

GLOBAL AIR NAVIGATION SERVICES PERFORMANCE REPORT

2017 – 2021 ANSP Performance Results

SHAPING
OUR
FUTURE
SKIES

canso.org

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.



© Copyright CANSO 2023

All rights reserved. No part of this publication may be reproduced, or transmitted in any form, without the prior permission of CANSO. This paper is for information purposes only. While every effort has been made to ensure the quality and accuracy of information in this publication, it is made available without any warranty of any kind.

CONTENTS

Acknowledgements	2
Foreword	4
Executive Summary	5
Introduction	10
2021 Industry Trends	12
Impact of COVID-19 on 2021 Performance	14
2021 Global ANS Report Participation	17
2021 Performance Data	22
Summary of Performance Trends	51
Related CANSO Benchmarking Activities	52
ANSP Factsheets	55
ANNEX 1: Methodology	105
ANNEX 2: Data Definitions	108
ANNEX 3: Key Performance Indicators	110
ANNEX 4: Contextual Data	112
ANNEX 5: KPI Data	136
ANNEX 6: Exchange Rates	152
ANNEX 7: Acronyms and Abbreviations	153
ANNEX 8: Sources	154

LIST OF TABLES

Table 1: CANSO global ANS report participation	18
Table 2: Participating ANSPs' reporting periods	20
Table 3: Participating ANSPs' IFR flight hours	21
Table 4: List of key performance indicators	22
Table 5: Average performance for all KPIS in 2020 and 2021	111

FOREWORD

With many regions of the world today well along the path to full traffic recovery from the COVID-19 pandemic impacts, this report looks back at a time when we were in the middle of those challenges.

The year started with many regions in the grips of a surge in cases and ended with the onset of Omicron, a highly infectious but less severe variant that drove new travel restrictions and testing protocols. Airline capacity in 2021 was still well below pre-pandemic numbers. IATA reported total Available Seat Kilometers (ASK) of -48.8 per cent from 2019 levels. International traffic was even lower and largely stagnant on 2020, with ASK for the full year 2021 at 65.3 per cent lower than 2019 levels¹.

As the industry works to settle into the new normal and to once again wrestle with capacity challenges driven by growth, there are still important lessons to be learnt from the developments during the COVID-19 period when traffic demand fell. To provide evidence to inform this and build a global picture of how Air Navigation Service Providers (ANSPs) were performing before, during and after the pandemic, we need data – and this is where the work of the CANSO Global Benchmarking Workgroup (GBWG) can help.

This year, CANSO delivers the thirteenth edition of the *Global Air Navigation Services Performance Report*, which now includes 48 ANSPs from all around 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 2021, 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 eleven 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

¹ <https://www.iata.org/en/iata-repository/publications/economic-reports/air-passenger-monthly-analysis>

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 on the [ACE dashboard](#).

This year's report provides data for 48 ANSPs and contains performance indicators for 2021, along with trend data between 2017 and 2021.

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 2021 has been included. Collaboration between CANSO workgroups aims to enable interdependencies between data to be analysed and ultimately drive better insights into the reasons behind performance trends.

PANDEMIC RECOVERY AND ITS 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. As governments eased travel restrictions and the demand for international travel returned, safety prevailed, with a reduction in the number of accidents seen during 2021, and an accident rate significantly below the five-year average².

Increases in traffic drove a return to congestion in isolated locations and at specific peak periods of the day. As traffic began to rise, particularly during mid-2021, the costs per IFR hour, a metric that cumulates ANSPs costs and spreads those out over the total number of annual IFR flight hours the ANSP handles in its airspace, suggests improvement in financial performance for ANSPs, reducing by nearly 18 per cent during 2021 for continental ANSPs. This can largely be accredited to the decreases in other costs for continental ANSPs, falling by a similar margin. Most ANSPs saw a decrease in this KPI, however, those that saw increases in costs per IFR hour ranged from 15-92 per cent increases in year-on-year costs.

As in 2020, continuity of services was key for ANSPs, and therefore staffing levels must ensure that coverage can be met at all times. While 53 per cent of continental ANSPs saw a decrease in ATCO in OPS costs, the total ATCO in OPS costs rose by 7.9 per cent. Alongside this, annual working hours grew by 1 per cent, with 64 per cent of ANSPs demonstrating growth as the average grew from 1334 in 2020, to 1343 in 2021.

Despite the challenges from the recovery of the COVID-19 pandemic, ANSPs showed resilience in their ability to function during difficult times. However, financial indicators, particularly for oceanic ANSPs with a higher exposure to international traffic which remained depressed in 2021, show that the industry continued to suffer from the reduction in traffic. It is therefore necessary to analyse these KPIs to ensure that the ATM industry, and indeed the wider aviation industry, is prepared for the future.

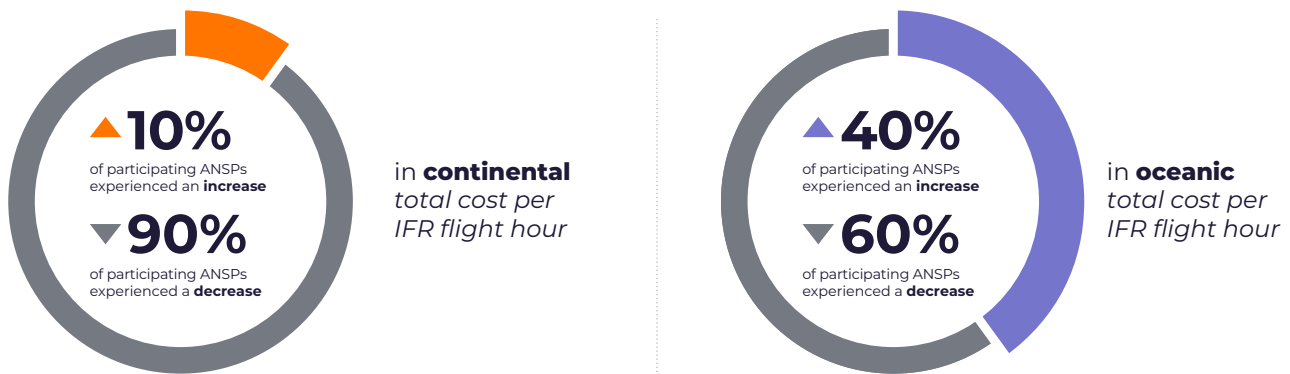
2 [2021 Airline Safety Performance | IATA](#)

It is important to note that the reporting periods for ANSPs submitting data to CANSO vary. Some include data within the 2020 calendar year, some for the 2021 calendar year and others include some of 2022. The PRU data for European ANSPs aligns with the 2021 calendar year. The impact of the varying reporting periods is more significant this year than ever due to the pandemic traffic restrictions. In account for this, the graphs representing the KPIs are ordered by reporting period. The earliest reporting period starts in April 2020 (for ATNS, which captures the major impact of the pandemic) and the latest reporting period ends in June 2022 (Airways NZ, which captures more of the pandemic recovery period).

Key findings of the report³

Cost Efficiency (Indicator 1)

Continental Cost efficiency slightly improves amidst a growth in traffic



With a slight increase in IFR traffic the Total cost per IFR flight hour in Continental airspace decreased by 17.4 per cent compared to 2020. However, the metric is still almost 70 per cent higher than in 2019.

The increase in global average total cost per IFR flight hour in Oceanic airspace was driven by NAV CANADA and Airservices Australia that reported a significant increase in 2021. Airservices Australia had a significant decrease in IFR flight hours while their total costs increased in 2021 compared to 2020. NAV CANADA has also reported a decrease in IFR flight hours, although less significant than Airservices Australia and hence their contribution was mostly driven by an increase (more than 100 per cent) of total costs in 2021. The rest of ANSPs shown a decrease in total cost per Oceanic IFR flight hour.

If we examine the fiscal years, most Oceanic ANSPs (although there are few) do not coincide with the year 2021; rather, they encompass a significant portion of 2020. This is likely causing a greater impact in the data for Oceanic compared to Continental.

Additionally, there might be another influencing factor for these ANSPs. In 2020, they incorporated a larger amount of data from 2019 compared to other ANSPs. This action would have lessened the influence on the data for the year 2020 compared to those ANSPs reporting on the calendar year, which is now being presented in the context of 2021.

³ For identified results supporting these key findings, see 2021 Performance data section. For this reason, there are also small differences between the numbers presented in both sections. Airservices Australia submitted data that is used to calculate the global trends within this document's Executive Summary section, but their data is not presented in the graphs included in the rest of this document.

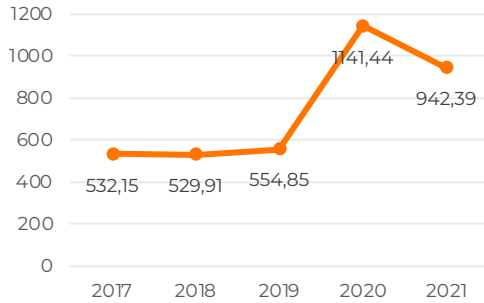
Average global per centage change – Total cost per IFR flight hour (2020-2021):

CONTINENTAL: -17.44%

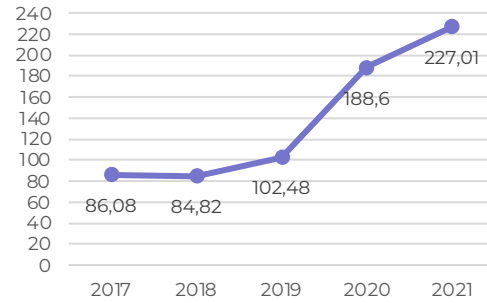
OCEANIC: +20.37%

Average KPI values – Total cost per IFR flight hour (USD) (2017-2021):

CONTINENTAL:

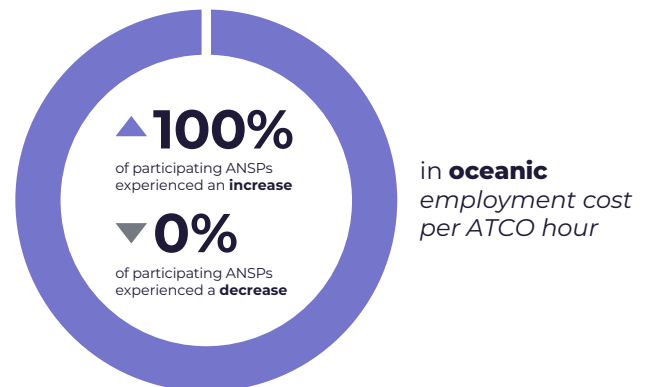
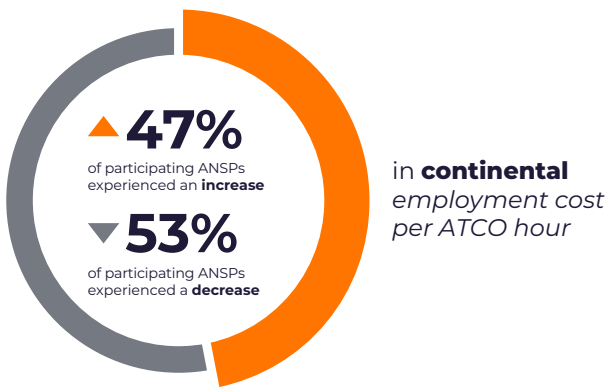


OCEANIC:



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

Increases in ATCO employment costs per ATCO hour compared to those recorded in the previous years as traffic begins to recover



Average global per centage change – Employment cost per ATCO hour (2020-2021):

CONTINENTAL: -1.84%

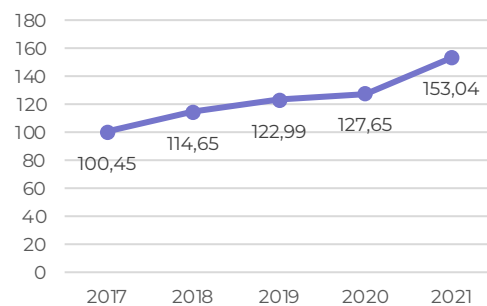
OCEANIC: +19.89%

Average KPI values – Employment cost per ATCO hour (USD) (2017-2021):

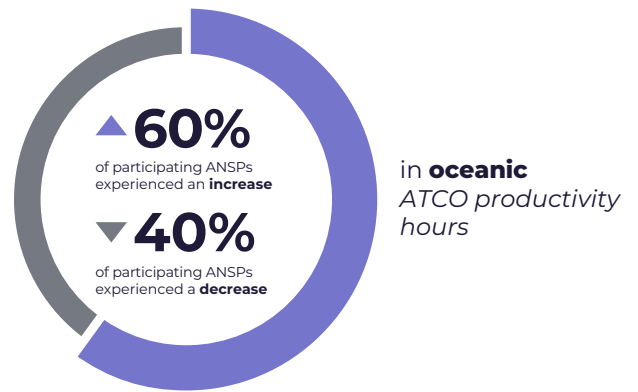
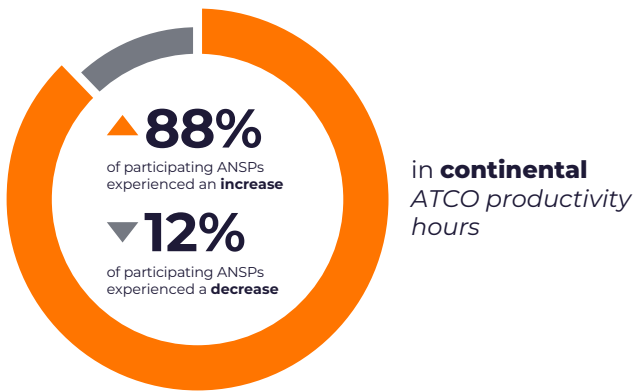
CONTINENTAL:



OCEANIC:



Productivity slowly increases for continental ANSPs, while declining performance continues for oceanic ANSPs which is largely being driven by varied reporting periods



The decrease in global average ATCO productivity in Oceanic airspace was driven by NAV CANADA and Airservices. This is because the ATCO productivity Key Performance Indicator (KPI) is based on IFR flight hours which significantly decreased for both ANSPs in 2021. The rest of ANSPs shown an increase in ATCO productivity in Oceanic airspace but due to lower traffic volumes and different reporting periods it does not balance out the average value.

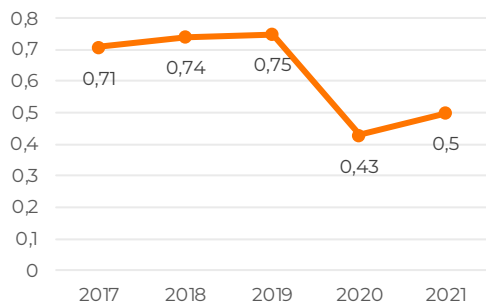
Average global per centage change – ATCO productivity (2020-2021):

CONTINENTAL: +16.74%

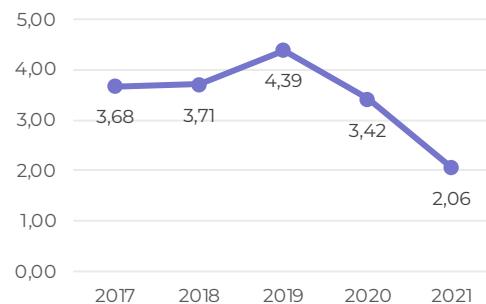
OCEANIC: -39.84%

Average KPI values – ATCO productivity (2017-2021):

CONTINENTAL:

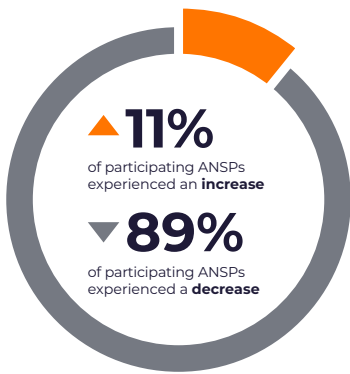


OCEANIC:

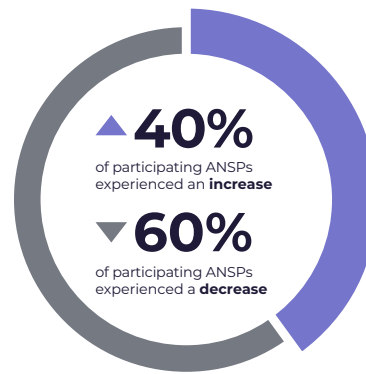


Other costs per IFR flight hour (Indicator 2C)

Continental costs show signs of returning to pre-pandemic levels while oceanic costs continue to rise which is largely being driven by varied reporting periods



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



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

The increase in global average other costs per IFR flight hour in Oceanic was driven by NAV CANADA's and Airservices's decrease in IFR flight hours in 2021. The rest of ANSPs reported a decrease in other costs per IFR flight hour in Oceanic airspace but due to lower traffic volumes it does not balance out the average value.

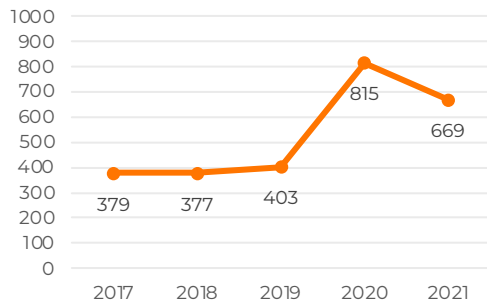
Average global per centage change – Other costs per IFR flight hour (2020-2021):

CONTINENTAL: -17.91%

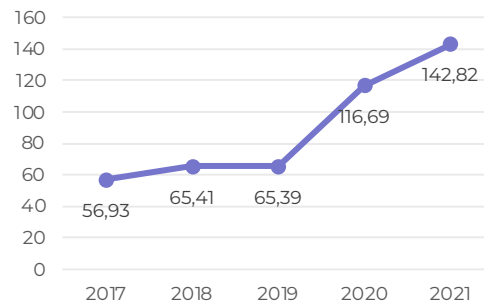
OCEANIC: +22.40%

Average KPI values – Other costs per IFR flight hour (USD) (2017-2021):

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 and 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 standard of safety in aviation, efficient, 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 12 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 2021, along with trend data between 2017 and 2021.

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, for the fourth year, 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 to the GBWG at GBWG/32 in Tokyo.

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 Organisation for Economic Co-operation and Development (OECD) 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 2017-2021: Participation*.

2021 INDUSTRY TRENDS⁴

MOVEMENT AND PASSENGER GROWTH SLOWLY RECOVERS



Global passenger increase of

11% YoY,

however 58% below 2019



Air cargo volume increased by

18.7% in 2021,

rising 7% on 2019 levels

+27.9% in Aircraft Movements in 2021 (-15.3% of 2019)



Domestic passenger numbers

increased by **68%**

of 2019 levels



International passenger numbers

increased by **28%**

of 2019 levels



Passenger traffic at the world's
25 busiest airports grew by

41.4% in 2021,

with 24.6% more aircraft movements

SIGNIFICANT ENVIRONMENTAL IMPLICATIONS AS A RESULT OF THE PANDEMIC



CO₂ emissions increased

by **20%**

compared to 2020



Fewer travel restrictions resulted in increased emissions, **with an average load factor**

of **66.9%** compared to **65%** in 2020



Forward purchase agreements of

\$17 billion

have been made towards SAFs



CORSIA offsetting

obligations came into effect for
all international flights



ICAO member states have furthered
their ambitions for **aviation**

decarbonisation by committing to

**net-zero carbon
emissions by 2050**

⁴ For sources of 2021 Industry Trends data please refer to ANNEX 8: Sources on page 154

FINANCIAL PERFORMANCE

 **\$45.1bn**
net loss in 2021

compared to a

 **\$43.2bn**
net profit in 2019

Cargo yields continued to improve,

+25.9%
during 2021

turning

\$210bn
in revenue,
over double 2019



2021 provided lower losses for airlines worldwide than 2020, however revenues were still

39.3% lower than in 2019 at **\$509b** (\$838bn in 2019)



Although passenger revenues increased, there were still

-40% less seats available than in 2019



Jet fuel peaked at

68% of 2020 values,
delaying financial recovery from the pandemic

SUPPLY AND DEMAND STARTS TO SHOW SIGNS OF RECOVERY

RPK increased alongside ASK for a load factor of

66.9%

compared to 65.3% in 2020



Europe continued to account for the majority of world international traffic in

2021 at 56%,

up from 55% in 2020 and 49% in 2019

RPK  / ASK  =

1.6% increase in load factor



The United States

overtook China as the busiest region for domestic travel, increasing by

88% since 2020

Asia/Pacific was the only region to reduce in passenger numbers, with

fewer **56%**

international passengers



Latin America provided the highest passenger load factor, at

77.3% of ASK

IMPACT OF COVID-19 ON 2021 PERFORMANCE

RECOVERY FROM THE PANDEMIC AND THE IMPACT ON TRAFFIC

This report focuses on 2021 performance data, however, the reporting periods of members' organisations are not all aligned. The performance data of those ANSPs that have reporting periods running from second half of 2020 or into the first quarter of 2022 may be differently impacted by the recovery from the COVID-19 pandemic and shift towards more 'normal' traffic.

With the exception of North America, Figure 1 illustrates that aircraft movements during 2021 remained generally below that of 2019, with aircraft movements declining by 15 per cent from 2019. This was largely due to the emergence of new COVID-19 variants and a peak in global cases during early 2021 across all the World Health Organization (WHO) reporting regions⁵. Europe saw the greatest decrease in aircraft movements, slipping by 62 per cent in movements compared to January 2020 during January 2021. As a result of relaxed domestic travel restrictions in Australia during early 2021, the Pacific saw a slight improvement to traffic numbers, however, the region remained well below January 2020 levels⁶. North America, on the other hand, saw only three months of traffic below that of January 2020 during 2021. Government 'stay at home' requests within China during early 2021 caused a significant reduction in traffic volumes at a time when demand increased, as demonstrated in Figure 1⁷.

The 2021 summer season brought about a period of increased travel demand for North America and Europe as a result of relaxed restrictions, resulting in aircraft movements exceeding January 2020 levels for the first time since March 2020. This was despite rising cases during August for the two regions, likely owing to the development of vaccinations and the increases in testing efficiency allowing domestic and parts of the international market to reopen. By the end of the year, most countries had at least partially re-opened borders, allowing for all markets, aside from Asia, to push significantly closer to a return to normality.

Towards the year end, most markets demonstrated some growth, nonetheless limited as a result of the Omicron variant of COVID-19. Markets in the Americas demonstrated the strongest recovery at the year end, with North America performing at only two per cent less than that of January 2020 in terms of movements. On the other hand, Asia presented the most stagnated growth through the year, peaking at 28 per cent less traffic than January 2020, and falling further to -51% during August.

5 WHO – Coronavirus (COVID-19) Dashboard

6 IATA – Negative Passenger Demand Trend Continues in February

7 IATA – Air Passenger Market Analysis

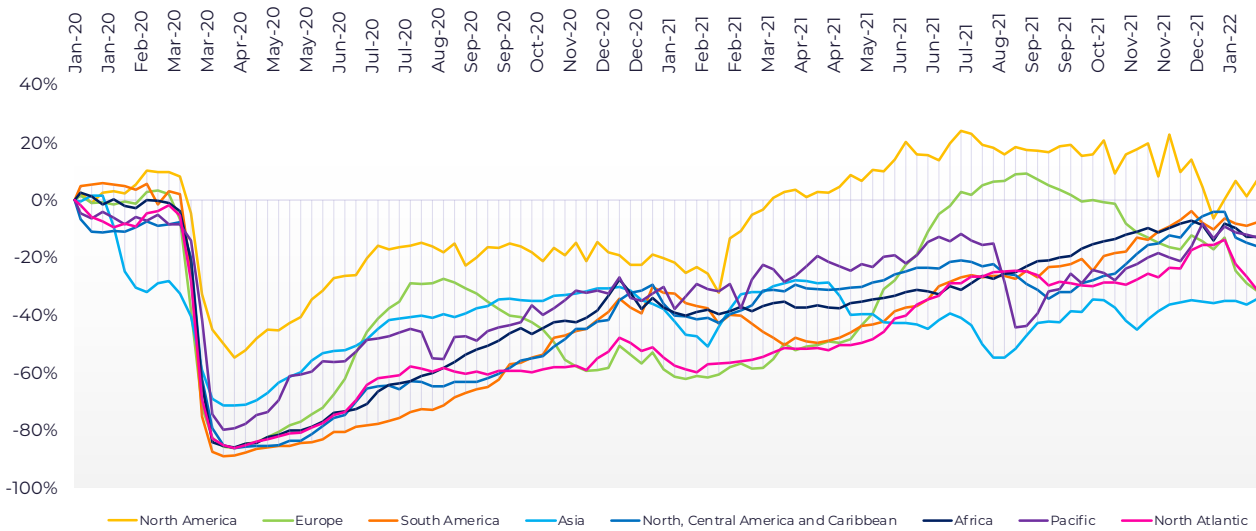


Figure 1: Per centage change in aircraft movements by region, from Jan 2020 towards Jan 2022. Taken from [CANSO ATM Traffic Analysis Report \(January 2022\)](#)

IMPACT OF COVID-19 AND VARIED REPORTING PERIODS

Similarly to previous reports, in collaboration with FAA-ATO we have indicated the reporting periods (fiscal years) of all ANSPs included in our data. As Figure 2 illustrates, the reporting periods for the ANSPs submitting to CANSO differ, with some ANSPs submitting data within the 2020 calendar year, and some reporting periods ending in 2022; European ANSPs submit data spanning the full 2021 calendar year. It is therefore inevitable that some trends displayed by ANSPs will be impacted inconsistently by the COVID-19 pandemic. Consideration should be made towards this, and thus, the KPI graphs have been ordered by reporting period, with the earliest month being April 2020 for ATNS, and the latest reporting period by Airways NZ in July 2022. While the majority of the submitting ANSPs have reporting periods during 2021, anomalous KPIs may be indicative of reporting period. For instance, in terms of Oceanic submissions, the majority of Oceanic ANSPs have financial years that are not aligned with 2021 but include a significant portion of 2020. Therefore, the data has more impact on the Oceanic ANSPs than the Continental ANSPs.

Fiscal Years

Apr 2020 - Jul 2022

Apr 2020	Apr 2021	ATNS	
Jul 2020	Jul 2021	Airservices Australia	
		KCAA	
Sep 2020	Sep 2021	NAV CANADA	
Oct 2020	Sep 2021	AEROTHAI	
		FAA-ATO	
Jan 2021	Jan 2022	EANA	
		Albcontrol	
		ANA	
		ANS CR	
		ANS Finland	
		ARMATS	
		Austro Control	
		Avinor (Continental)	
		BULATSA	
		Croatia Control	
		DCAC Cyprus	
		DFS	
		DHMI	
		DSNA	
		EANS	
		ENAIRES	
		ENAV	
		HASP	
		HungaroControl	
		IAA	
		Isavia ANS	
		LFV	
		LGS	
		LPS	
		LVNL	
		MATS	
		M-NAV	
		MOLDATSA	
		MUAC	
		NATS (Continental)	
		NAV Portugal (Continental)	
		NAVIAIR	
		Oro Navigacija	
		PANSA	
		ROMATSA	
		Sakaeronavigatsia	
		SANS	
		skeyes	
		skyguide	
		Slovenia Control	
		SMATSA	
		UKSATSE	
Apr 2021	Mar 2022	AAI	
		CAAS	
		JANS	
Jul 2021	Jul 2022	Airways NZ	

Figure 2: Reporting periods

2021 GLOBAL ANS REPORT PARTICIPATION

CANSO GBWG SUBMISSIONS

CANSO data submissions for this year's *Global ANS Performance Report* were received from 22 ANSPs. Together with the data from PRU, it provides data for 48 ANSPs. All ANSPs who submitted to PRU, CANSO or both are indicated in the table below.

Note that PRU data was used as default in this report for those submitting both CANSO and PRU.

The 2021 data submission covers⁸:

Total IFR flight hours: 38,541,722

Total costs: 24,482,282,030.84 USD

Total ATCOs in operations: 35,529

Region	Country/ Territory	Organisation	Acronym	Submitted CANSO	PRU	Both
Africa	Kenya	Kenya Civil Aviation Authority	KCAA	x		
	South Africa	Air Traffic & Navigation Services	ATNS	x		
Americas	Canada	NAV CANADA	NAV CANADA	x		
	USA	Federal Aviation Administration – Air Traffic Organization	FAA-ATO	x		
Asia Pacific	Australia	Airservices Australia	Airservices	x		
	India	Airports Authority of India	AAI	x		
	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	
	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	x	x
	Finland	Fintraffic Air Navigation Services	ANS Finland		x	

⁸ As some ANSPs did not submit data for every field, this is not the total for all participating ANSPs; rather it is the total of all data submitted. For instance EANA, JANS, UKSATSE and SANS did not submit data for 2021.

	France	Direction des Services de la navigation aérienne	DSNA	x	x	x
	Georgia	Sakaeronavigatsia Ltd.	Sakaeronavigatsia		x	
	Germany	DFS Aviation Services GmbH	DFS		x	
	Greece	Hellenic Civil Aviation Authority	HCAA		x	
	Hungary	HungaroControl Pte. Ltd. Co.	HungaroControl	x	x	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	x	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	x	x
	Malta	Malta Air Traffic Services	MATS		x	
	Moldova	Moldovan Air Traffic Services Authority	MOLDATSA		x	
Europe	Netherlands	Luchtverkeersleiding Nederland	LVNL		x	
	Norway	Avinor Air Navigation Services	Avinor (Continental)		x	
	Poland	Polish Air Navigation Services Agency	PANSA	x	x	x
	Portugal	Navegação Aérea de Portugal - NAV Portugal, E.P.E.	NAV Portugal (Continental)	x	x	x
	Romania	Romanian Air Traffic Services Administration	ROMATSA		x	
	Serbia and Montenegro	Serbia and Montenegro Air Traffic Services SMATSA Ilc	SMATSA	x	x	x
	Slovakia	Letové prevádzkové služby	LPS		x	
	Slovenia	Kontrola zračnega prometa Slovenije	Slovenia Control	x	x	x
	Spain	ENAIRES	ENAIRES	x	x	x
	Sweden	Luftfartsverket	LFV		x	
	Switzerland	skyguide	skyguide		x	
	Turkey	General Directorate of State Airports Authority	DHMI	x	x	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	KCAA	Jul 2020 – Jun 2021
	ATNS	Apr 2020 – Mar 2021
Americas	EANA	Jan 2021 – Dec 2021
	NAV CANADA	Sep 2020 – Aug 2021
	FAA-ATO	Oct 2020 – Sep 2021
Asia Pacific	Airservices	Jul 2020 – Jun 2021
	AAI	Apr 2021 – Mar 2022
	JANS	Apr 2021 – Mar 2022
	Airways NZ	Jul 2021 – Jun 2022
	CAAS	Apr 2021 – Mar 2022
	AEROTHAI	Oct 2020 – Sep 2021
Europe	Albcontrol	Jan 2021 – Dec 2021
	ARMATS	Jan 2021 – Dec 2021
	Austro Control	Jan 2021 – Dec 2021
	skeyes	Jan 2021 – Dec 2021
	BULATSA	Jan 2021 – Dec 2021
	Croatia Control	Jan 2021 – Dec 2021
	DCAC Cyprus	Jan 2021 – Dec 2021
	ANS CR	Jan 2021 – Dec 2021
	NAVIAIR	Jan 2021 – Dec 2021
	EANS	Jan 2021 – Dec 2021
	ANS Finland	Jan 2021 – Dec 2021
	DSNA	Jan 2021 – Dec 2021
	Sakaeronavigatsia	Jan 2021 – Dec 2021
	DFS	Jan 2021 – Dec 2021
	HASP	Jan 2021 – Dec 2021
	HungaroControl	Jan 2021 – Dec 2021
Isavia ANS	Jan 2021 – Dec 2021	
IAA	Jan 2021 – Dec 2021	
ENAV	Jan 2021 – Dec 2021	
LGS	Jan 2021 – Dec 2021	

Region	Organisation	Reporting Period
Europe	Oro Navigacija	Jan 2021 – Dec 2021
	ANA	Jan 2021 – Dec 2021
	M-NAV	Jan 2021 – Dec 2021
	MATS	Jan 2021 – Dec 2021
	MOLDATSA	Jan 2021 – Dec 2021
	LVNL	Jan 2021 – Dec 2021
	Avinor (Continental)	Jan 2021 – Dec 2021
	PANSA	Jan 2021 – Dec 2021
	NAV Portugal (Continental)	Jan 2021 – Dec 2021
	ROMATSA	Jan 2021 – Dec 2021
	SMATSA	Jul 2020 – Jun 2021
	LPS	Jan 2021 – Dec 2021
	Slovenia Control	Jan 2021 – Dec 2021
	ENAIRE	Jan 2021 – Dec 2021
	LFV	Jan 2021 – Dec 2021
	skyguide	Jan 2021 – Dec 2021
	DHMI	Jan 2021 – Dec 2021
	UKSATSE	Jan 2021 – Dec 2021
	NATS (Continental)	Jan 2021 – Dec 2021
	MUAC	Jan 2021 – Dec 2021
Middle East	SANS	Jan 2021 – Dec 2021

Table 2: Participating ANSPs' reporting periods

TOTAL IFR FLIGHT HOURS

Organisation	Comparator Group* (based on IFR flight hours)	CONTINENTAL		OCEANIC	
		Total IFR Flight Hours 2021	Growth IFR Flight Hours	Total IFR Flight Hours 2021	Growth IFR Flight Hours
AAI	CG1	2,644,188	53%		
AEROTHAI	CG2	209,150	-56%		
Airservices	CG1	1,409,444	-19%	86,975	-49%
Airways NZ	CG2	171,379	-9%	39,428	24%
Albcontrol	-	32,550	48%		
ANA	CG3	12,122	17%		
ANS CR	-	131,580	16%		
ANS Finland	-	60,150	5%		
ARMATS	-	8,945	70%		
ATNS	CG2	106,076	-60%	1,346	-90%
Austro Control	-	189,460	22%		
Avinor (Continental)	-	248,946	10%		
BULATSA	-	176,475	38%		
CAAS	CG2	161,078	56%		
Croatia Control	-	168,165	58%		
DCAC Cyprus	-	116,706	48%		
DFS	--	804,294	15%		
DHMI	CG1	958,222	44%		
DSNA	CG1	1,365,506	30%		
EANS	CG3	37,511	12%		
ENAIRE	CG1	937,654	41%		
ENAV	-	707,203	43%		
FAA-ATO	CG1	20,365,001	7%	1,536,279	4%
HASP	-	414,183	50%		
HungaroControl	CG2	161,370	30%		
IAA	-	154,876	18%		
Isavia ANS	CG2	18,905	43%	146,752	24%
KCAA	CG2	105,373	21%		
LFV	-	216,208	9%		
LGS	CG3	47,227	21%		
LPS	-	54,125	32%		
LVNL	-	94,282	15%		
MATS	-	49,099	23%		
M-NAV	CG3	26,476	61%		
MOLDATSA	-	7,404	45%		
MUAC	-	311,836	8%		
NATS (Continental)	-	638,434	5%		
NAV CANADA	CG1	1,701,635	-24%	330,335	-28%
NAV Portugal (Continental)	CG2	225,529	29%		
NAVIAIR	-	107,116	8%		
Oro Navigacija	-	46,915	29%		
PANSA	CG2	271,765	23%		
ROMATSA	-	245,011	43%		
Sakaeronavigatsia	-	31,838	21%		
skeyes	-	70,284	26%		
skyguide	-	196,047	30%		
Slovenia Control	CG3	40,032	43%		
SMATSA	CG2	142,831	36%		

* Comparator Group 1: (>1mil IFR flight hours: AAI, Airservices Australia, DHMI, DSNA, ENAIRE, 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, LGS, M NAV, Slovenia Control)

Table 3: Participating ANSPs' IFR flight hours

2021 PERFORMANCE DATA

The following section presents 2021 performance data and 2017-2021 trend data for both continental and oceanic activities in line with the *CANSO ANS Performance Framework* levels 1-3 (Figure 32 on page 110) and list of KPIs below.

KPI		Numerator	Denominator	Figure	
Cost Efficiency and Productivity Performance Indicators				Continental 2021/Trend	Oceanic 2021
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 Figure 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 proportion 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
Cost Efficiency and Productivity Performance Indicators				Continental and Oceanic 2021/Trend	
CO1	Cost per IFR flight hour	Total costs	IFR flight hours	Figure 25	
CO2D	Employment costs of ATCOs in OPS as a proportion 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 combined continental and oceanic metric for KPI 1. Likewise, KPI CO2D is the combined continental and oceanic metric for KPI 2D.

CONTINENTAL COST EFFICIENCY AND PRODUCTIVITY: 2021

Indicator 1: Cost per IFR flight hour (USD)

Formula: Total costs/IFR flight hours

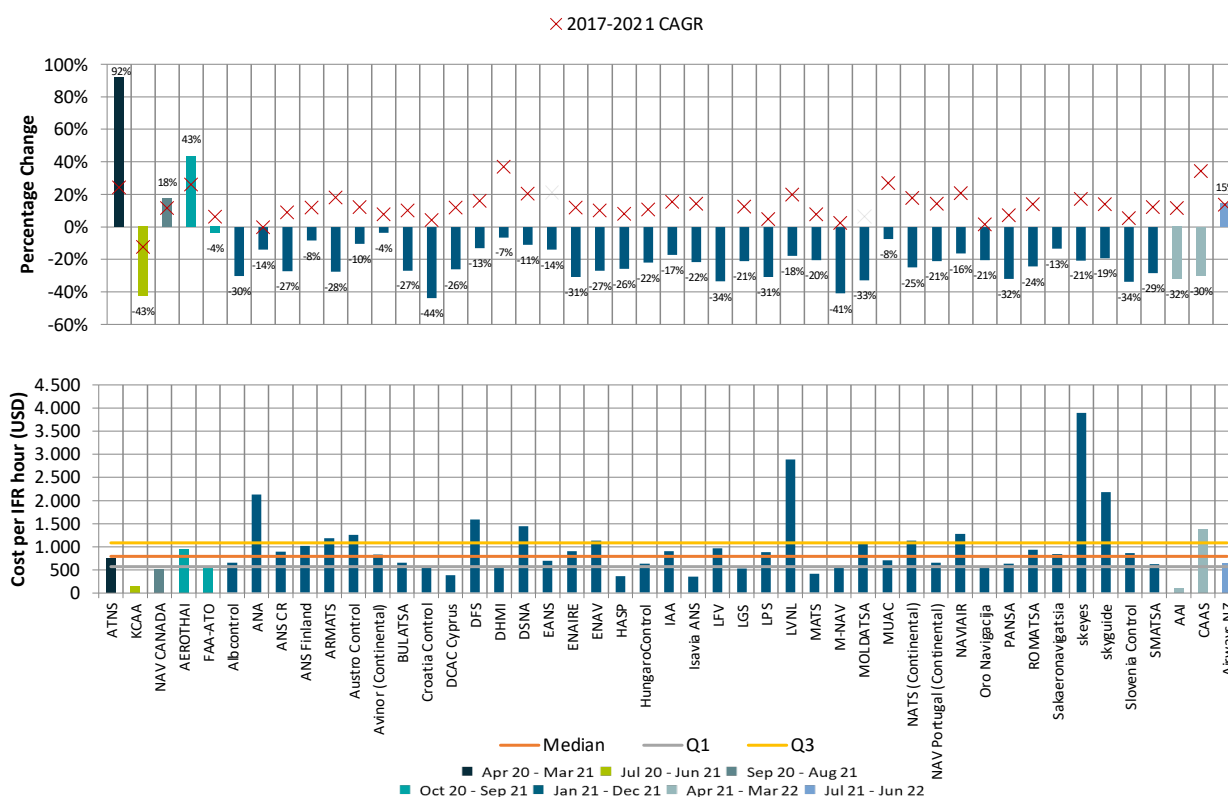


Figure 3: Cost per IFR flight hour (USD)

The 2021 median cost per IFR flight hour was USD 794. The 2021 weighted average (considering total continental IFR flight hours per ANSP) cost per IFR flight hour was USD 659. The same ANSPs that submitted continental data for 2021 also provided continental data for 2020; the 2020 median was USD 938 and the weighted average was USD 643.

In terms of absolute total costs, 89.58 per cent of ANSPs saw a reduction of total continental costs with the median reducing by 18 per cent between 2020 and 2021.

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.

Specific ANSP comments are outlined below.

ARMATS (Armenia)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For ARMATS, this reflects an increase in staff costs (+nine per cent, or +€0.4M resulting from payments of employee benefits, which had been suspended due to the COVID-19 pandemic) as well as reporting of exceptional items (€1M) reflecting disposal of obsolete assets.

ENAIRE (Spain)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For ENAIRE, there are reductions across all the cost categories with the most sizeable decrease observed for exceptional costs (-€24.5M), reflecting the fact that the transition period to IFRS accounting rules, which began in 2008 ended in 2020, and these exceptional costs are no longer included in the cost base.

DFS (Germany)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For DFS, all cost categories decreased in 2021, with the main contributors being staff costs (-€19.1M, or -2.3 per cent), non-staff operating costs (-€10.4M, or -8.1 per cent reflecting savings achieved across most cost categories incl. training and mission expenses, facility management, etc.), depreciations costs (-€5.9M, or -6.5 per cent) and the cost of capital (-€3.4M, or -12.7 per cent).

DHMI (Turkiye)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

In the case of DHMI, this primarily reflects a very large increase in the cost of capital (+84.6 per cent, or +€42.2M) resulting from the combination of a growing asset base and occurring during a period of a higher rate of return on equity, happening in the context of high inflation in 2021 (19.6 per cent).

DSNA (France)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For DSNA, the decrease in ATM/CNS provision costs reflects reductions across all cost categories with staff costs (-€25.3M, or -2.8 per cent) and non-staff operating costs (-€10.0M, or -3.5 per cent) being the main drivers.

HASP (Greece)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For HASP, increases are observed across most cost categories, with staff costs (+9.2 per cent, or +€8.7M) being the main contributor. This reflects the fact that traffic volumes impact some elements of remuneration.

LFV (Sweden)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For LFV, staff costs (-€81.8M, or -39.6 per cent) were the main driver for the observed reduction, chiefly reflecting lower pension costs in 2021.

NATS (United Kingdom)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

In case of NATS, it reflects reductions across most cost categories with significant decreases recorded in exceptional items (-92.2 per cent, or -€71.9M) and staff costs (-12.0 per cent, or -€57.0M). These reductions are resulting from the implementation of a redundancy programme in 2020, which led to a lower headcount, thus positively affecting the staff costs in 2021. Another cost category which reduced significantly was non-staff operating costs (-51.2 per cent, or -€60.6M), reflecting the release of provisions for bad debts for airlines recorded in 2020.

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

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

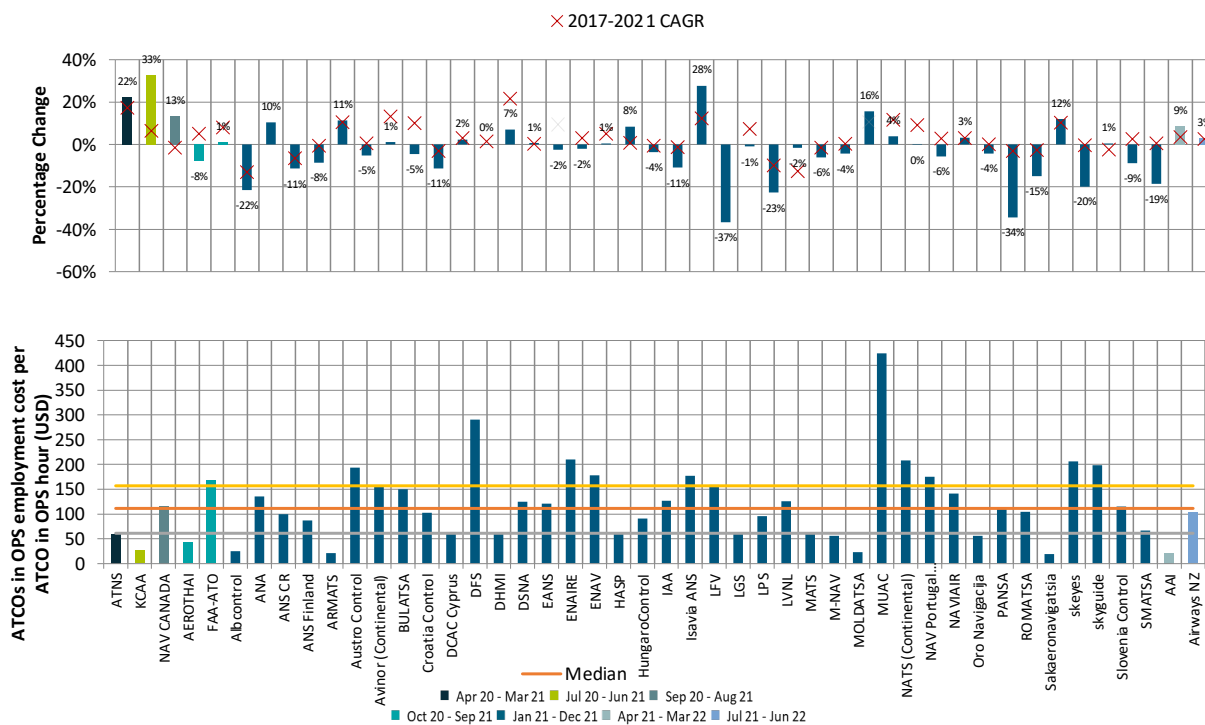


Figure 4: ATCO in OPS employment cost per ATCO in OPS hour (USD)

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median ATCO in OPS employment cost per ATCOs in OPS hour was USD 111. The same ANSPs that submitted continental data for 2020, also provided continental data for 2021; the 2020 median was USD 115.

ANSPs with reporting periods that begin in mid-2020 are likely to have been impacted by cost cutting measures owing to the pandemic, particularly by ANSPs implementing part-time work as a part of their staffing contracts. The reporting period for ATNS was most affected by the 2020 results, with 75 per cent of their reporting period being in 2020. This is seen in Indicator 3B, with a 29 per cent reduction in Annual Working hours per ATCO in OPS. MUAC typically has a higher cost due to the volume of flights operating in its operational upper airspace. LFV, the ANSP with the largest decrease in ATCOs in OPS employment cost per ATCO in OPS hour, was likely impacted by a lower level of traffic as well as a revenue reduction during 2021. KCAA demonstrated a 33 per cent increase in their ATCO costs, yet had a 43 per cent reduction in Cost per IFR hour. The Total costs for KCAA decreased by 50 per cent, despite ATCO Employment costs increasing by 1M USD. KCAA also saw an increase in IFR flight hours by 22.2 per cent, which also reduced Cost per IFR hour.

Specific ANSP comments are outlined below.

ANS CR (Czech Republic)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

Similarly, ANS CR recorded a significant decrease in ATCO in OPS employment costs (-30.4 per cent, or -€9.1M), reflecting a continuation of cost-containment measures in 2021 including wage reductions, as well as postponement of bonuses and overtime payments.

ARMATS (Armenia)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For ARMATS, the increase in ATCO employment costs is the result of certain 2020 cost containment measures being lifted in 2020 (mainly relating to the payment of bonuses/benefits to employees).

DCAC Cyprus (Cyprus)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

The increase in ATCO employment costs for DCAC Cyprus, mainly reflects payments for overtime and promotions, as well as the increase in the number of ATCOs.

DFS (Germany)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For DFS, a large part of the decrease in ATCO in OPS employment costs in 2021 is due to the significant reduction in the number of ATCOs in OPS (-152 FTEs), with the majority reallocated to non-operational duties (+105 FTEs).

HASP (Greece)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

In the case of HASP, the increase in ATCO in OPS employment costs is driven by a combination of an increase in the number of ATCOs in OPS and in the average employment cost per ATCO hour.

LFV (Sweden)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

In the case of LFV, the large reduction in ATCO in OPS employment costs (-37.9 per cent, or -€50.1M) is due to the significant decrease in pension costs.

NAVIAIR (Denmark)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For NAVIAIR, the increase in ATCO in OPS employment costs is the combined effect of an increase in the number of ATCOs in OPS and higher average ATCO in OPS hours on duty per year.

PANSA (Poland)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For PANSA, the observed decrease (-37.5 per cent, or -€25.6M) mainly reflects decreases in salaries and other non-fixed parts of staff costs (bonuses, awards, etc.), impacted by cost-containment measures introduced in 2020.

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

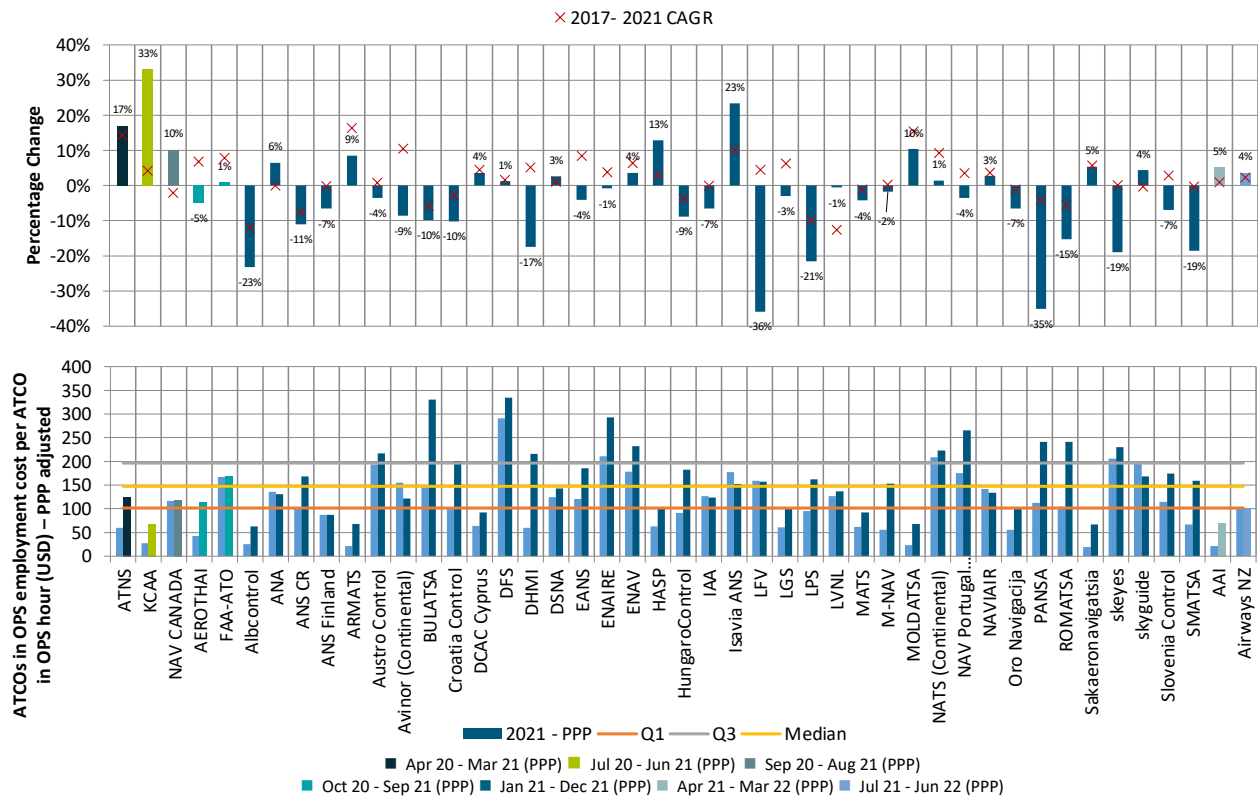


Figure 5: ATCO in OPS employment cost per ATCO in OPS hour (USD) – PPP adjusted

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median ATCOs in OPS employment cost per ATCOs in OPS hour, after PPP adjustment was USD 147. The same ANSPs that submitted continental data for 2021 also provided continental data for 2020; the 2020 median was USD 138.

During 2021, Albcontrol had a larger reduction in staffing numbers relative to other ANSPs, perhaps indicative of their 23 per cent decrease in PPP adjusted ATCOs in OPS employment cost per ATCO in OPS hour. Isavia ANS received a greater volume of traffic during summer 2021, as did many ANSPs, thus increasing their staffing numbers to reflect this. PANSA also shows one of the largest decreases in PPP adjusted ATCOs in OPS employment cost per ATCO in OPS hour, reflecting a continuing of their cost containment measures from 2020, and the vast cost reduction methods targeted towards managing staffing costs.

Indicator 2B: ATCO in OPS hour productivity

Formula: IFR flight hours/ATCOs in OPS hours

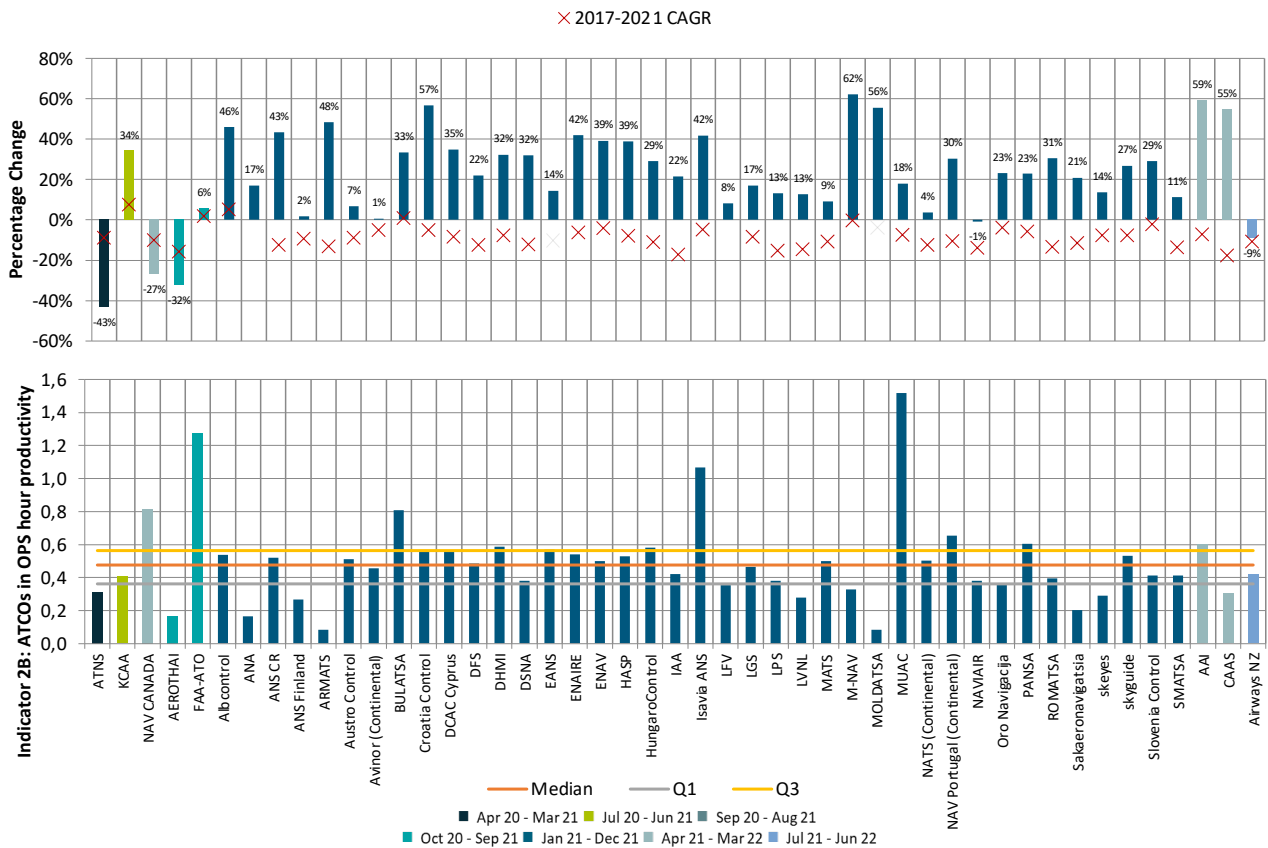


Figure 6: ATCO in OPS hour productivity

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median ATCOs in OPS hour productivity was 0.48. The same ANSPs that submitted continental data for 2020, also provided continental data for 2021 did so for 2020; the 2020 median was 0.38.

As featured in the 2020 report, MUAC maintained the highest productivity of all submitting ANSPs, again it should be noted that MUAC typical scope of services does not cover the more complex lower airspace, which helps to keep productivity high. Most ANSPs saw increased productivity during 2021, given that all, aside from ATNS, showed a decrease in Indicator 2B in the 2020 Report. ATNS saw the largest percentage decrease (43 per cent) owing to the bulk of the reporting period being subdued by COVID-19 restrictions, in comparison to the previous report reflecting more productive pre-pandemic figures.

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

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

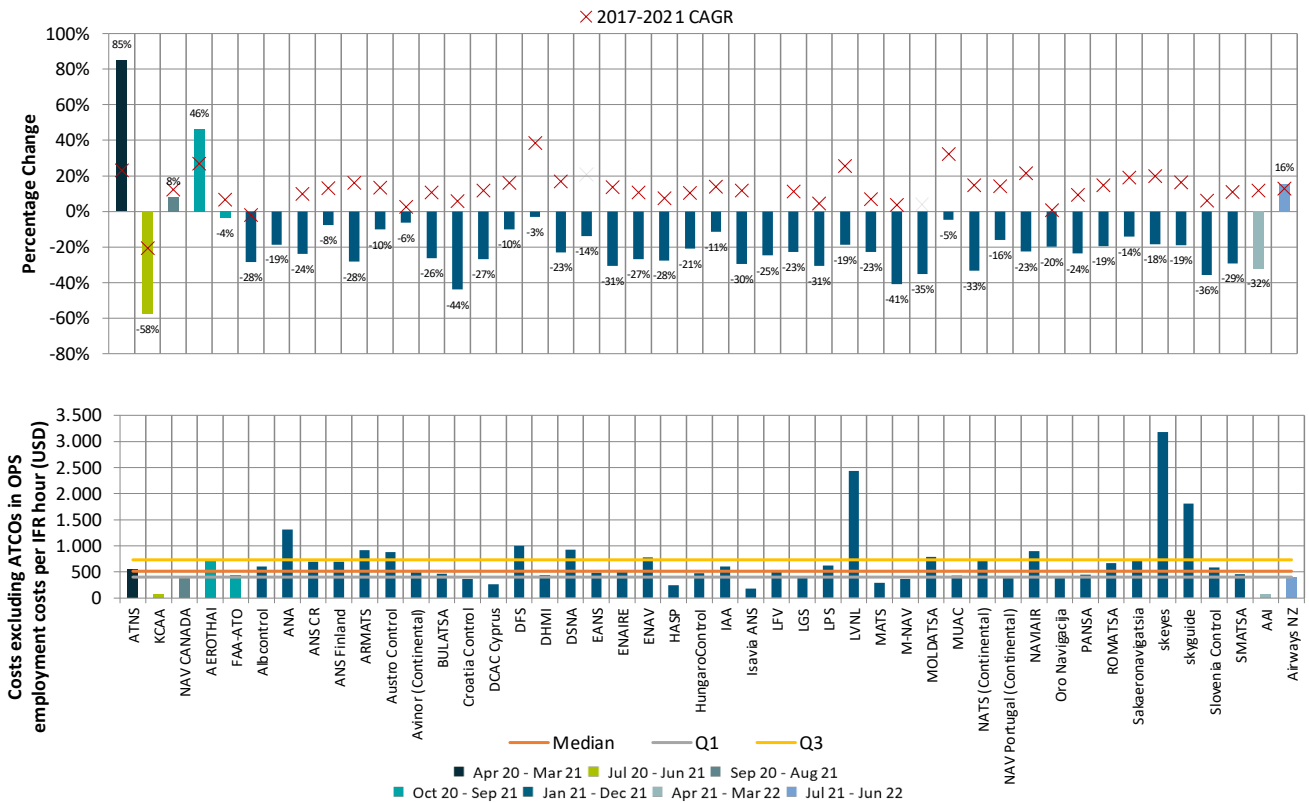


Figure 7: Cost excluding ATCO in OPS employment costs per IFR hours

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median cost excluding ATCOs in operations employment cost per IFR flight hour was USD 515. The same ANSPs that submitted continental data for 2020, also provided continental data for 2021; All ANSPs submitting continental data for 2021 did so for 2020; the 2020 median was USD 645. In terms of absolute total costs, 89.36 per cent of ANSPs saw a reduction of continental costs excluding ATCOs in OPS employment costs with the median reducing by 18 per cent between 2020 and 2021.

The 85 per cent increase in Costs excluding ATCOs in OPS employment costs per IFR hour by ATNS was impacted by the reporting period starting in 2020 (which makes up the majority of the reporting period of ATNS in this report) when the IFR traffic was low. The cost reduction for KCAA is likely due to government spending cuts and subsequent cost cutting measures. All European ANSPs submitting to CANSO saw a decrease in costs per flight hour, as a result of increased traffic volumes during 2021. With skeyes infrastructure made available to MUAC as part of their agreements, and therefore, combined with the fact that skeyes provides services in the more complex lower airspace only, skeyes and LVNL (for similar reasons) typically have larger costs per flight hour. Airways NZ was the only ANSP, with a reporting period beginning in 2021, to show increased costs for the year, potentially as a result of their investment in their ANSP provision as described in Annex 4.

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'.

Specific ANSP comments are outlined below.

ANS CR (Czech Republic)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For ANS CR, there were reductions – across most support cost categories, with the most significant reduction observed in support staff costs (-23.1 per cent, or -€10.1M) reflecting a continuation of cost containment measures in 2021. These measures include the postponement of bonuses and payments for overtime, in addition to reductions in the following: wages; non-staff operating costs (-16.2 per cent, or -€2.5M); energy consumption; repairs and maintenance; travel expenses; costs of communication and other services.

LFV (Sweden)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

In the case of LFV, the reduction in support staff costs (-42.7 per cent, or -€31.8M), driven by large decrease in pension costs in 2021, more than compensated for the higher non-staff operating costs (+16.3 per cent, or +€4.8M) and cost of capital (+100 per cent, or +€2.1M reflecting higher inflation in Sweden).

NATS (United Kingdom)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

With the exception of the cost of capital (+42.9 per cent, or +€14.7M), NATS was in a position to reduce all support cost categories through the implementation of various cost containment measures. The largest decreases are observed for exceptional costs (-92.2 per cent, or -€71.9M), non-staff operating costs (-51.2 per cent, or -€60.6M) and support staff costs (-21.5 per cent, or -€53.0M). As indicated above, NATS implemented a redundancy programme in 2020, which generated additional exceptional costs during its implementation but led to a lower headcount and subsequent reduction in staff costs for 2021.

NAVIAR (Denmark)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For NAVIAIR, the observed decrease primarily reflects reductions in support staff costs (-28.1 per cent, or -€14.9M) and, to a lesser extent, in non-staff operating costs (-8.5 per cent, or -€2.0M) and the cost of capital (-15.9 per cent, or -€1.5M). The difference in support staff costs mainly reflects a significant reduction in support staff (-30 FTEs) over 2021 following the voluntary redundancy programme implemented by NAVIAIR in 2020.

PANSA (Poland)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

In the case of PANSA, reductions were observed in most support cost categories with the most significant reductions in support staff costs (-18.1 per cent, or -€10.8M) and, to a lesser extent, in non-staff operating costs (-11.3 per cent, or -€2.3M). These reductions reflect the continuation of cost containment measures introduced by PANSA in 2020.

Indicator 2D: Employment costs of ATCOs in OPS as a proportion of Total costs

Formula: ATCO in OPS employment costs/Total Costs

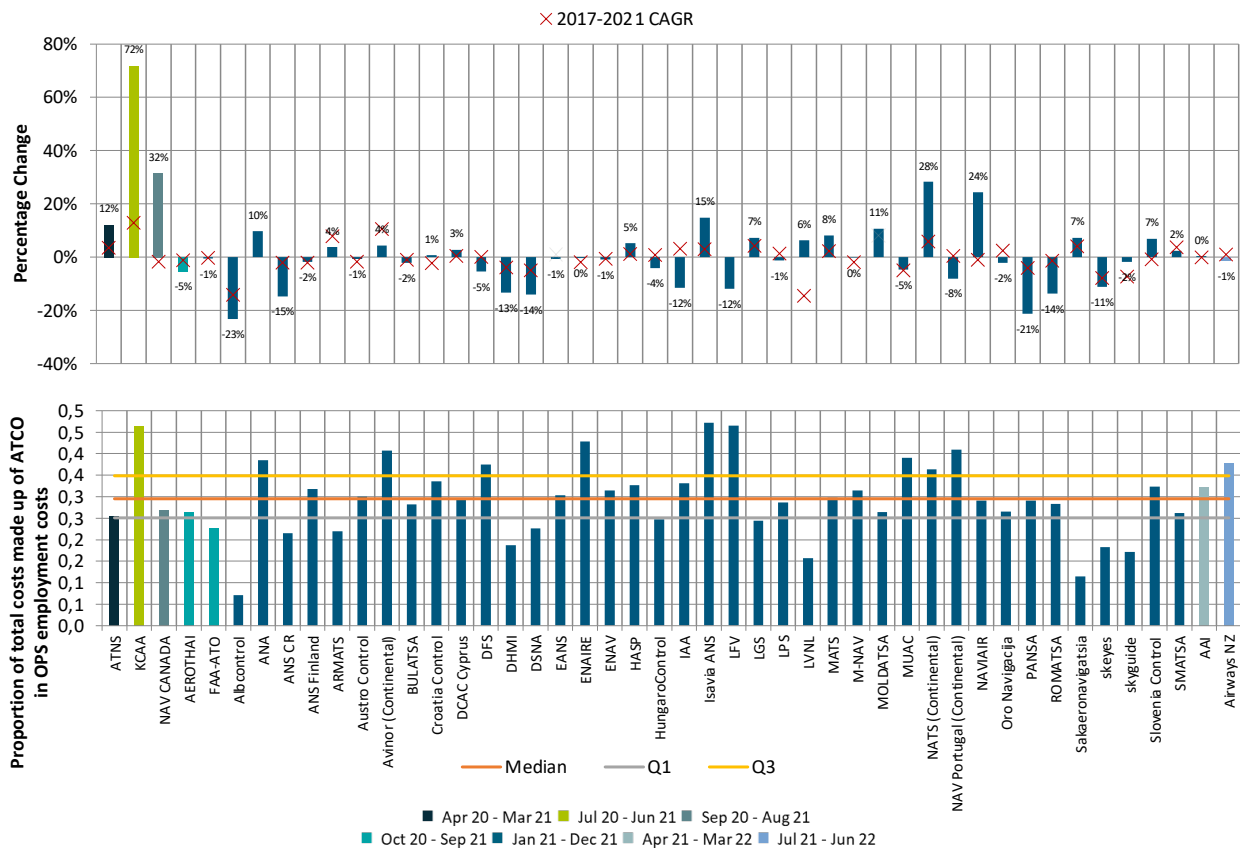


Figure 8: Employment costs of ATCOs in OPS as a proportion of total costs

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

In 2021, the median of the total ANS costs spent on employing ATCO in OPS was 30 per cent. The same ANSPs that submitted continental data for 2021 also provided continental data for 2020; the 2020 median was 29 per cent.

For most ANSPs, the year-on-year variation of Indicator 2D was up to 10 per cent. Of the European ANSPs, NATS had the largest variation (+28 per cent), potentially as a result a reduction in the cost base for exception items, as well as reduced staff costs during 2021, resulting from their redundancy programme in 2020. KCAA reported the proportion of total costs made up of ATCO in OPS employment costs as 0.46, which seemingly contradicts previous KPIs. This may have been impacted by increased staffing costs during a time of a significant reductions to Total costs (KPI 1).

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

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

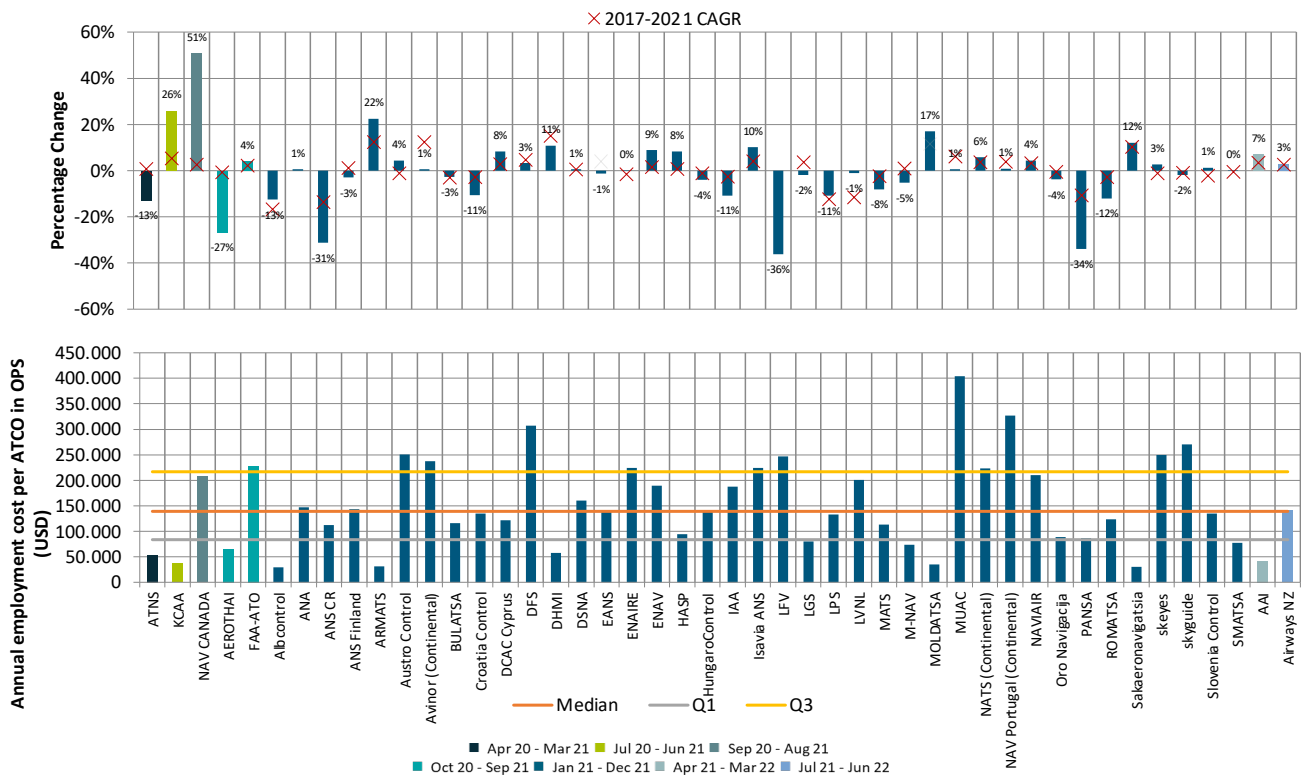


Figure 9: Annual employment cost per ATCO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median unit ATCO in OPS employment cost was USD 139,103. The same ANSPs that submitted continental data for 2020 also provided continental data for 2021; the 2020 median was USD 141,102.

NAV CANADA had the largest Annual employment cost per ATCO in OPS, rising by 51 per cent on the 2020 report figures. The lowest was LfV with a 36 per cent reduction on 2020, because of reduced pension costs. There were mixed results for ANSPs with reporting periods that began before 2021, with AEROTHAI falling the most (27 per cent) during this year. Growth, while limited, was demonstrated by ANSPs reporting after the start of 2021, indicative of a return to normality for ANSPs.

Specific ANSP comments are outlined below.

ANS CR (Czech Republic)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

Similarly, ANS CR recorded a significant decrease in ATCO in OPS employment costs (-30.4 per cent, or -€9.1M), reflecting a continuation of cost-containment measures in 2021 including reductions in wages, postponement of bonuses and payments for overtime.

ARMATS (Armenia)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For the ARMATS, the increase in ATCO employment costs is the result of lifting some cost containment measures implemented in 2020 (mainly relating to the payment of bonuses/benefits to employees).

DCAC Cyprus (Cyprus)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

The increase in ATCO employment costs for DCAC Cyprus mainly reflects the payments for overtime and promotions, as well as the increase in the number of ATCOs.

DFS (Germany)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For DFS, a large part of the decrease in ATCO in OPS employment costs in 2021 is due to the significant reduction in the number of ATCOs in OPS, (-152 FTEs) following with the majority reallocated to non-operational duties (+105 FTEs).

HASP (Greece)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

In the case of HASP, the increase in ATCO in OPS employment costs is driven by a combination of an increase in the number of ATCOs in OPS and in the average employment cost per ATCO hour.

LFV (Sweden)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

In the case of LFV, the large reduction in ATCO in OPS employment costs (-37.9 per cent, or -€50.1M) is due to the significant decrease in pension costs.

NAVIAIR (Denmark)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For NAVIAIR, the increase in ATCO in OPS employment costs is the combined effect of an increase in the number of ATCOs in OPS, and higher average ATCO in OPS hours on duty per year.

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

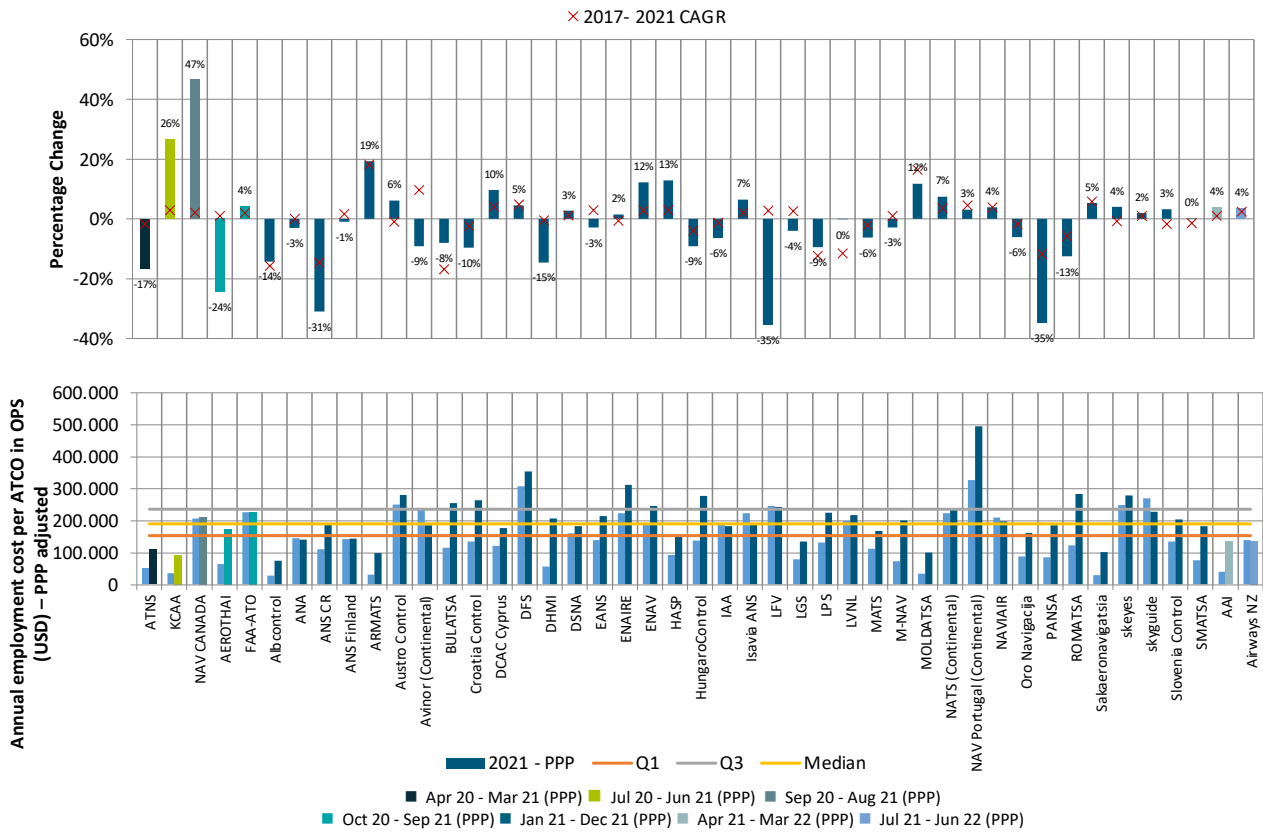


Figure 10: Annual employment cost per ATCO in OPS (USD)

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median unit ATCO in OPS employment cost, after PPP adjustment, was USD 190,676. The same ANSPs that submitted continental data for 2020, also provided continental data for 2021; the 2020 median was USD 198,517.

Indicator 3B: Annual Working hours per ATCO in OPS

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

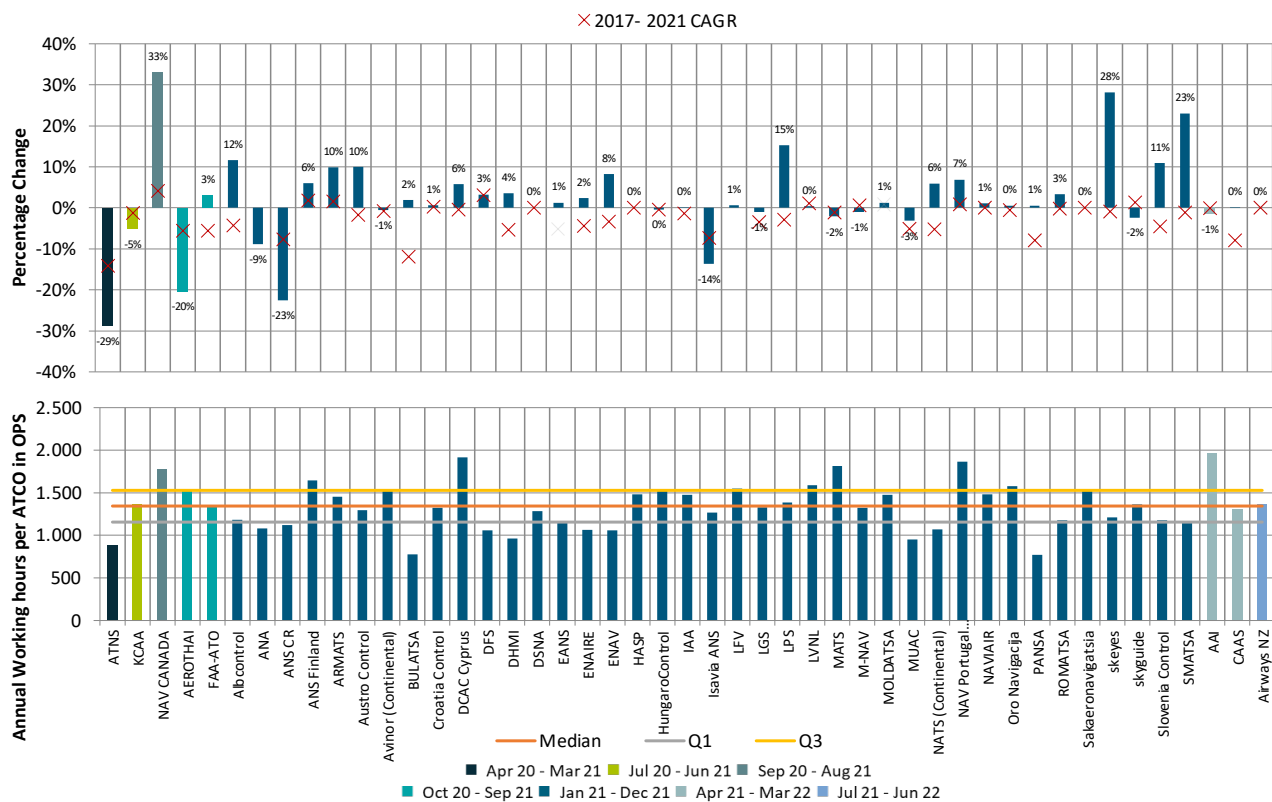


Figure 11: Annual working hours per ATCO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median annual working hours per ATCO in OPS was 1,346 hours. The differences recorded for in this metric were influenced by the number of staff working full-time. The same ANSPs that submitted continental data for 2020, also provided continental data for 2021; the 2020 median was 1,341 hours.

NAV CANADA had the largest increase for this indicator with a 33 per cent year-on-year increase, owing to significant reductions in staff, as well as a partial return towards 'normal' traffic operations. ATNS reported the largest decrease in Annual Working hours per ATCO in OPS, partially owing to their increased hiring and vacancy filling during 2021. The largest decrease for European ANSPs was reported by ANS CR, likely as a result of their relatively large decrease in total staff number, which had been stable during previous years for this indicator. Several European ANSPs reported minimal change in their figures from 2020, suggesting success in maintaining staff provision alongside returning traffic.

Specific ANSP comments are outlined below.

Generic

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

It is important to consider that, the adjustment of ATCO-hours to quickly adapt to lower traffic levels, can be constrained by several factors which might be beyond ANSPs direct control.

NAVAIR (Denmark)

The following justification is taken from the [ACE Benchmarking Report \(2023 Edition\)](#).

For NAVIAIR, the increase in ATCO in OPS employment costs is the combined effect of an increase in the number of ATCOs in OPS, and higher average ATCO in OPS hours on duty per year.

Indicator 3C: Annual IFR hours per ATCO in OPS

Formula: IFR flight hours/No. ATCOs in OPS

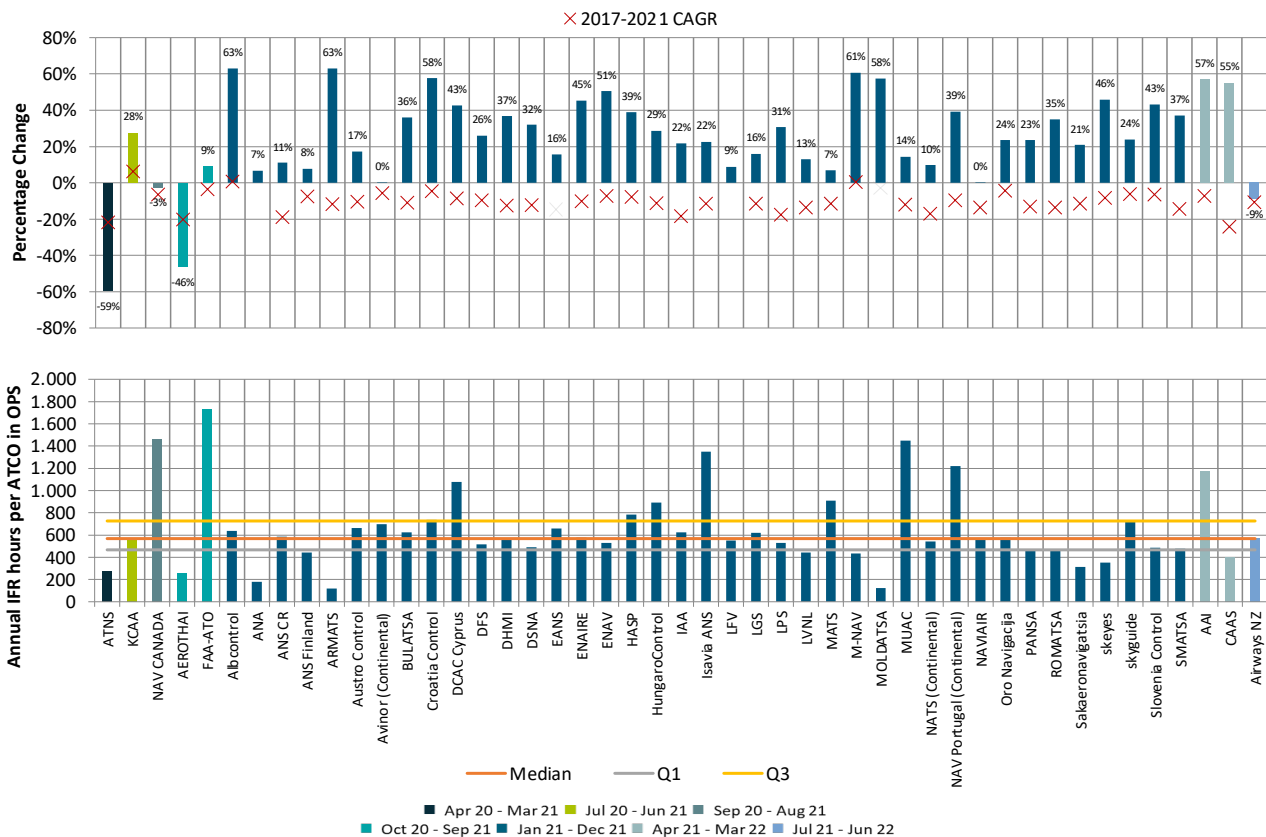


Figure 12: Annual IFR hours per ATCO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median annual IFR hours per ATCO in OPS was 568 hours. The same ANSPs that submitted continental data for 2020 also provided continental data for 2021; the 2020 median was 473.

Nearly all ANSPs with reporting periods spanning 2021 saw an increase in Annual IFR hours per ATCO, demonstrating a recovery from the Pandemic and the subsequent increase in operations. For ANSPs submitting before 2021, these larger reductions are likely to originate as a result of their reporting period, for instance ATNS, who had this KPI reduce by five per cent in the previous reporting period, fell 59 per cent, explained by most of their traffic shortage captured in this period rather than the previous (2016-2020). Similar conclusions can be drawn from Airways NZ, who faced one of the most severe travel restrictions during the pandemic, through their two years of reduction in this KPI.

Indicator 3D: Ratio of Frontline Service Staff to ATCO in OPS

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

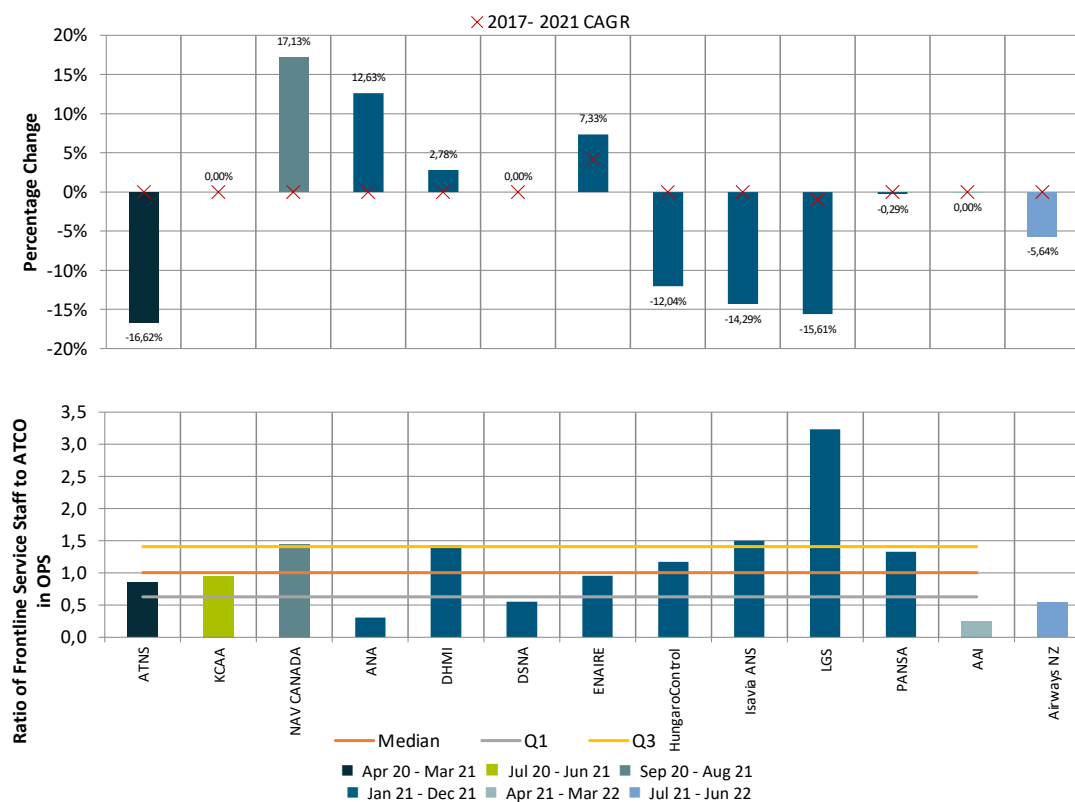


Figure 13: Ratio of frontline service staff to ATCO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median ratio of frontline service staff to ATCO in OPS was 1.00. The same ANSPs that submitted continental data for 2020, also provided continental data for 2021; the 2020 median was 1.16.

The largest increase in the Ratio of Frontline Service Staff to ATCO in OPS came from NAV CANADA at +17 per cent, and the largest decrease was demonstrated by LGS at -16 per cent, falling further than the -4 per cent change seen in 2020. ATNS saw a decrease in this ratio, likely as a result of growth in staff numbers during 2020. This was likely also as a result of their reporting period, being mostly in 2020 when restrictions were greater, and therefore, changes in support staff provisions to provide for the reduced volume of movements will have impacted this KPI.

OCEANIC COST EFFICIENCY AND PRODUCTIVITY: 2021

Indicator 1: Cost per IFR flight hour (USD)

Formula: Total costs/IFR flight hours

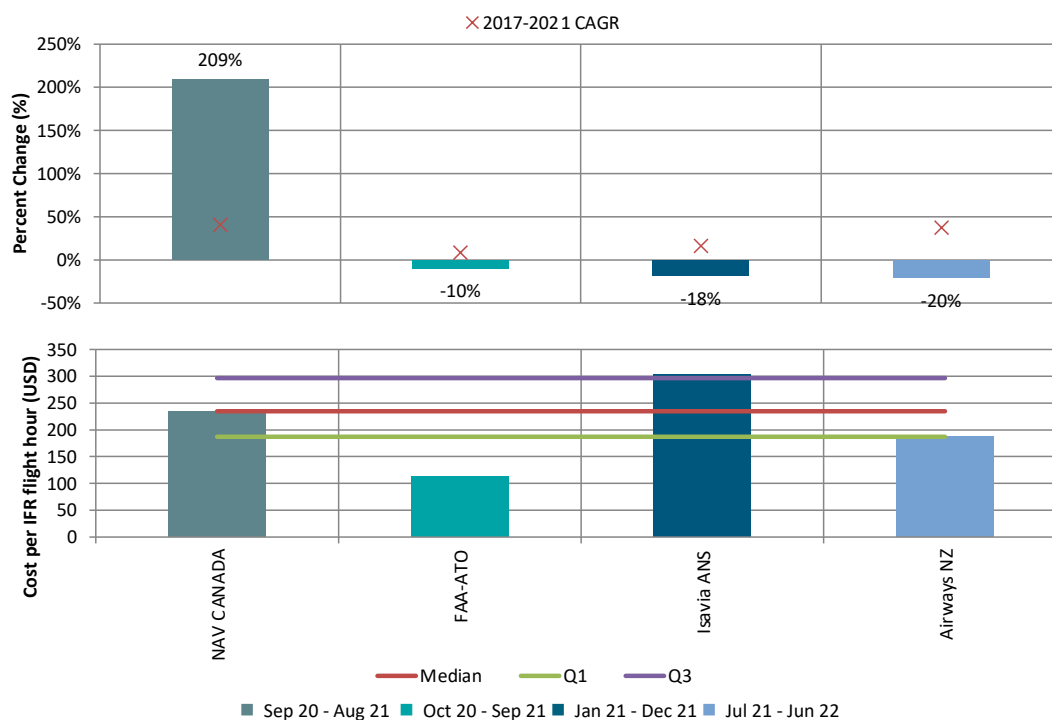


Figure 14: Cost per IFR flight hour

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median cost per IFR flight hour was USD 235 (for comparison, this figure for continental flights is USD 794). The 2021 weighted average (taking into account total oceanic IFR flight hours per ANSP) cost per IFR flight hour was USD 154. The same ANSPs that submitted oceanic data for 2020, also provided this data for 2021; the 2020 median for these ANSPs was 136 USD and the weighted average was USD 131.

Despite the three out of four ANSPs submitting oceanic data saw a reduction of total (oceanic) costs, the group median increased by 20 per cent between 2020 and 2021. This is driven by NAV CANADA's performance as they control the highest number of oceanic IFR movements.

All ANSPs included in this indicator have different reporting periods, making comparison of trends difficult for Oceanic ANSPs. However, it is typically seen that ANSPs with reporting periods starting later in 2020 or in 2021 (FAA-ATO, Isavia ANS and Airways NZ), experienced a decrease in the Oceanic cost per IFR hour. On the other hand, NAV CANADA saw a substantial increase in their Oceanic cost per IFR hour, increasing by over 200 per cent. This may be largely due to their reporting period covering 2020, thus skewing the trends on the graph. Another potential explanation for this may be that this is a result of investment into reducing aircraft minima over the oceanic routes, along with NATS (who did not submit for this data cycle). Similarly to NAV CANADA, with regards to earlier reporting periods, movements were affected more by restrictions in 2020, therefore reducing the IFR flight hours for the two ANSPs (where NAV CANADA will have been impacted greater by stronger restrictions in the USA, and therefore a fewer number of trans-Atlantic movements).

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

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

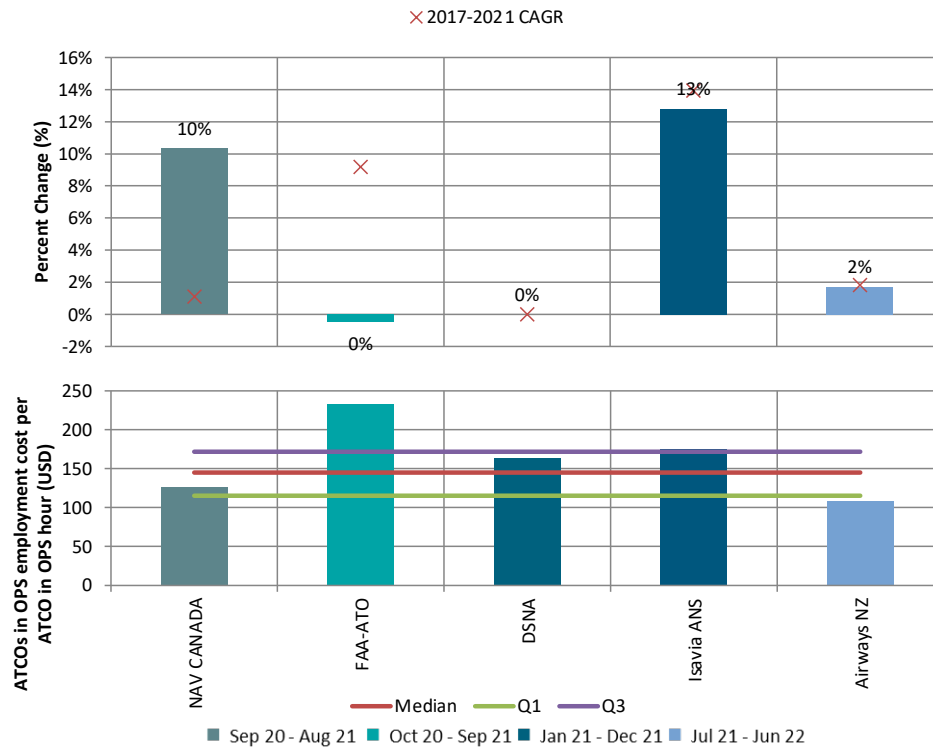


Figure 15: ATCO in OPS employment cost per ATCO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 oceanic median employment cost per ATCO in OPS hour was USD 145. For comparison, the 2021 figure for continental airspace is USD 111. DSN did not submit during 2020 and there is therefore no CAGR and percentage change, however all other ANSPs who submitted during 2020 are present in this year's report; the 2020 median was USD 115.

All ANSPs submitting Oceanic data for this KPI experienced a growth, with the largest increase being demonstrated by Isavia ANS (13 per cent), and the smallest being Airways NZ (2 per cent). As with their continental data, Isavia ANS received a greater volume of traffic during summer 2021, alike many ANSPs, increasing their staffing numbers to reflect this. NAV CANADA likely showed an increase in this KPI as result of staffing cuts, as well as a reduction in OPS hours as a result of their reporting period. FAA-ATO appeared to normalise their figures, given their growth of 33 per cent in the previous years; FAA-ATO ATCO in OPS employment cost per ATCO in OPS hour was higher for oceanic than continental; an effect of the higher cost of living in the areas that cover oceanic traffic.

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

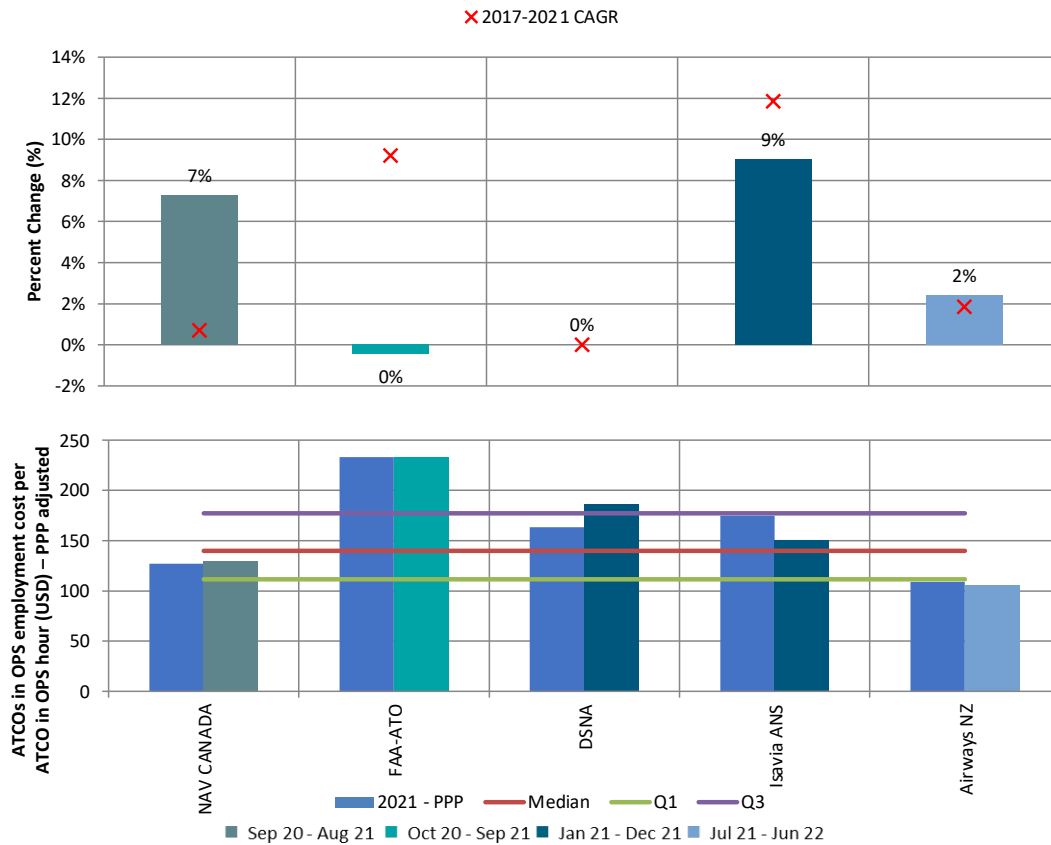


Figure 16: ATCO in OPS employment cost per ATCO in OPS hour – PPP adjusted

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 Oceanic median employment cost per ATCO (PPP Adjusted) in OPS hour was USD 140; the median figure for continental airspace was USD 147. DSN did not submit during 2020 and therefore there is no CAGR and per centage change, however all other ANSPs who submitted during 2020 are present in this year's report; for comparison, the 2020 median was USD 121.

Indicator 2B: ATCO in OPS hour productivity

Formula: IFR flight hours/ATCOs in OPS hours

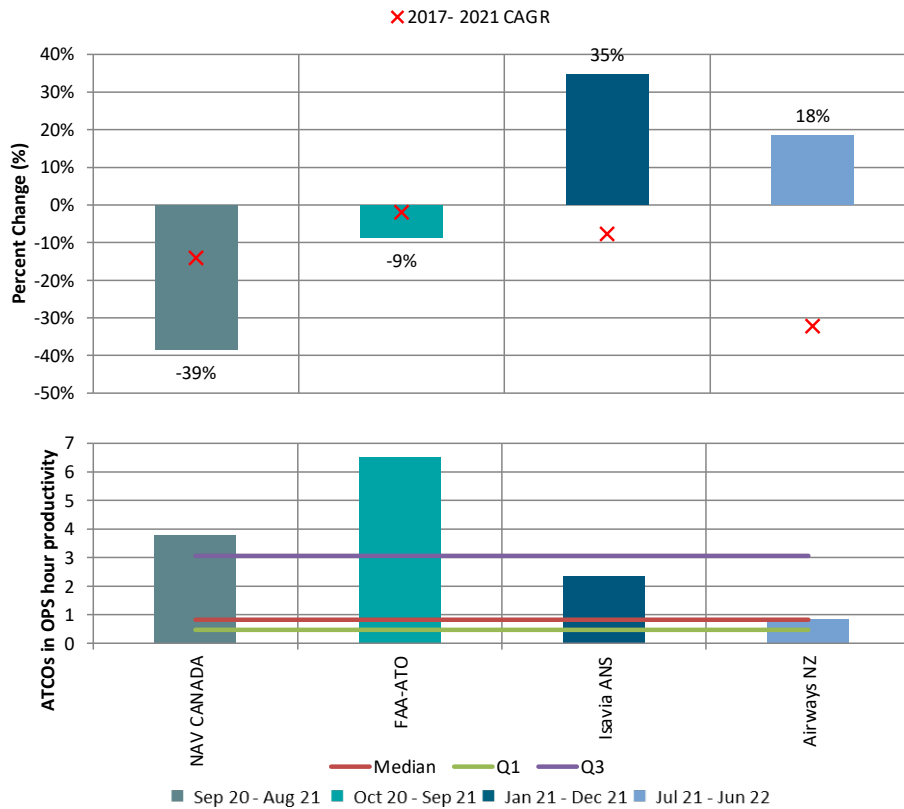


Figure 17: ATCO in OPS hour productivity

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median ATCOs in OPS hour productivity was 1.58 IFR flight hours per ATCO in OPS hours, which is significantly higher than the continental figure of 0.48. The same ANSPs that submitted oceanic data for 2020, also provided this data for 2021; the 2020 median was 1.74.

NAV CANADA and FAA-ATO illustrate the impacts of the varied reporting periods. Isavia ANS and Airways NZ, both of which have reporting periods beginning in 2021, increased their ATCOs in OPS hour productivity. As before, NAV CANADA have both been affected by the earlier reporting period.

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

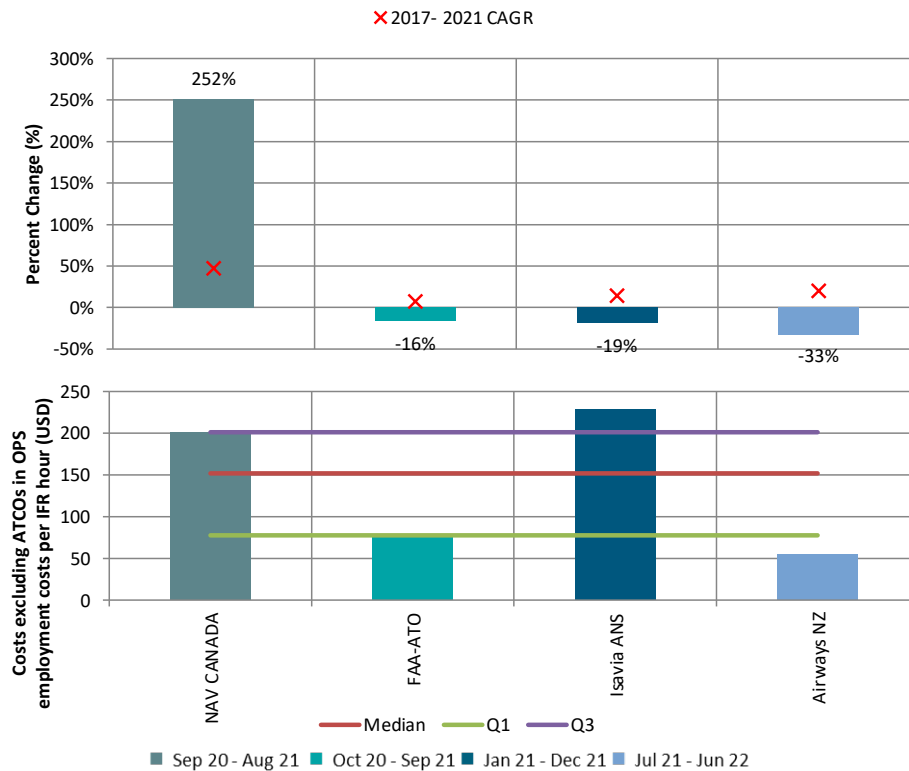


Figure 18: Costs excluding ATCOS in OPS employment costs per IFR flight hours

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median cost excluding ATCOs in operations employment cost per IFR flight hour was USD 152. The same ANSPs that submitted oceanic data for 2020, also provided this data for 2021; the 2020 median was USD 82.

In terms of absolute total costs, submitting ANSPs saw varying changes in oceanic costs excluding ATCOs in OPS employment costs, with the median increasing by 32 per cent between 2020 and 2021.

By far the largest increase was with NAV CANADA, likely resulting from the decrease in IFR hours on trans-Atlantic routes during 2020 (owing to their reporting period). FAA-ATO, Isavia ANS and Airways NZ all reduced in this KPI, largely owing to substantial increases during the previous year.

Indicator 2D: Employment costs of ATCOs in OPS as a proportion of Total costs

Formula: ATCO in OPS employment costs/Total Costs

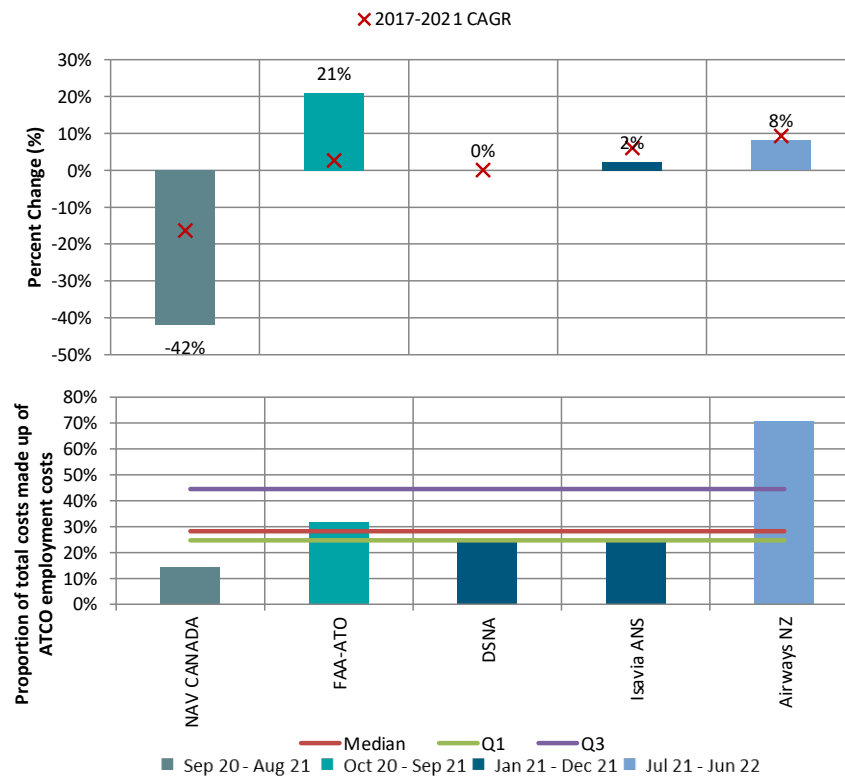


Figure 19: Employment costs of ATCOs in OPS as a proportion of total costs

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 Median for the Proportion of Total costs made up of ATCO in OPS Employment costs was 32 per cent. The same ANSPs that submitted oceanic data for 2020, also provided this data for 2021; for comparison the 2020 median was 26 per cent.

As with the indicators previously, ANSPs with reporting periods closing earlier will have been more susceptible to COVID-19 impacts and travel restrictions, compared to those with reporting periods finishing at the end of 2021 or in 2022. NAV CANADA underwent staff reductions during their reporting period, and naturally, the proportion of total costs made up of ATCO in OPS employment costs reduced significantly by 42 per cent. In the case of FAA-ATO, whose proportion grew significantly year-on-year, it is the increased 2021 Oceanic flight hours which resulted in increased Oceanic ATCO Hours and thereby the Oceanic ATCO employment cost proportionally; all while 2021 Oceanic Total Costs decreased compared to 2020.

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

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

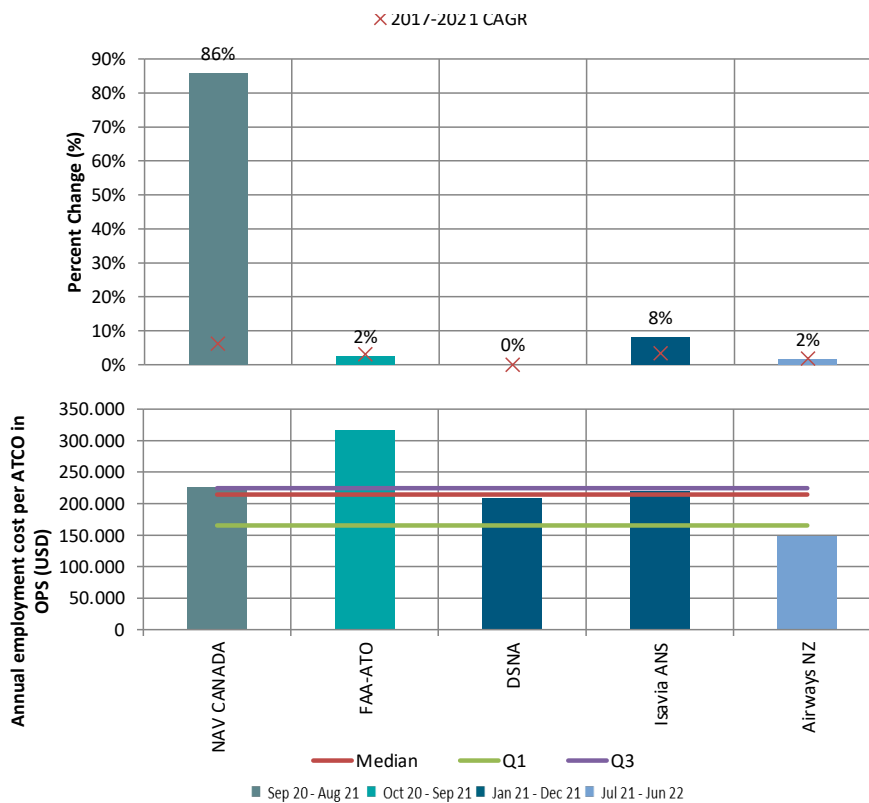


Figure 20: Annual employment cost per ACTO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median of Annual ATCO in OPS employment cost was USD 214,439. There is no CAGR data point for DSN, because they have only submitted ATCO employment costs since 2021, however all other ANSPs who submitted during 2020 are present in this year’s report; for comparison the 2020 median was USD 145,810.

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 (86 per cent) compared to other ANSPs. Part of this is likely to be as a result of a 39 per cent decrease during the previous year and subsequent recovery this year, in addition to the aforementioned staff reductions.

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

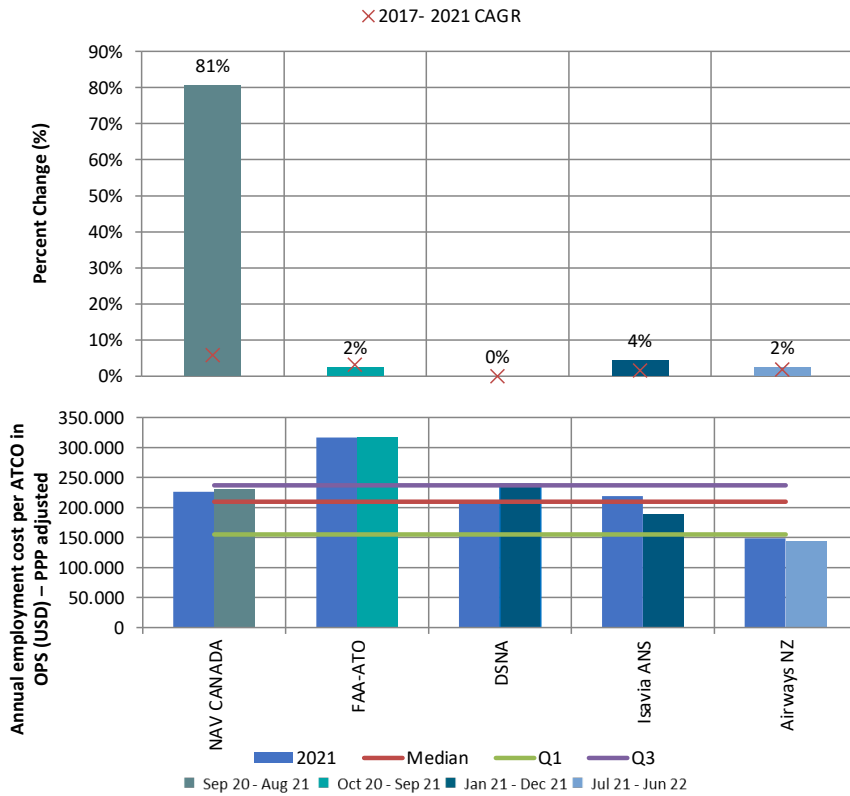


Figure 21: Annual employment cost per ATCO in OPS – PPP adjusted

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median unit ATCO in OPS employment cost, after PPP adjustment, was USD 209,660. There is no CAGR data point for DSNNA because they have only submitted ATCO employment costs since 2021, however all other ANSPs who submitted during 2020 are present in this year’s report; for comparison the 2020 median was USD 140,528.

Indicator 3B: Annual Working hours per ATCO in OPS

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

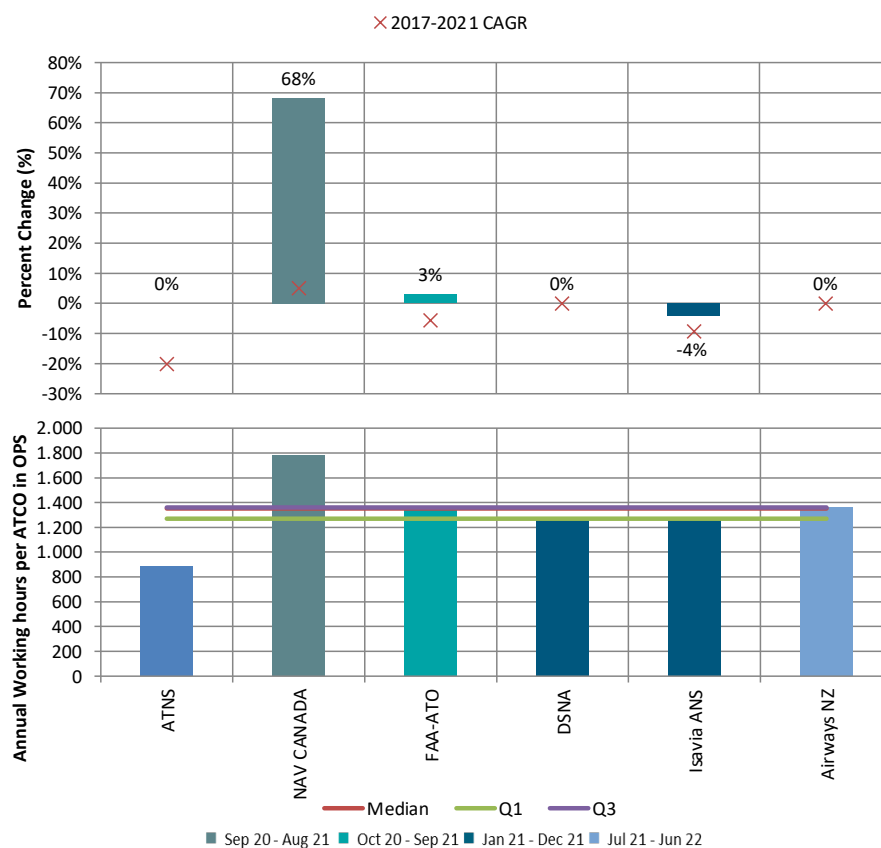


Figure 22: Annual working hours per ATCO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median annual working hours per ATCO in OPS was 1,340 hours and the 2020 median was 1,330 hours. DSNNA and ATNS did not submit during 2020 and there is therefore no CAGR and per centage change, however all other ANSPs who submitted during 2020 are present in this year's report.

The ANSPs generally experienced minimal variation across reporting periods in Annual working hours per ATCO in OPS for Oceanic data, excluding NAV CANADA reporting a 68 per cent increase on their 2020 values. This was significant, both in terms of NAV CANADA's CAGR and in relation to the other Oceanic ANSPs. As with the other ATCO-related KPIs, such a variation may stem from the reduction of ANSP staff during the reporting period, particularly when benchmarking NAV CANADA against their previous reporting period – where they decreased by 30 per cent in the same KPI.

Indicator 3C: Annual IFR hours per ATCO in OPS

Formula: IFR flight hours/No. ATCOs in OPS

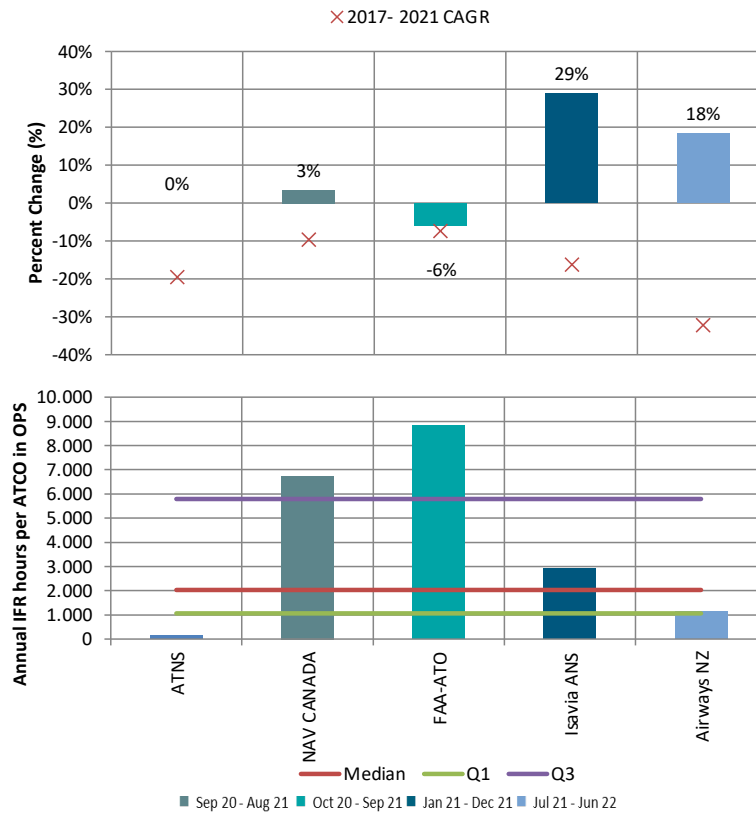


Figure 23: Annual IFR hours per ATCO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median annual IFR hours per ATCO in OPS was 2,029 hours. ATNS did not submit during 2020 and therefore there is no per centage change, however all other ANSPs who submitted during 2020 are present in this year's report; for comparison the 2020 median was 2,276 hours.

Indicator 3D: Ratio of Frontline Service Staff to ATCO in OPS

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

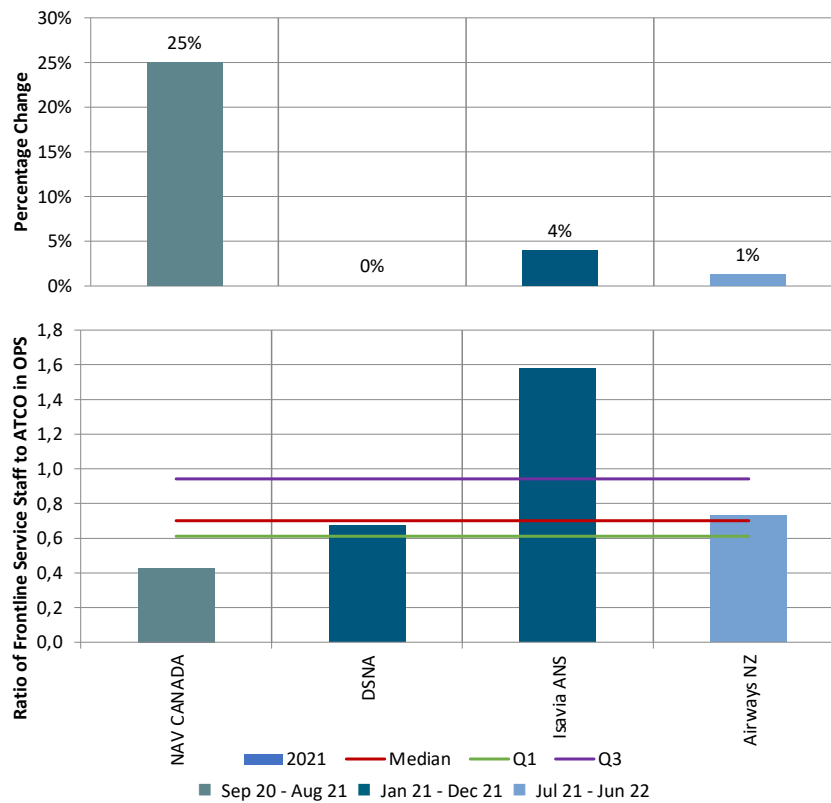


Figure 24: Ratio of frontline service staff to ATCO in OPS

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median ratio of frontline service staff to ATCO in OPS was 0.73. The same ANSPs that submitted oceanic data for 2020, also provided this data for 2021; for comparison the 2020 median was 0.72.

For the Ratio of Frontline Service Staff to ATCO in OPS, NAV CANADA had the largest increase during their reporting period at 25 per cent, likely due to staff cuts during the reporting period as mentioned earlier in the report. Isavia ANS' operations were dominated by oceanic flights (90 per cent), 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.

There are no CAGR data points for this KPI because ANSPs have been submitting frontline service staff data only since 2018.

JOINT CONTINENTAL AND OCEANIC COST EFFICIENCY: 2021

Indicator CO1: Cost per IFR flight hour (USD)

Formula: Total costs / IFR flight hours

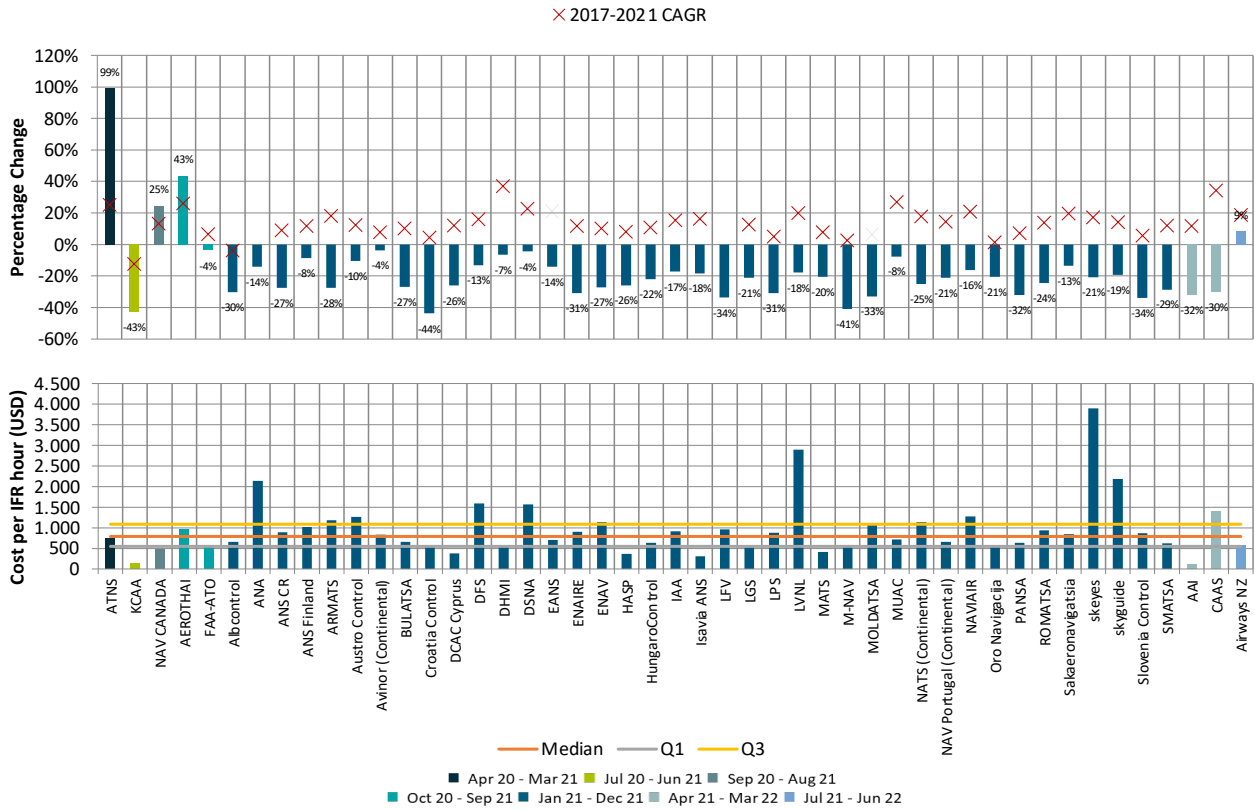


Figure 25: Cost per IFR flight hour

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median cost per IFR flight hour was USD 789. The 2021 weighted average (considering total continental and oceanic IFR flight hours per ANSP) cost per IFR flight hour was USD 579. The 2020 median was USD 938 and the weighted average was USD 652 (2020 including the data from EANA and JANS which are not a part of 2021 submissions).

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

Formula: ATCOs in OPS employment costs/Total costs

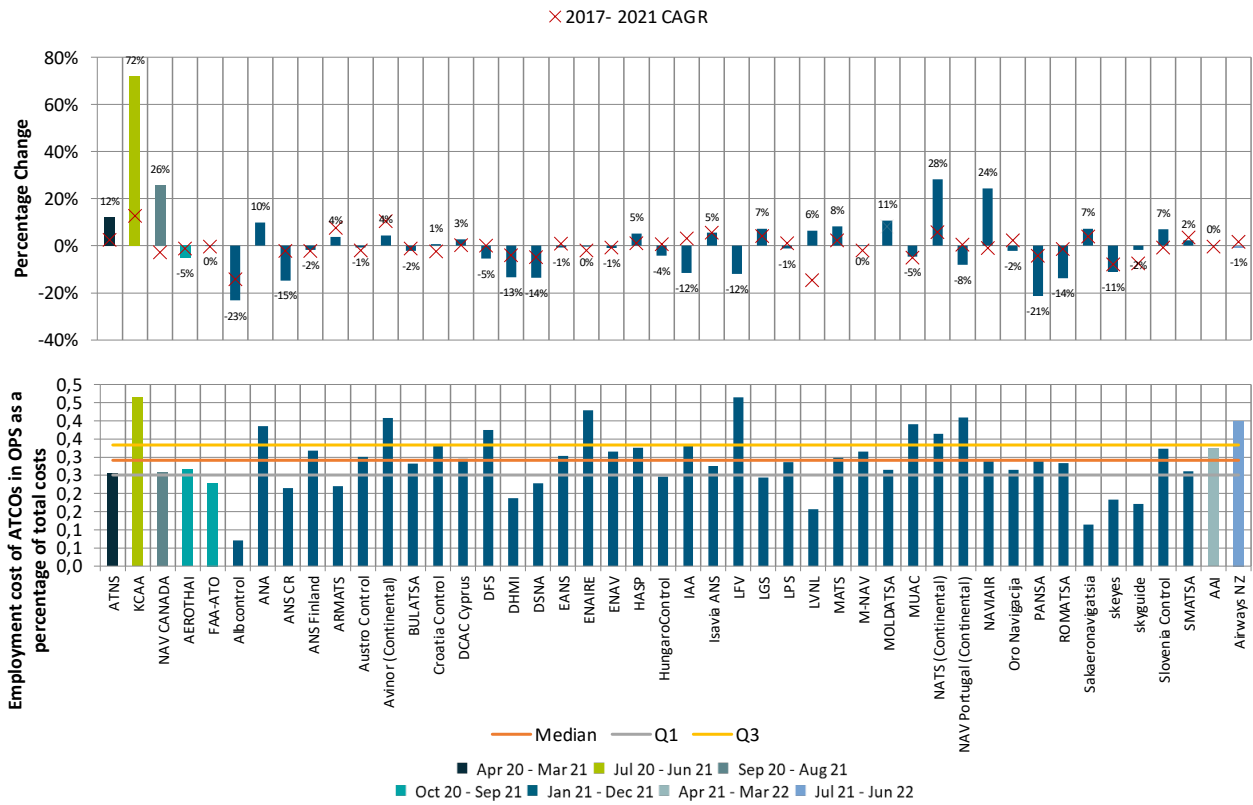


Figure 26: Employment cost of ATCOs in OPS as a per centage of total costs

Please Note: Due to varied reporting periods, not all ANSPs will have been impacted equally by the COVID-19 pandemic, particularly those who begin their reporting periods in 2020, or finish them in 2022. The above figure has been colour coded with respect to reporting periods to allow for more accurate analysis.

The 2021 median employment cost of ATCOs in OPS as a per centage of total costs was 29 per cent. The same ANSPs that submitted oceanic data for 2020, also provided this data for 2021; for comparison the 2020 median was 29 per cent.

SUMMARY OF PERFORMANCE TRENDS

KEY FINDINGS

- Disparity between performance trends of continental and oceanic ANSPs;
- Cost efficiency and ATCO productivity, specifically of continental ANSPs, are slowly improving and show signs of returning to pre-pandemic as traffic began to rise;
- Accelerated increases in ATCO employment costs per ATCO hour compared to those recorded in the previous year's continue;
- The majority of continental ANSPs reported a reduction in both total costs and costs excluding ATCO in OPS employment costs per IFR flight hour.

In 2021, the ANS performance and data are still being heavily impacted by the pandemic, with aircraft movements being 15 per cent below the 2019 levels. The low traffic levels at the beginning of the year had a negative impact on all key indicators. However, leading into the mid-year, most markets demonstrated some limited growth, resulting in slightly improved cost efficiency and productivity indicators for continental ANSPs while declining performance continued for oceanic ANSPs.

Analysis presented in the *Impact of COVID-19 on 2021 Performance* highlighted the impact of different fiscal and reporting periods that ANSPs use. As a result, the performance data of those ANSPs with reporting periods running from the second half of 2020 and those running into the first quarter of 2022 may be differently impacted by the recovery from the pandemic and shift towards more 'normal' traffic levels.

COST EFFICIENCY

In terms of cost efficiency, only five ANSPs experienced an increase in cost per IFR flight hour, compared to 99 per cent in 2020 and 60 per cent in 2019, when comparing the same set of ANSPs. With a slight increase in IFR traffic the Total cost per IFR flight hour in Continental airspace decreased by 17.4 per cent compared to 2020. On the contrary, the Total cost per IFR flight hour in Oceanic airspace increased by 20.4 per cent compared to 2020.

PRODUCTIVITY

The 41 ANSPs reported an increase in their ATCO productivity, compared to 98 per cent experiencing a decrease in productivity in 2020. When comparing the same set of ANSPs, the ATCO productivity of continental ANSPs increased by 16.7 per cent (2020-2021), while oceanic ANSPs saw a productivity decrease of 39.8 per cent.

FUTURE PERFORMANCE

The operations during pandemic recovery and after, remain a challenge for the whole ATM system. Such recovery of ATCO productivity and cost efficiency should materialise in a sustainable manner by incorporating solutions fostering resilience of ANSPs to future changes in traffic demand.

The year 2019 will be regularly referred to as a reference year for normal traffic levels. However, it must be kept in mind that, as shown in the report from 2020, slowing traffic growth in 2019 resulted in several of the key trends from previous years being reversed.

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, contextualizing 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 WORK GROUP

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 global⁹ CANSO Safety Forum.

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. 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, both through proactive indicators of the CANSO Standard of Excellence (SoE) in Safety Management Systems (SMS) and event-based indicators of loss of separation and runway incursions.

This ensures that globally, ATM stakeholders understand how today safety performance drives tomorrow's improvements – inspiring CANSO members to be future-focused.

Note: Results from the CANSO Standard of Excellence in Safety Management Systems have been omitted from this report. In the spirit of collaboration, the SMS Maturity results should not be used to showcase performance in an external setting. The assessment is meant to drive internal efforts to improve areas of an ANSP's SMS that are found to be lacking, as well as to encourage the adoption of world leading practices. Any comparison with other ANSPs should be made for this purpose only. Unfortunately, a small number of ANSPs have extended the use of the results outside of this intended scope. Through productive discussions we are hopeful these challenges will be corrected, and results can be provided in the next edition.

ATM GROUND IFR-IFR LOSSES OF SEPARATION¹⁰

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.

In 2021, 24 ANSPs submitted data on IFR-IFR losses of separation. The total number of reported ATM Ground IFR-IFR losses of separation was 426. Putting it into

⁹ In the context of this report, "global" means the "participating ANSPs."

¹⁰ 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

perspective, this represents 0.007 per cent of the traffic managed by participating ANSPs. The 99.993 per cent of traffic was managed without a loss of separation between two IFR aircraft.

The annual average rate for these ANSPs was 65.45 IFR-IFR losses of separation per one million IFR flight hours and 2.65 per 100,000 IFR flights.

There were six reported losses considered as high severity in the Risk Analysis Tool (RAT) classification scheme¹¹, which differs from the ICAO runway incursion severity classification. The RAT severity classification describes the impact of hazards incurred 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 the risk of collision/proximity determined by the achieved separation and rate of closure, and the degree of controllability over the incident or, in other words, the effectiveness of tactical barrier management.

55 per cent of all losses occurred in the Terminal environment and 26 per cent in enRoute. The remaining 19 per cent were not provided for analysis.

From the graph below, 45.6 per cent of the IFR-IFR losses of separation had the lowest RAT severity (E).

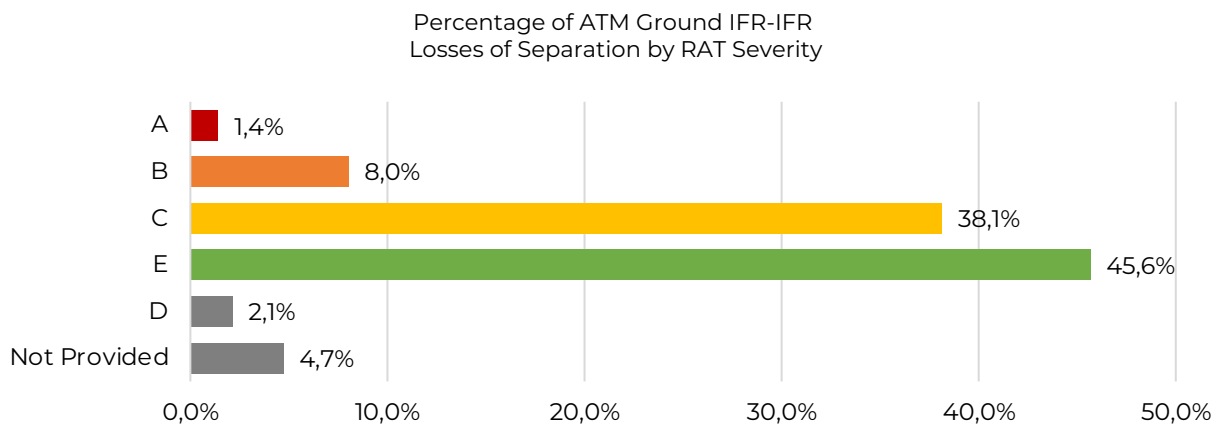


Figure 27: ATM ground IFR-IFR LOS by RAT severity classification in 2021

The details of the RAT Severity Classification Scheme are below.

RAT SEVERITY	DESCRIPTION
A	An incident involving circumstances indicating that an accident nearly occurred. Note: The difference between an accident and a serious incident lies only in the result.
B	An incident associated with the operation of an aircraft, in which safety of aircraft may have been compromised, having led to a near collision between aircraft, with ground or obstacles.
C	An incident involving circumstances indicating that an accident, a serious or major incident could have occurred if the risk had not been managed within safety margins, or if another aircraft had been in the vicinity.
E	An incident which has no safety significance.
D	Insufficient information was available to determine the risk involved or inconclusive or conflicting evidence precluded such determination.

Figure 28: RAT severity classification scheme

¹¹ Please refer to <https://skybrary.aero/articles/risk-analysis-tool-rat> for a description of the RAT framework.

RUNWAY INCURSIONS

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 2021, 23 ANSPs submitted data on runway incursions. The total number of reported occurrences was 1,023 out of over 15.5 million runway movements, representing 0.007 per cent of the traffic managed by participating ANSPs. Eleven per cent of runway incursions were assessed as primarily attributed to the ANSPs, which equates to 0.0007 per cent of traffic.

The average 2021 rate of runway incursions for the ANSPs who submitted data was 7.22 RIs per 100,000 runway movements, or one runway incursion for every 14,000 take offs and landings. The rate of ATC-Attributed runway incursions was 0.71, or one in 140,000 take offs and landings.

Below are graphs summarizing the attribution (the primary causal element) and the severity based on the ICAO classification scheme. It is worth noting that most runway incursions were attributed to pilot deviation. No explanatory details are available for analysis which opens opportunities for further collaboration across industry partners.

Events assessed at ICAO runway incursion severities A and B contribute to about 3 per cent of all runway incursions regardless of attribution.

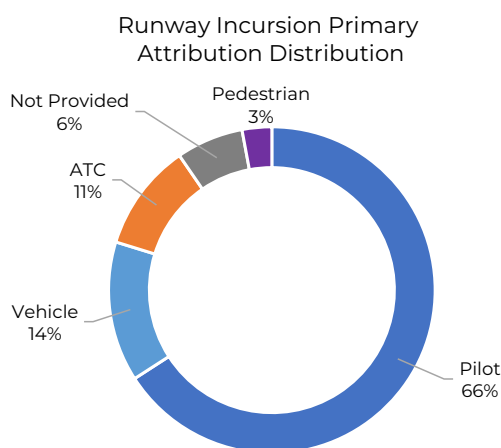


Figure 29: Runway incursion primary attribution distribution

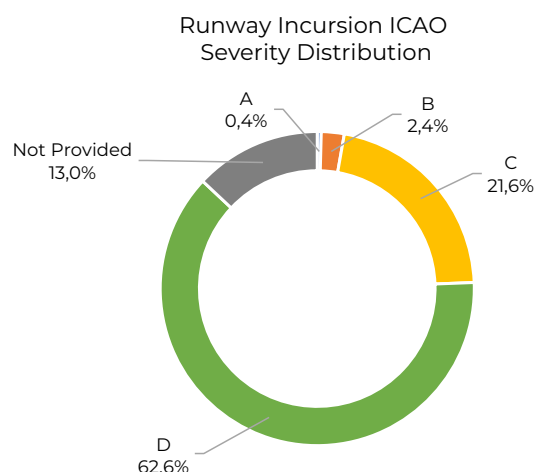


Figure 30: Runway ICAO severity distribution

The details of the ICAO Severity Classification Scheme are below.

ICAO SEVERITY	DESCRIPTION
A	A serious incident in which a collision is narrowly avoided.
B	An incident in which separation decreases and there is significant potential for collision, which may result in a time-critical corrective/evasive response to avoid a collision.
C	An incident characterised by ample time and/or distance to avoid a collision.
D	An incident that meets the definition of a runway incursion such as the incorrect presence of a vehicle, person, or aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.
E	Insufficient information, or inconclusive or conflicting evidence precludes a severity assessment.

Figure 31: ICAO severity classification scheme



AAI, India
Continental data

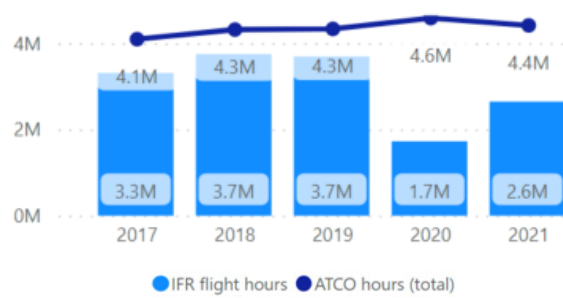


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

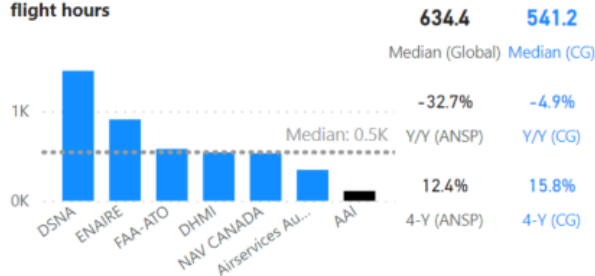


Total costs (USD) in 2021 increased by 4.2% compared to 2020. ATCO Employment costs remained stable at 0.09bn, accounting for 32.0% of Total costs. Whilst IFR hours increased by 53.4% during 2021, they still remained 28.4% below 2019 value. ATCO in OPS hours were reduced by 3.7% but remained above 2019 levels by 1.9%.

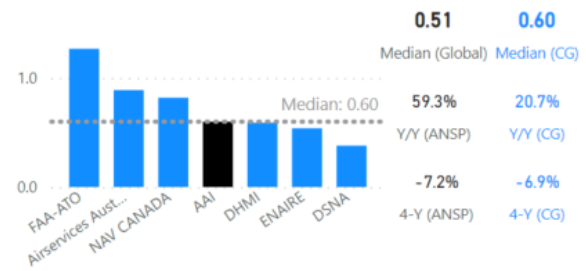
Performance in 2021 (key KPIs compared to CG)

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

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



KPI 2B: ATCO in OPS hour productivity

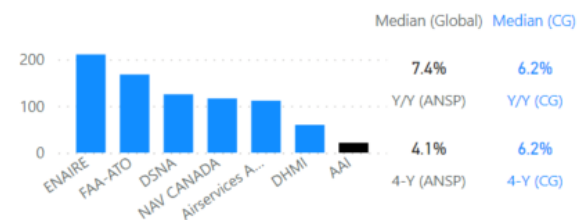


Comparing AAI with other ANSPs in Comparator Group 1

AAI had the lowest Total cost per IFR flight hour with 109.7 USD, significantly below the median at 541.2. AAI sat at the median of the CG in terms of ATCO in OPS hours productivity, at 0.60.

AAI's ATCO in OPS costs per ATCO in OPS hour was 21.2 USD.

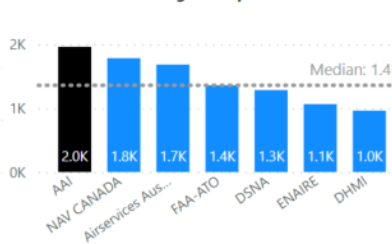
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



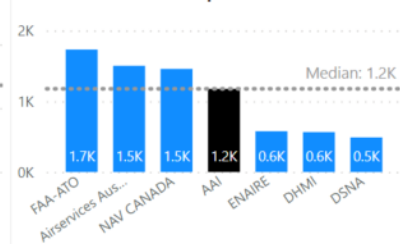
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



AAI had the lowest Annual employment cost per ATCO in OPS of 41,649 USD but produced the highest working hours per ATCO in OPS with 2.0K, far greater than the CG's median. Annual IFR hours per ATCO in OPS fell at the median of the group at 1,175 hours per ATCO.



AEROTHAI, Thailand

Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

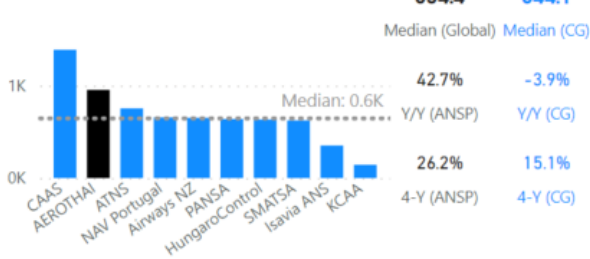


Total costs (USD) in 2021 decreased by 37.0% compared to 2020. ATCO in OPS employment costs accounted for 27.0% of Total costs, compared to 28.0% in 2020. IFR flight hours decreased by 55.9%, further below 2019 values. ATCO in OPS hours decreased by 34.8% compared to 2020 and by 53.1% compared to 2019.

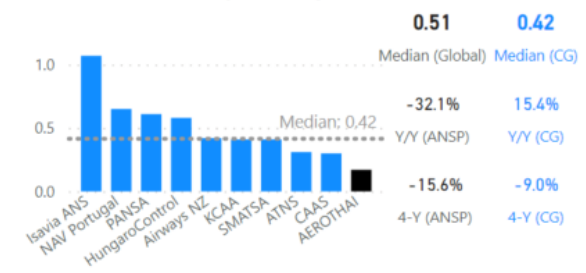
Performance in 2021 (key KPIs compared to CG)

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

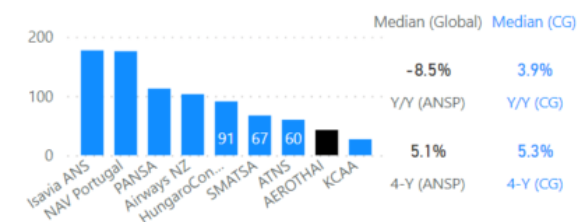


KPI 2B: ATCO in OPS hour productivity



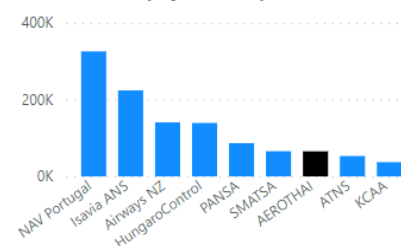
Comparing AEROTHAI with other ANSPs in Comparator Group 2, in terms of Total cost per IFR flight hour (952 USD) AEROTHAI was above the median value (644.1 USD, calculated for the CG). On the other hand, ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of AEROTHAI was the lowest (0.17), below the CG's median value (0.42).

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

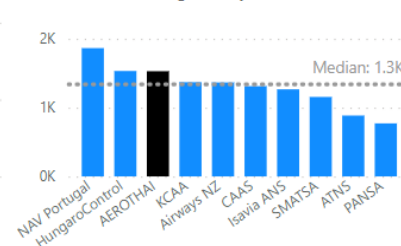


AEROTHAI's ATCO in OPS costs per ATCO in OPS hour was 42.7 USD.

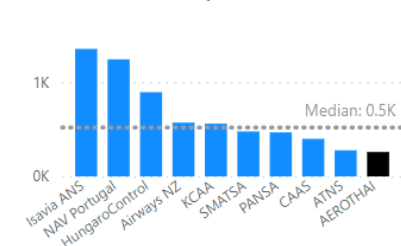
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



AEROTHAI's Annual employment cost per ATCO in OPS was 65K USD. Annual working hours per ATCO in OPS were 1,528, slightly above the CG's median value (1,338). Annual IFR hours per ATCO in OPS reached 258, ca. half of CG's median value (517).



Airservices Australia, Australia

Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

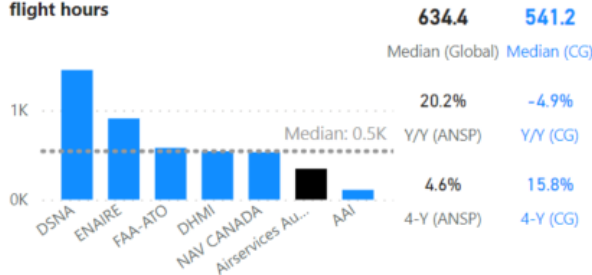


Airservices Australia saw minimal change in their yearly Total cost of 0.49bn USD, falling by only 0.8%. ATCO in OPS employment cost accounted for 36.0% of Total Costs during 2021. IFR flight hours decreased by 18.6% during 2021 and remained below 2019 figures by around 0.7M hours. The ATCO hours remained stable at 1.7M.

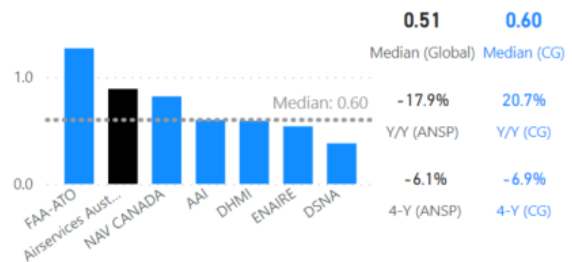
Performance in 2021 (key KPIs compared to CG)

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

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



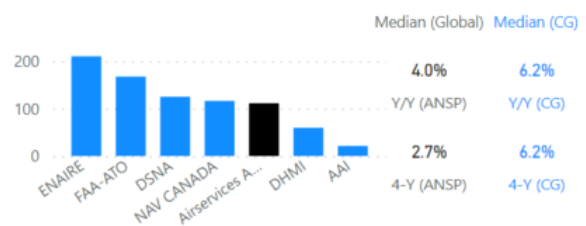
KPI 2B: ATCO in OPS hour productivity



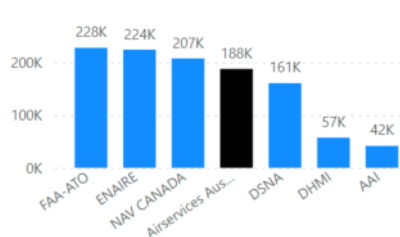
Comparing Airservices Australia with other ANSPs in Comparator Group 1, Airservices Australia had a relatively low Total cost per IFR flight hours at 345 USD. Airservices Australia produced the second highest ATCO in OPS hour productivity (0.89), significantly above the CG's median.

Airservices Australia performed very similarly to DSNA and NAV CANADA for KPI 2A, at 111.4 USD ATCO in OPS cost per ATCO in OPS hour.

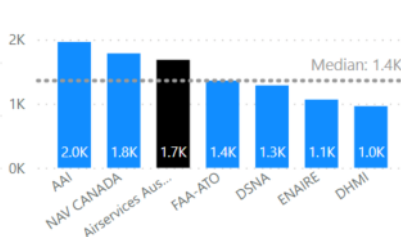
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



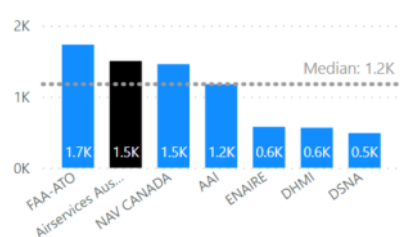
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Airservices Australia's Annual employment cost per ATCO in OPS was ca 40K USD below FAA-ATO, the group leader, and was the middle performer in Comparator Group 1. Annual working hours per ATCO in OPS were 0.3K above the median at 1.4K. Airservices Australia had the second highest IFR hours per ATCO in OPS during 2021 with 1,502 hours.

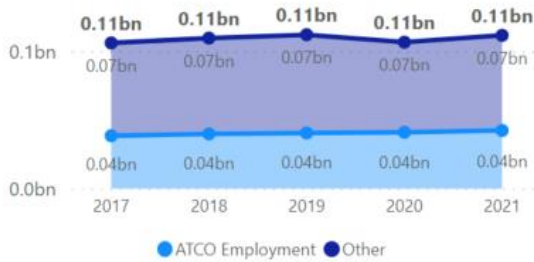


Airways NZ, New Zealand Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

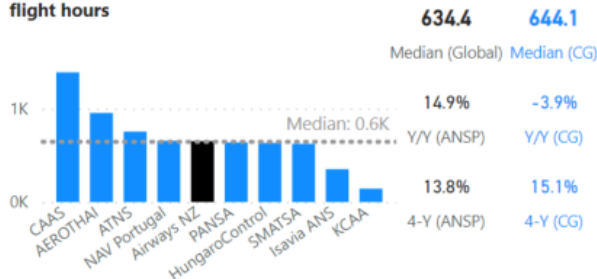


Total costs (USD) for Airways NZ rose by 0.7%, with ATCO Employment costs and Other costs remaining somewhat consistent to the previous years, remaining at ca. 0.04bn and 0.07bn (USD) respectively. IFR flight hours decreased by 0.02M, 18.9% less than 2019 figures whilst ATCO hours increased by 0.5% on 2020.

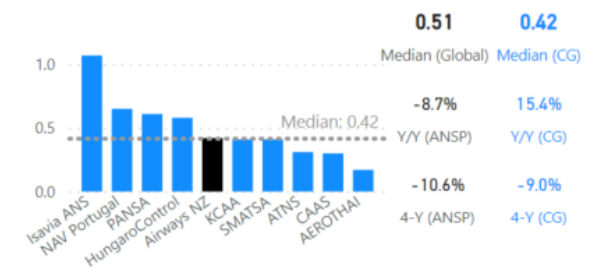
Performance in 2021 (key KPIs compared to CG)

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

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

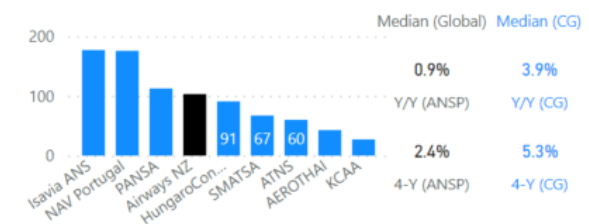


KPI 2B: ATCO in OPS hour productivity



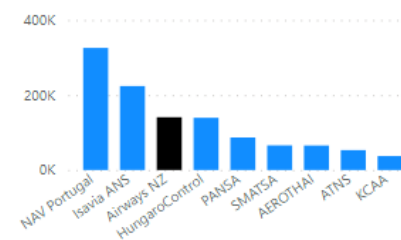
Comparing Airways NZ with other ANSPs in Comparator Group 2, Airways NZ performed at around the median for the whole CG. Total costs per IFR hour was around 0.6K USD, similar to PANSO and NAV Portugal. ATCO in OPS hour productivity was at the CG's median, with 0.42.

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

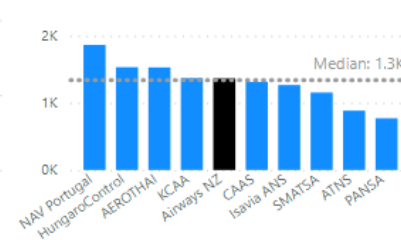


Airways NZ reported 103.1 USD as the cost per ATCO in OPS hour.

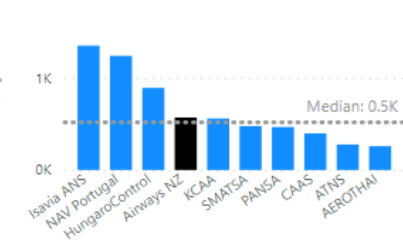
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Airways NZ's Annual employment cost per ATCO in OPS was slightly above the median at 141K USD for 2021, rising almost 3% on 2020 figures. Annual working hours per ATCO in OPS were 1,364, sitting at the CG's median. Annual IFR hours per ATCO in OPS were 570, also at the CG's median.

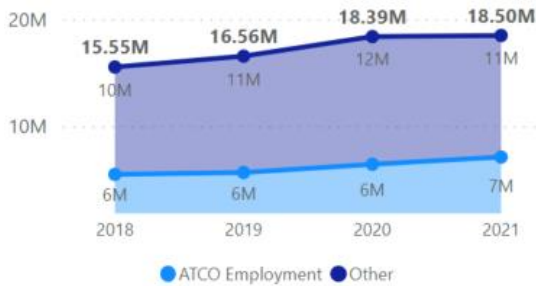


ANA, Luxembourg
Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

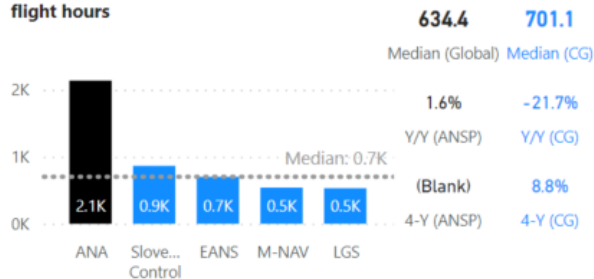


Total costs (USD) increased by 0.6% for 2021 to 18.50M. ATCO in OPS employment costs increased by 10.4% whilst other costs decreased to 11M. ATCO in OPS employment costs amounted to 39.0% of total costs for ANA. ATCO hours were consistent across the four reported years at around 73K, whilst IFR flight hours remained well below the 2019 levels.

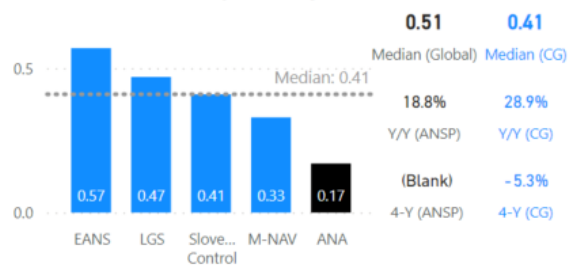
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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

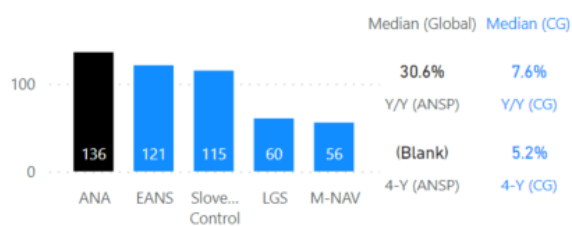


KPI 2B: ATCO in OPS hour productivity



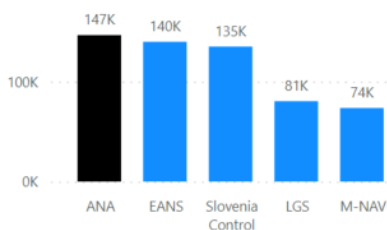
Comparing ANA with other ANSPs in Comparator Group 3, ANA had the highest Total costs per IFR flight hours among the CG ANSPs with 2.1K USD. While the ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) was the lowest (0.17) for ANA, well below the half of the CG's median value (0.41).

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

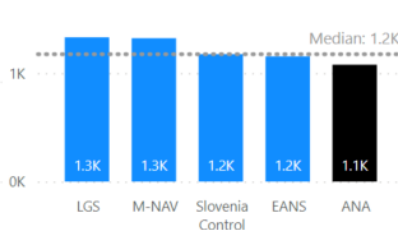


ANA's ATCO in OPS cost per ATCO in OPS hour was 136 USD.

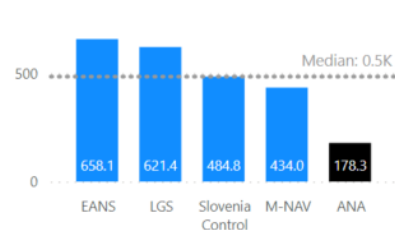
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



ANA's Annual employment cost per ATCO in OPS was the highest in the CG at 147K USD. Annual working hours per ATCO in OPS for ANA were the lowest at 1.1K. ANA had the lowest Annual IFR hours per ATCO in OPS of 178.3 just a third of the CG's median value (484.8).

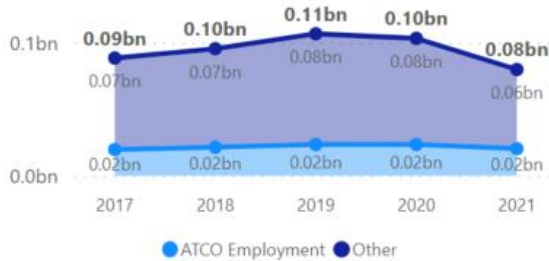


ATNS, South Africa Continental data

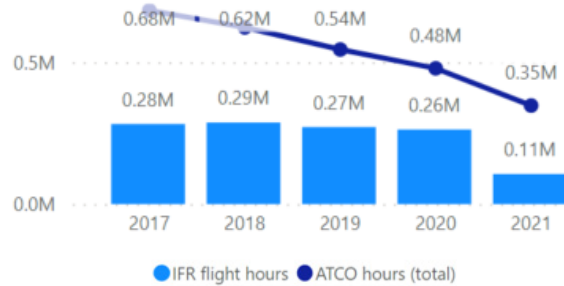


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours



Total costs (USD) for ATNS decreased by 22.7%, largely owing to a decrease in Other costs during 2021. ATCO in employment costs accounted for 25.0% of ATNS' costs for 2021. IFR flight hours steeply declined to 0.11M, decreasing by 59.7% compared to 2020. Alongside this, ATCO hours in OPS employment decreased by 29.1% to 0.35M.

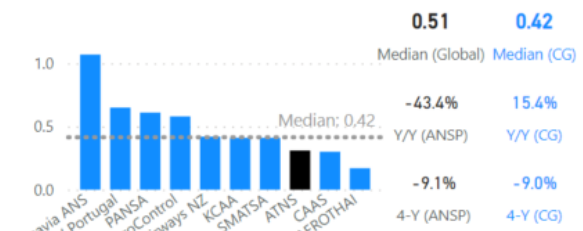
Performance in 2021 (key KPIs compared to CG)

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

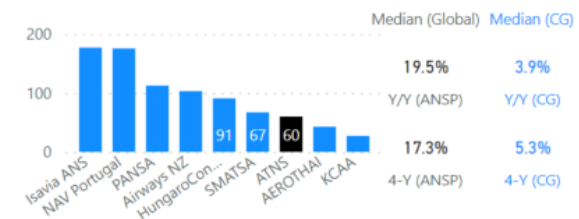


KPI 2B: ATCO in OPS hour productivity



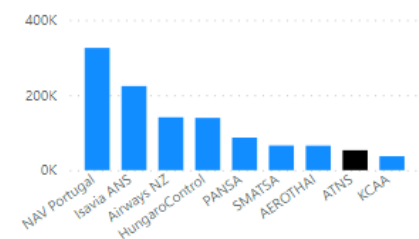
Comparing ATNS with other ANSPs in Comparator Group 2, ATNS had a slightly higher Total cost per IFR flight hour (753 USD) than the CG's median at 644.1 USD. ATCO in OPS hour productivity fell below the group median at 0.31.

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

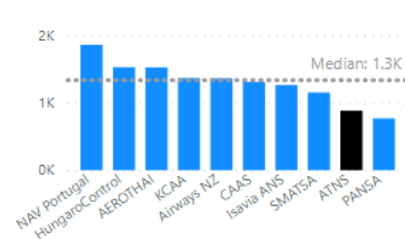


ATCO in OPS cost per ATCO in OPS hour for ATNS was 60 USD.

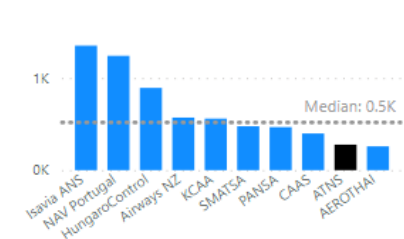
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



ATNS' Annual employment cost per ATCO in OPS was significantly lower than the group leader, NAV Portugal, at 52.9K USD for 2021. ATNS' Annual working hours per ATCO in OPS were the second lowest in the CG, at 884, far under the median value for the CG. Annual IFR hours per ATCO in OPS reduced by 60.0% in 2021 to 276.

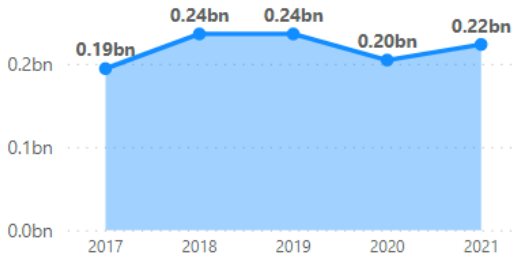


CAAS, Singapore
Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

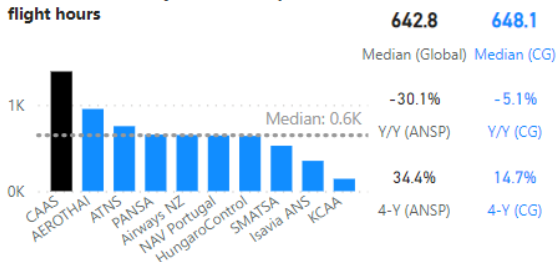


CAAS submitted cost data (as used for KPI 1) but without breakdown into ATCO employment cost and other costs. ATCO hours remained relatively constant in 2021 at 0.53M. There was a large increase in IFR flight hours respective to 2020, growing by 56.0% to 0.16M, however the IFR flight hours remained significantly (65.0%) below 2019 levels.

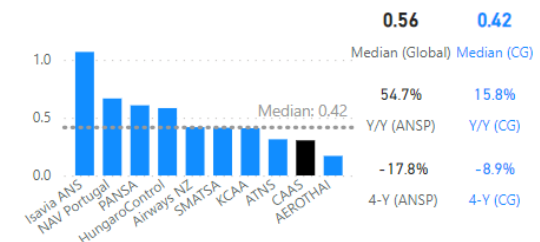
Performance in 2021 (key KPIs compared to CG)

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

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



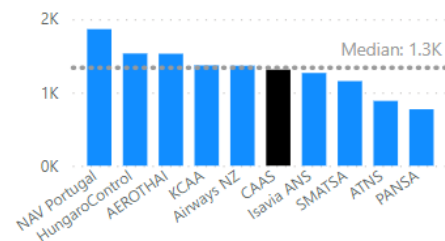
KPI 2B: ATCO in OPS hour productivity



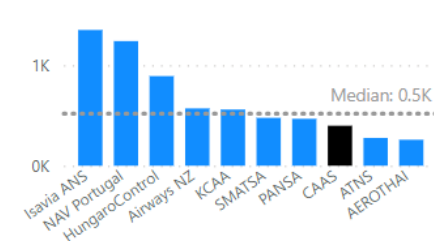
Comparing CAAS with other ANSPs in Comparator Group 2, CAAS had the highest Total cost per IFR flight hour (1,387 USD), twice the CG's median (644.1 USD). ATCO in OPS hour productivity grew on 2020's value to 0.30, however this was still under the CG's median of 0.42, and nearly half that of the global median.

No data was available for CAAS's ATCO in OPS cost per ATCO in OPS hour.

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 just below the group median at 1,311 hours, broadly unchanged from 2020. Annual IFR hours per ATCO in OPS reached 398 hours, around 20.0% less than the group median.

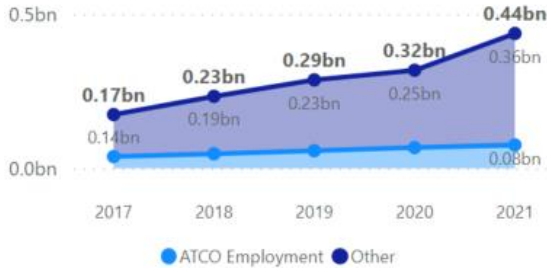


DHMI, Türkiye
Continental data

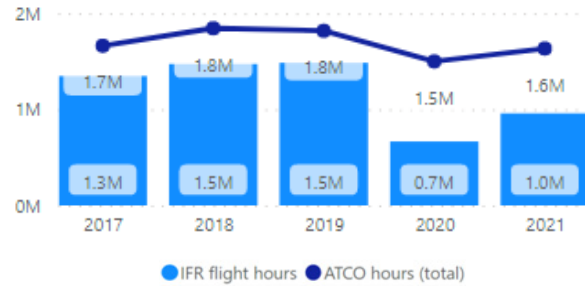


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

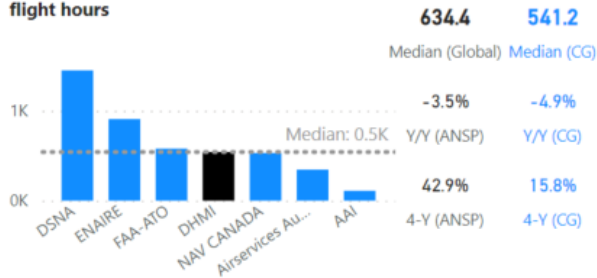


Total costs (USD) in 2021 increased by 38.2% compared to 2020, by 0.12bn (USD). ATCO in employment costs accounted for 19.0% of costs during 2021 for DHMI at 0.08bn USD, showing an increase of ca. 21.5% on 2020. IFR flight hours increased by 44.0% during 2021 but remained 35.4% below 2019 levels. ATCO hours increased by 0.1M (9.0%), but again fell short of 2019 by -10.1%.

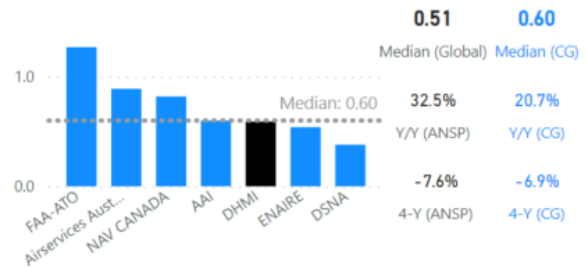
Performance in 2021 (key KPIs compared to CG)

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

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



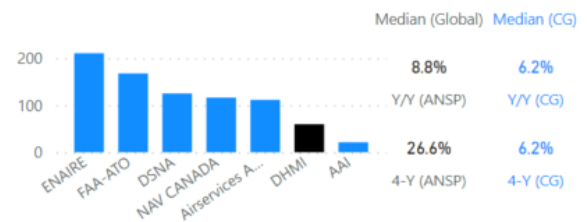
KPI 2B: ATCO in OPS hour productivity



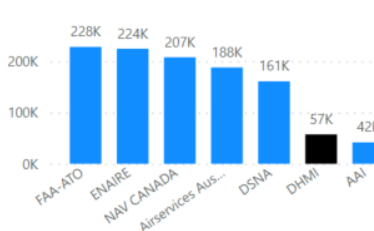
Comparing DHMI with other ANSPs in Comparator Group 1, DHMI had a Total cost per IFR flight hours at the group median, sitting at 541.2 USD for 2021. For KPI 2B, ATCO in OPS hour productivity, DHMI was just under the CG's median value (0.60) at 0.59.

For ATCO in OPS costs per ATCO in OPS hour DHMI had one of the comparator group's second lowest values, returning 59.5 USD for 2021.

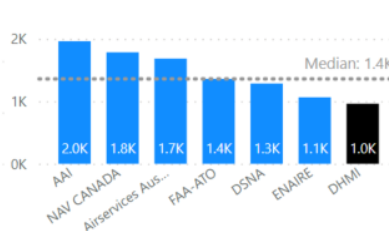
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



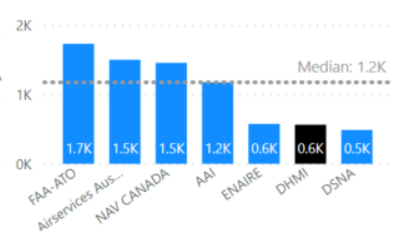
KPI 3A: Annual employment cost per ATCO in OPS



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 significantly below the next largest ANSP in the CG, DSNA, at 57.2K USD for 2021. Annual working hours per ATCO in OPS were 0.96K, the smallest in the comparator group. Annual IFR working hours per ATCO in OPS were under half of the CG's median value (ca. 1.2K) at 0.56K.

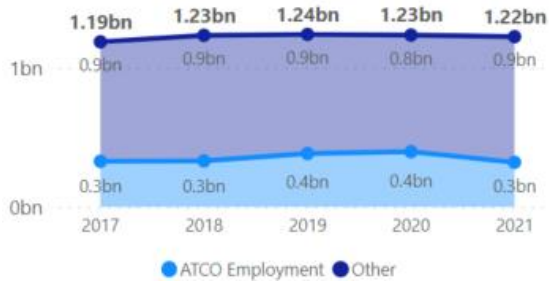


DSNA, France
Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

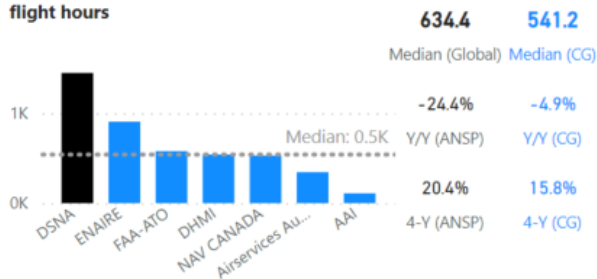


Total costs (USD) in 2021 decreased by 0.8% compared to 2020. ATCO in OPS employment costs decreased by 19.2% and amounted for 23.0% of Total costs. IFR flight hours increased by 50.5% but were still 45.0% below 2019. ATCO in OPS hours increased by 4.7% compared to 2020 and by 5.7% compared to 2019.

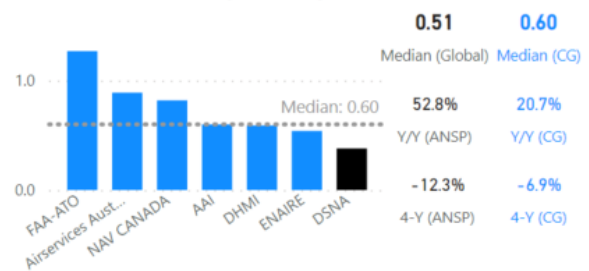
Performance in 2021 (key KPIs compared to CG)

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

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

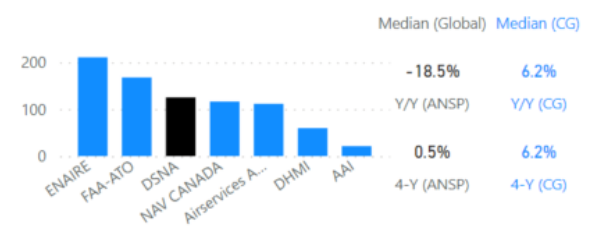


KPI 2B: ATCO in OPS hour productivity



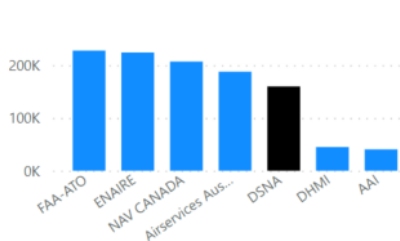
Comparing DSNA with other ANSPs in Comparator Group 1, DSNA had the highest Total cost per IFR flight hour (1,450 USD), almost three times the median value (541.2 USD, calculated for the CG). Linked to this performance, ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of DSNA was the lowest (0.38), near the half of the CG's median value (0.60).

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

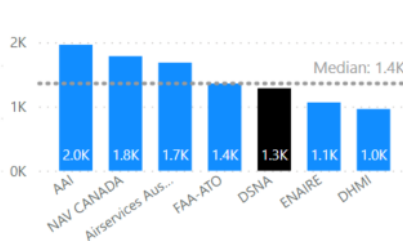


DSNA's ATCO in OPS costs per ATCO in OPS hour was 125 USD.

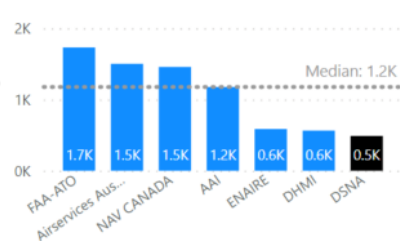
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



DSNA's Annual employment cost per ATCO in OPS was 161K USD, ca. 67K below FAA-ATO but ca. 120K above AAI or DHMI. Annual working hours per ATCO in OPS were 1,284, slightly below the CG's median value (1,358). Annual IFR hours per ATCO in OPS reached 489, almost third of CG's median value (1,175).

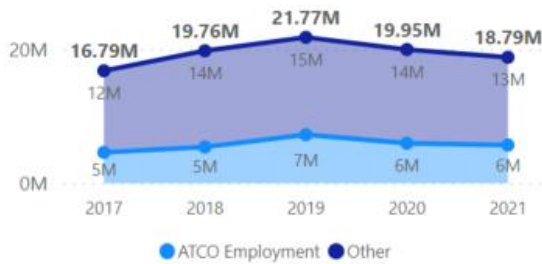


EANS, Estonia
Continental data

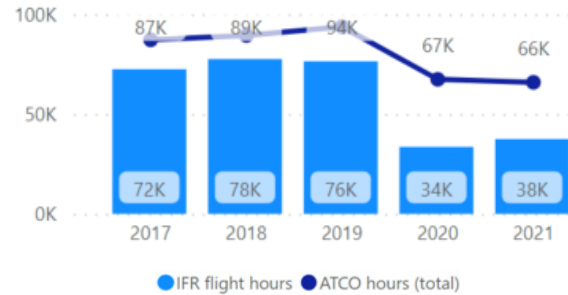


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

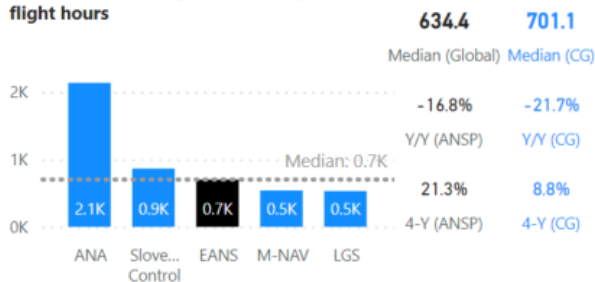


EANS' Total costs in USD during 2021 decreased by 5.8% to 18.79M, owing mostly to a decrease of 4.7% in non-ATCO employment costs. ATCO Employment costs accounted for around 30.0% of Total costs during 2021. IFR flight hours increased by 11.8% on 2020 but remained 50.9% below 2019 levels. ATCO in OPS Employment hours decreased only by 1K in 2020, but by 29.7% compared to 2019 figures.

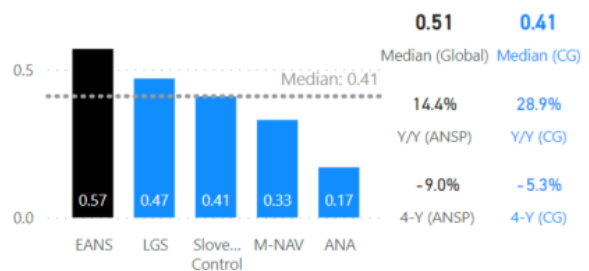
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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

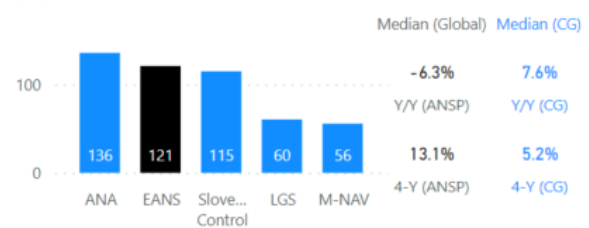


KPI 2B: ATCO in OPS hour productivity



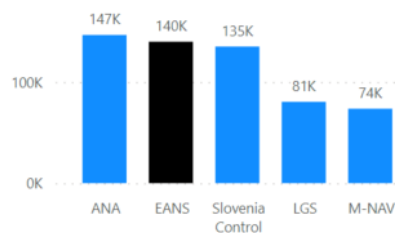
Comparing EANS with other ANSPs in Comparator Group 3, EANS had the median Total costs per IFR flight hours at 701.1 USD for the year. EANS performed above the CG's median for ATCO in OPS hour productivity, with 0.57.

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

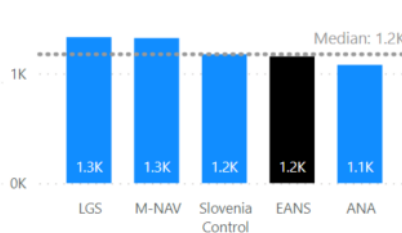


EANS' ATCO in OPS cost per ATCO in OPS hour was 121.1 USD.

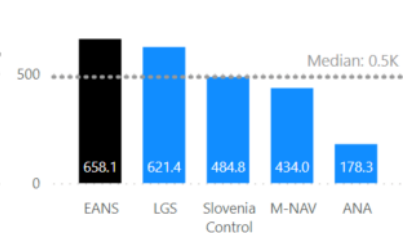
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



EANS' Annual employment cost per ATCO was very similar, yet just above Slovenia Control's figures for 2021 at 140K USD. Annual working hours per ATCO in OPS were the group median at 1,157 for 2021. Annual IFR hours per ATCO in OPS reached 658.1, the highest of the group.

ENAIRE 
ENAIRE, Spain
 Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

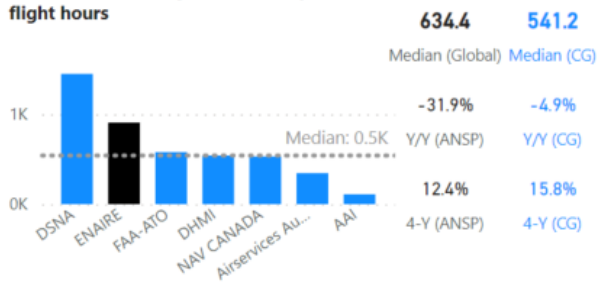


ENAIRE's Total costs for 2021 (USD) fell by 2.2% to 0.61bn. ATCO in OPS employment costs decreased by 2.6%, accumulating to 43.0% of costs during 2021. There was a minimal reduction (-0.5%) in ATCO hours during 2021 for ENAIRE, which remained at the 1.7M mark. IFR flight hours, however, increased by 28.6% to 0.9M during 2021.

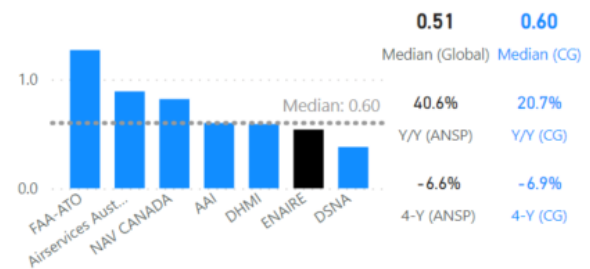
Performance in 2021 (key KPIs compared to CG)

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

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

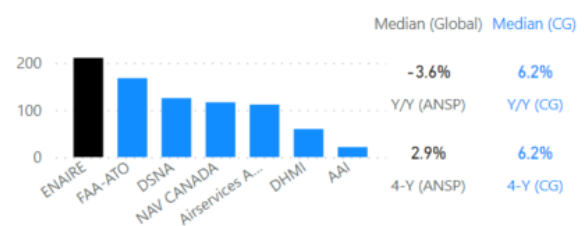


KPI 2B: ATCO in OPS hour productivity



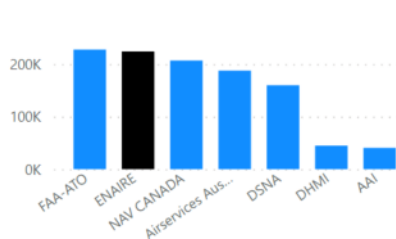
Comparing ENAIRE with other ANSPs in Comparator Group 1, ENAIRE had the second largest Total cost per IFR flight hour (908 USD). ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) returned at 0.54 for 2021, slightly below the CG's median.

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

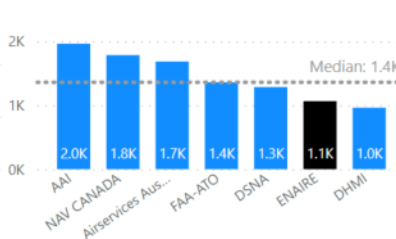


ENAIRE's ATCO in OPS costs per ATCO in OPS hour was 211 USD – the highest among the CG ANSPs.

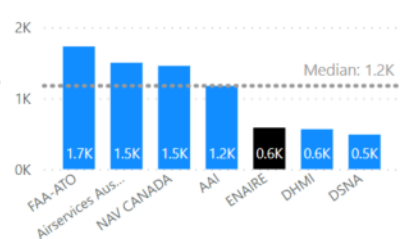
KPI 3A: Annual employment cost per ATCO in OPS



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 224K USD, slightly below the CG leader, FAA-ATO. ENAIRE recorded one of the lowest Annual working hours per ATCO in OPS in 2021 (1,064). Annual IFR hours per ATCO in OPS were 576 for ENAIRE in 2021.



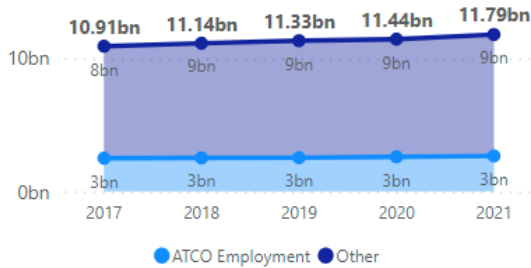
FAA-ATO, United States

Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

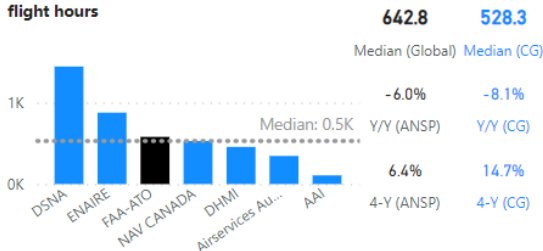


FAA-ATO's Total costs (USD) in 2021 increased by 3.0% compared to 2020 costs, as there were only small increases to both ATCO employment costs and Other costs during the year. IFR flight hours increased by 7.1% during 2021 yet remained below 2019 levels by around 5M. ATCO hours stayed consistent at 16M in 2021.

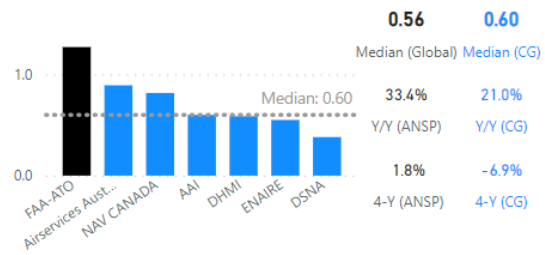
Performance in 2021 (key KPIs compared to CG)

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

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

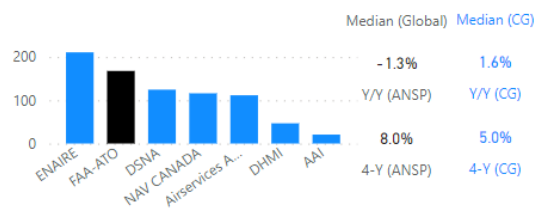


KPI 2B: ATCO in OPS hour productivity



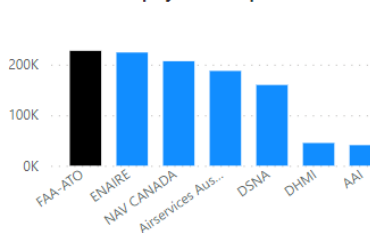
Comparing FAA-ATO with other ANSPs in Comparator Group 1, FAA-ATO had a Total cost per IFR flight hours close to the median of the CG at 578.86 USD. For ATCO in OPS hour productivity, the FAA-ATO was the comparator group leader at 1.27, significantly higher than the next closest, Airservices Australia.

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

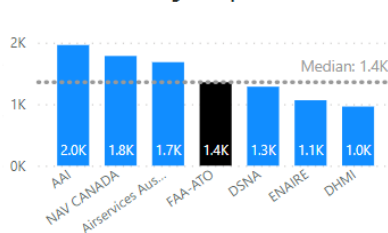


For ATCO in OPS cost per ATCO in OPS hour, the FAA-ATO was 167.53 USD.

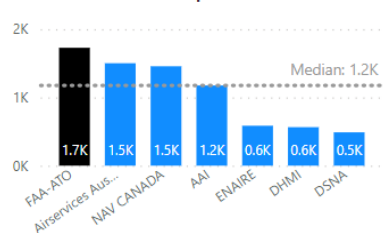
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



FAA-ATO's Annual employment cost per ATCO in OPS was 227K USD, the highest of the group. Annual working hours per ATCO in OPS were 1.4K, at the CG's median value. Annual IFR hours per ATCO in OPS were the highest of the group, at 1.7K.



HungaroControl, Hungary Continental data

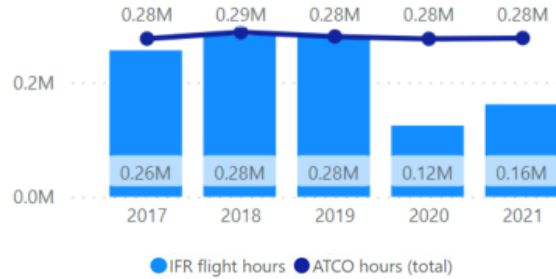


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

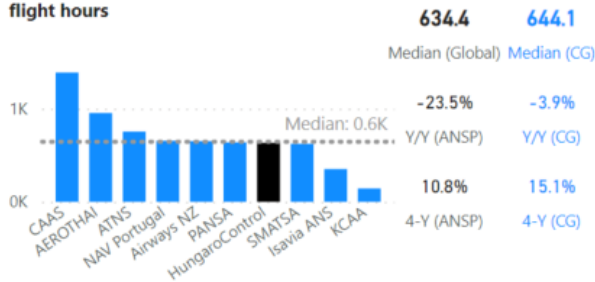


In 2021, the Total costs for HungaroControl rose slightly by 1.2%, with Other Costs rising by 10M to 0.08bn during the year, accounting for just over 75% during the year. ATCO in Employment costs remained at a stable level at 0.03bn. IFR flight hours saw an increase of around a third to 0.16M, whilst ATCO in OPS employment hours remained constant at the 0.28M level.

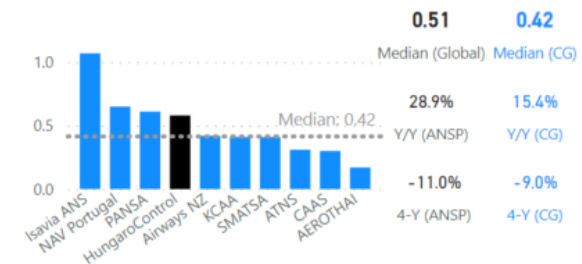
Performance in 2021 (key KPIs compared to CG)

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

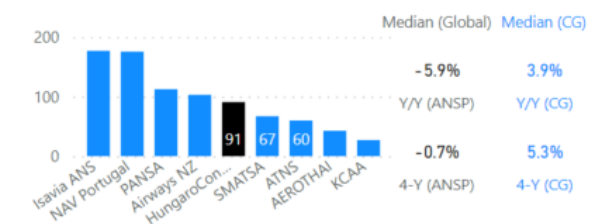


KPI 2B: ATCO in OPS hour productivity



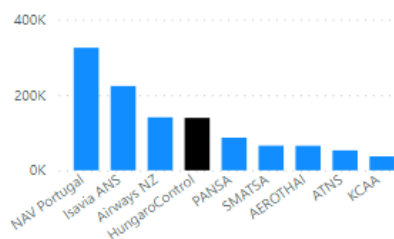
Comparing HungaroControl with other ANSPs in Comparator Group 2, HungaroControl had one of the lowest Total costs per IFR flight hour (632 USD), close to the median CG value of 644.1 USD. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of HungaroControl was above the median at 0.58.

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

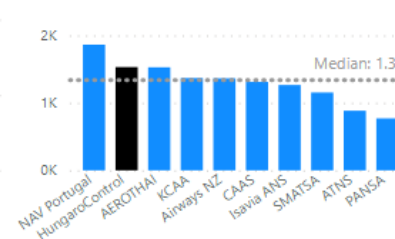


HungaroControl's ATCO in OPS cost per ATCO in OPS hour was 90.9 USD.

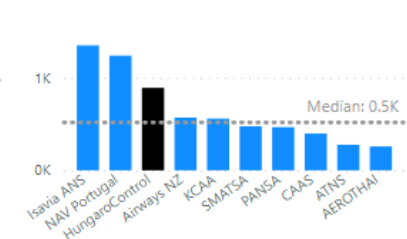
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



HungaroControl's Annual employment cost per ATCO in OPS decreased to 139K USD, similar to Airways NZ figures. Annual working hours per ATCO in OPS came in above the median at 1,531, similarly to AEROTHAI's figures during 2021. HungaroControl's Annual IFR hours per ATCO in OPS had a relatively large yearly increase to 829 for 2021.

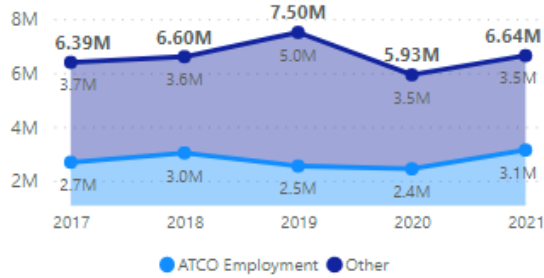


Isavia ANS, Iceland Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

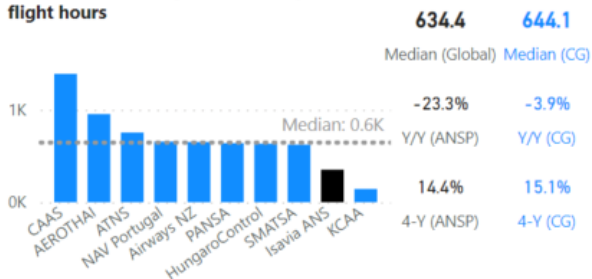


Isavia ANS increased their Total costs (USD) in 2021 to 6.64M, a 12.0% increase compared to 2020 costs. ATCO costs increased by 0.7M, accounting for 47.0% of Isavia ANS's Total costs. IFR flight hours grew by 42.8% to 19K but remained well below 2019 levels. ATCO hours for Isavia ANS reduced by 5K to 81K, the lowest figure during the five reporting years.

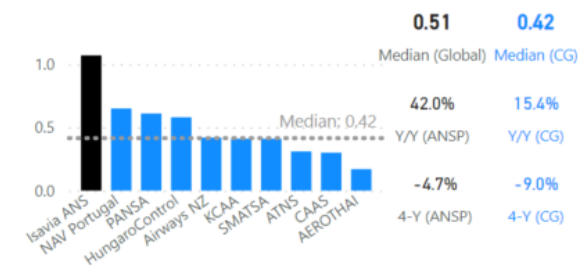
Performance in 2021 (key KPIs compared to CG)

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



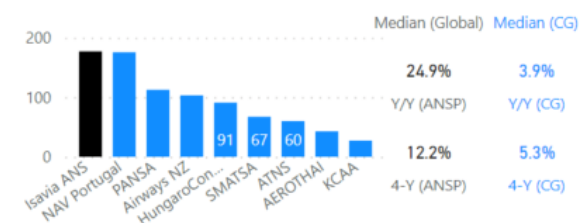
KPI 2B: ATCO in OPS hour productivity



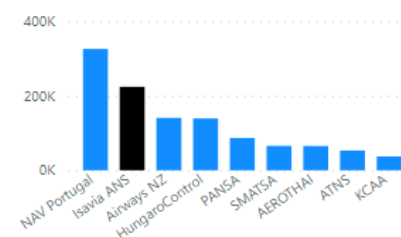
Comparing Isavia ANS with other ANSPs in Comparator Group 2, Isavia ANS' Total cost per IFR flight hours during 2021 was 351 USD, well below the CG's median. On the other hand, ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) was the largest in the CG at 1.07, over double the CG's median.

Isavia ANS' ATCO in OPS cost per ATCO in OPS hour was the largest in the comparator group at 177.0 USD.

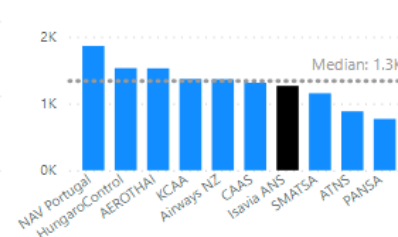
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



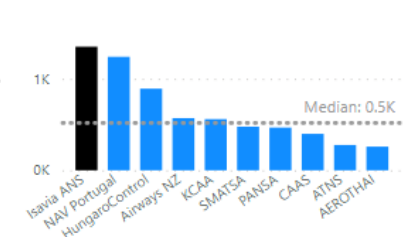
KPI 3A: Annual employment cost per ATCO in OPS



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 2021 was 224K USD, above the median for the CG. Annual working hours per ATCO in OPS for Isavia ANS were relatively close to the CG's median, at 1,265. Isavia ANS had the largest Annual IFR hours per ATCO in OPS amongst the CG, rising 22.0% from 2020 values to 1,350.



KCAA, Kenya
Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

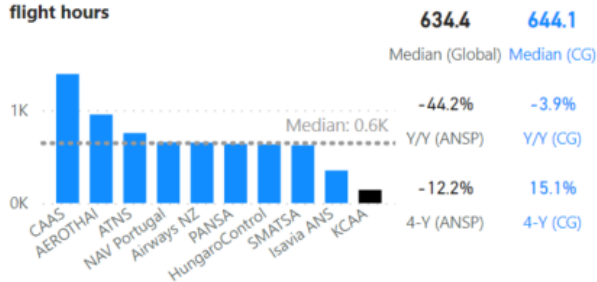


Total costs (USD) in 2021 fell by 30.5% compared to 2020. Whilst Other costs had the greatest decrease, reducing by roughly 50% from 2020 figures, ATCO employment costs rose by 1M. IFR flight hours rose by 20.9% from 2020 and aligned closely with 2019 figures. ATCO hours reduced by 10.0% during 2021.

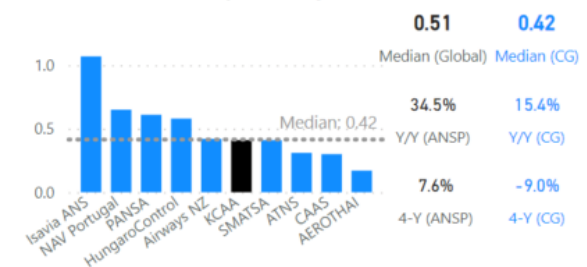
Performance in 2021 (key KPIs compared to CG)

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

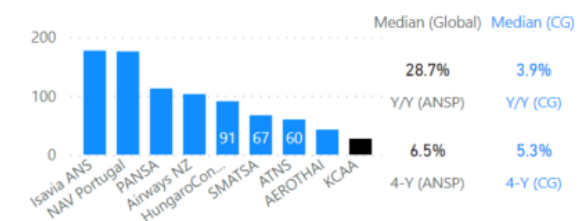


KPI 2B: ATCO in OPS hour productivity



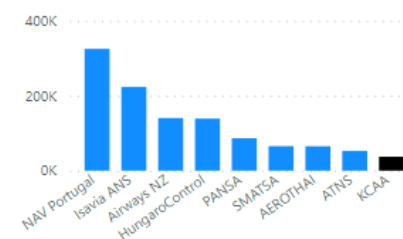
Comparing KCAA with other ANSPs in Comparator Group 2, KCAA had the lowest Total cost per IFR flight hour at 143 (USD), far less than the group median (644.1 USD). ATCO in OPS hour productivity rose by 34% compared to 2020 figures to 0.41, slightly below the CG's median.

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

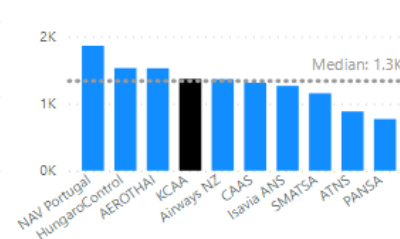


ATCO in OPS cost per ATCO in OPS hour was again the lowest of the CG at 27.1 USD.

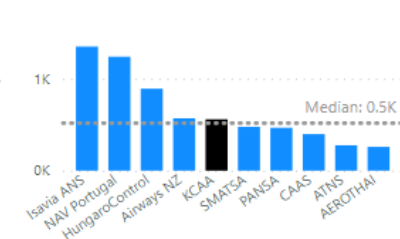
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



KCAA's Annual employment cost per ATCO in OPS was the CG's lowest value at 37K USD during 2021, far away from the group leader, NAV Portugal (327K USD). Annual working hours per ATCO in OPS were slightly above the CG's median at 1,368. For KCAA's Annual working IFR hours per ATCO in OPS, fell close to the CG's median at a value of 559 for 2021.



LGS, Latvia
Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

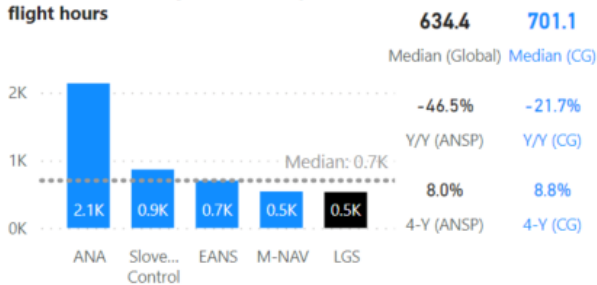


Total costs (USD) in 2021 for LGS decreased by 18.9% to 17.91M, the lowest over the 5-year reporting period. ATCO employment costs remained stable at ca. 4M. IFR flight hours saw a significant increase of 20.6%, yet still 48.3% below 2019 levels. ATCO hours, increased by 3.1% compared to 2020.

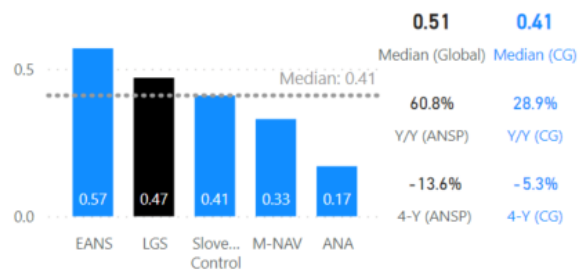
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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

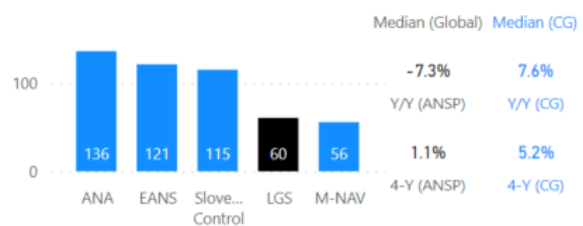


KPI 2B: ATCO in OPS hour productivity



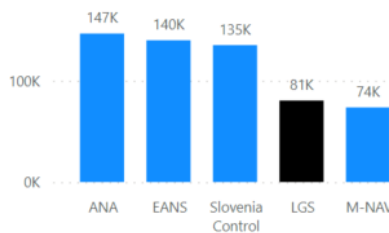
Comparing LGS with other ANSPs in Comparator Group 3, LGS had the lowest Total cost per IFR flight hour at 0.5K well below the median value (701.1 USD), calculated for the CG. On the other hand, the ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of LGS was the second highest (0.47), slightly more than the CG's median (0.41).

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

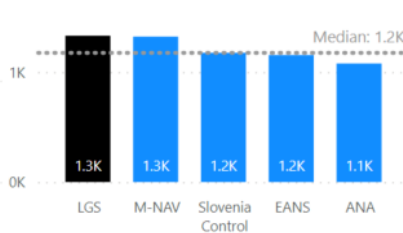


LGS' ATCO in OPS cost per ATCO in OPS hour was the lowest of the group at 60.4 USD.

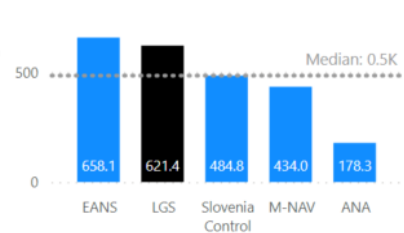
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



LGS' Annual employment cost per ATCO in OPS was 81K, only around 7K more than the lowest ANSP in the CG. Annual working hours per ATCO in OPS for LGS were the highest for the group at 1.3K, around 0.1K greater than the group median. LGS was by far the second highest scoring ANSP in Annual IFR hours per ATCO in OPS with 621.4.



M-NAV, North Macedonia
Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

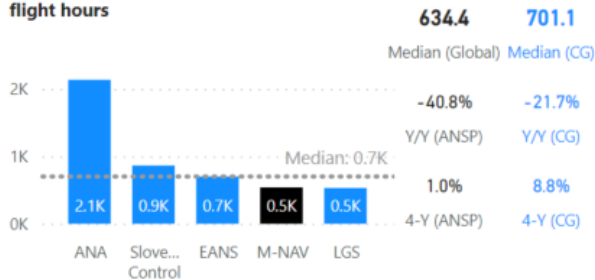


M-NAV's Total costs for 2021 (USD) fell by 6.4% to 14.28M. ATCO in OPS employment costs decreased by around 1M USD. ATCO in OPS employment costs represented 31.0% of Total costs during 2021. IFR hours rose during 2021, however these remained around 29.7% below 2019 figures. ATCO hours fell by 1.0% but showed a growth of 10.8% compared to 2019 figures.

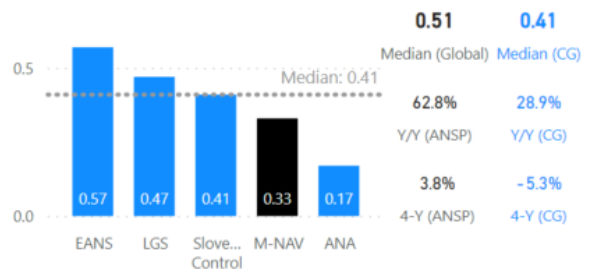
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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



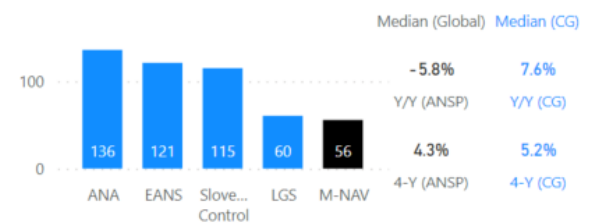
KPI 2B: ATCO in OPS hour productivity



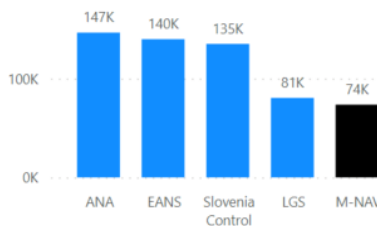
Comparing M-NAV with other ANSPs in Comparator Group 3, M-NAV's Total costs per IFR flight hours fell below the group median, but similarly to that of the lowest ANSP, LGS. For ATCO in OPS hour productivity, M-NAV fell below the CG's median at 0.33, still significantly below the group leader EANS.

ATCO in OPS cost per ATCO in OPS hour was 55.7 USD.

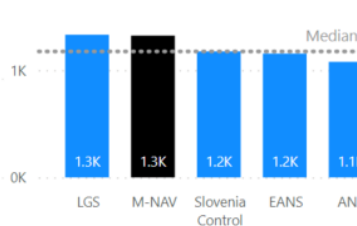
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



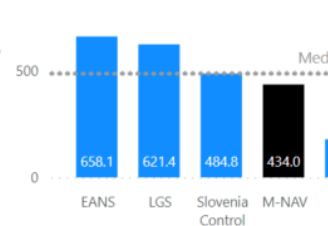
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



M-NAV's Annual employment cost per ATCO in OPS was the lowest of the group at 73.7K USD, almost half that of the CG leader, ANA. Annual working hours per ATCO in OPS were slightly above the CG's median at 1.3K. Annual IFR hours per ATCO in OPS were 434.0, just below the CG median.

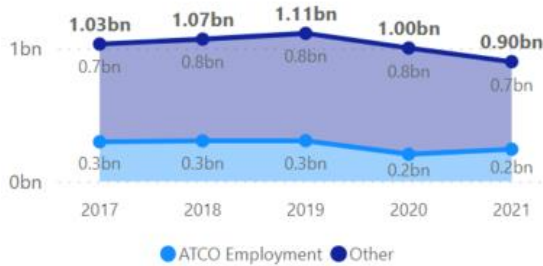


NAV CANADA, Canada
Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

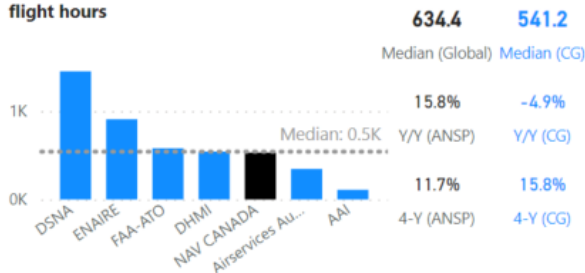


NAV CANADA's Total costs (USD) reduced by 10.2% as a result of decreased non-ATCO employment costs. ATCO employment costs accounted for 27.0% of total costs during 2021, increased by 2.0% from 2020. IFR hours reduced by 23.6% compared to 2020 and were nearly half that of 2019 levels (46.3% less). ATCO hours rose by 4.3% during 2021.

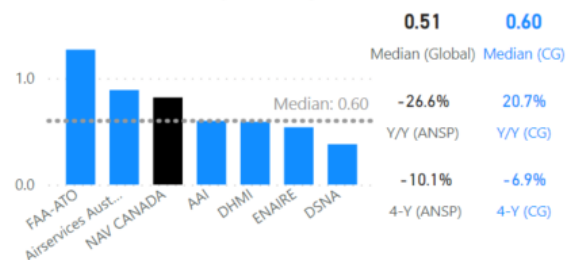
Performance in 2021 (key KPIs compared to CG)

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

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

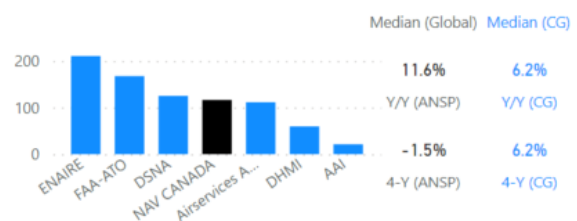


KPI 2B: ATCO in OPS hour productivity



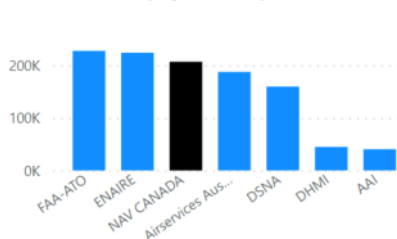
Comparing NAV CANADA with other ANSPs in Comparator Group 1, NAV CANADA had just below the median Total cost per IFR flight hour (529.8 USD). For ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours), NAV CANADA performed above the CG's median at 0.82.

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

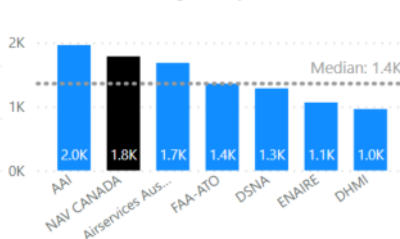


NAV CANADA's ATCO in OPS costs per ATCO in OPS hour was 116.2 USD.

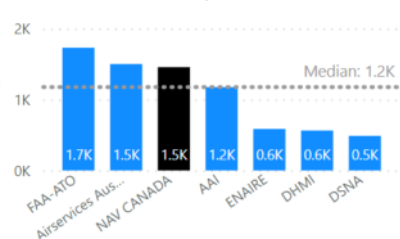
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



NAV CANADA's Annual employment cost per ATCO in OPS was slightly above the median at 207K (USD) for 2021. Annual working hours per ATCO in OPS were 1,784, around 0.4K above the median for the CG. Annual IFR hours per ATCO in OPS sat around 25% above the CG's median at 1.5K.



NAV Portugal, Portugal
Continental data

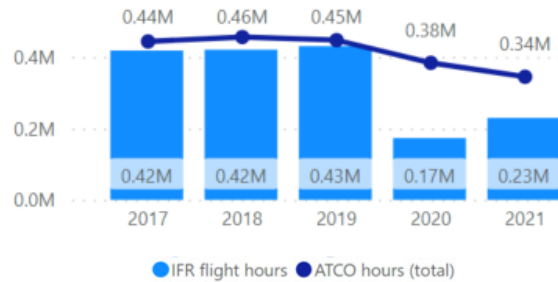


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

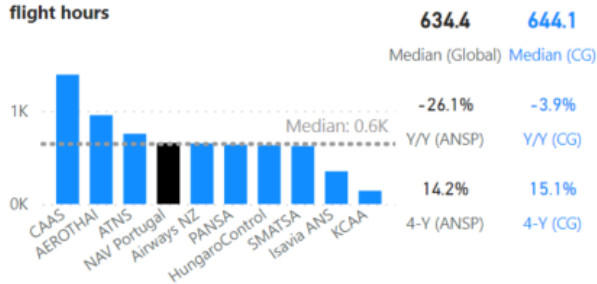


For NAV Portugal, Total costs (USD) reduced slightly, but remained close to the 0.11bn mark. The ATCO Employment costs fell by 11.9% and accounted for 41% of total costs. ATCO hours reduced by 10.2% in 2021 and remained 22.9% below 2019 figures. IFR flight hours increased by 30.4% over 2020 but were nearly half that of 2019.

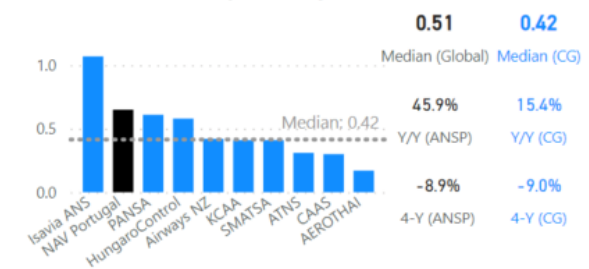
Performance in 2021 (key KPIs compared to CG)

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

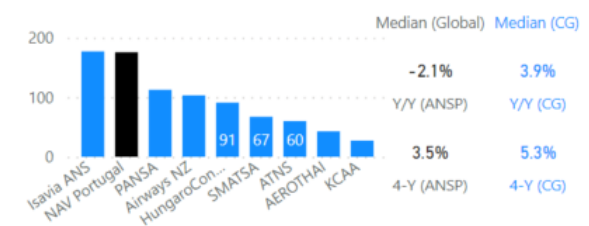


KPI 2B: ATCO in OPS hour productivity



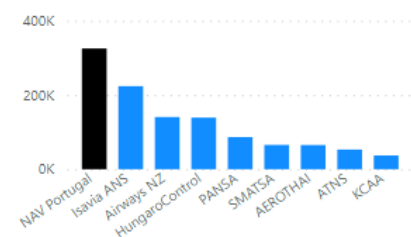
Comparing NAV Portugal with other ANSPs in Comparator Group 2, NAV Portugal fell just above the median for Total costs per IFR flight hours at 655 USD, however remained far below the CG leader, CAAS. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) for NAV Portugal was 0.65, the second largest of the CG.

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

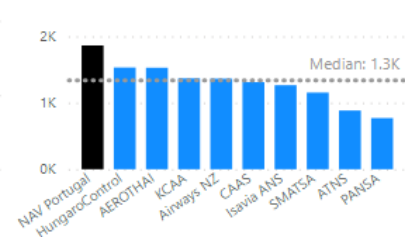


NAV Portugal's ATCO in OPS costs per ATCO in OPS hour was 175.5 USD.

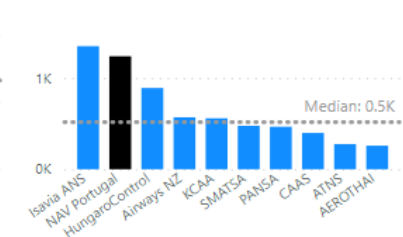
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



NAV Portugal was the group leader for Annual employment cost per ATCO in OPS at 327K USD, around 100K USD more than Isavia ANS. Again, for Annual working hours per ATCO in OPS, NAV Portugal was the CG leader at 1,863. Annual IFR hours per ATCO in OPS reached 1.2K, slightly below the group leader Isavia ANS.



PANSNA, Poland
Continental data

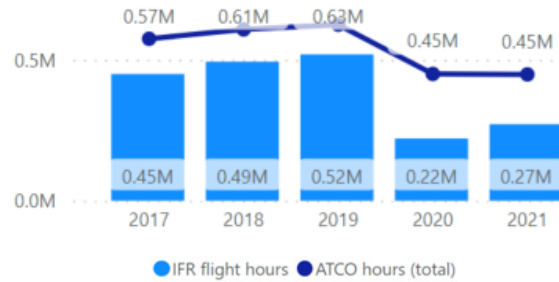


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

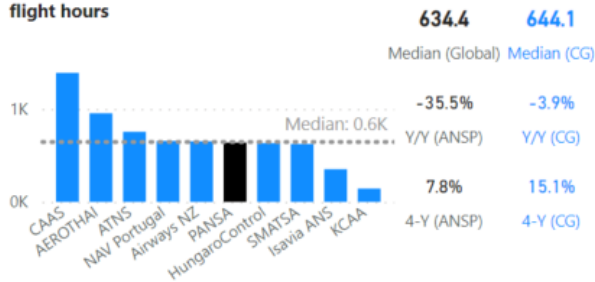


Total costs (USD) in 2021 for PANSNA decreased by 19.9% during the year, with ATCO costs providing the biggest decrease of 34.3%. IFR flight hours showed growth for PANSNA in 2021, increasing by 23.0%, however these remained 47.7% lower than in 2019. ATCO hours remained consistent at 0.45M, however these also remained below 2019 levels by 28.2%.

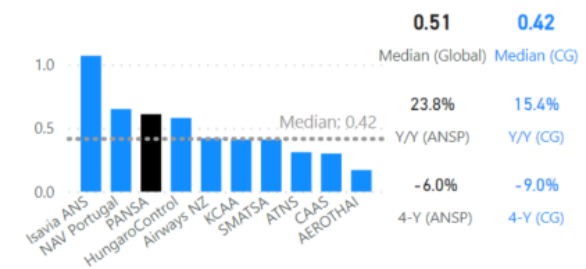
Performance in 2021 (key KPIs compared to CG)

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

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



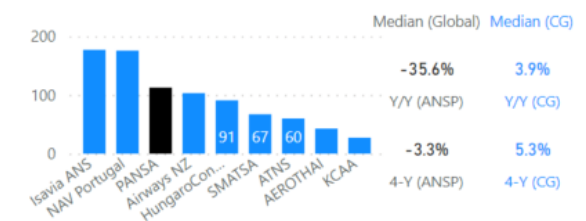
KPI 2B: ATCO in OPS hour productivity



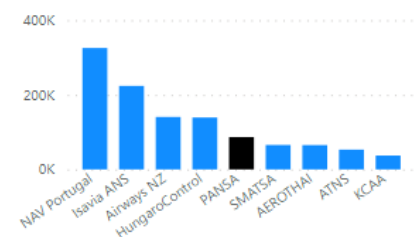
Comparing PANSNA with other ANSPs in Comparator Group 2, PANSNA had a Total costs per IFR flight hour (637 USD) very close to CG median value of 644.1 USD. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of PANSNA was higher than the CG's median at 0.61.

PANSNA's ATCO in OPS cost per ATCO in OPS hour was 112.5 USD.

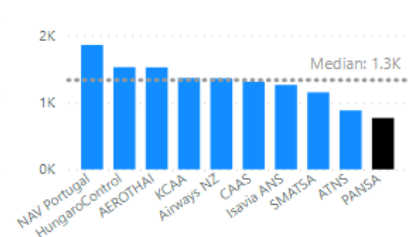
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



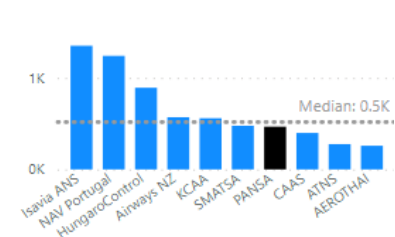
KPI 3A: Annual employment cost per ATCO in OPS



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 PANSNA in 2021 was 87K USD, relatively close to the median for the CG. Annual working hours per ATCO in OPS for PANSNA were the lowest of the CG at 770. PANSNA's Annual IFR hours per ATCO in OPS were close to the CG's median, rising 23% on 2020 values to 467.



Slovenia Control, Slovenia

Continental data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

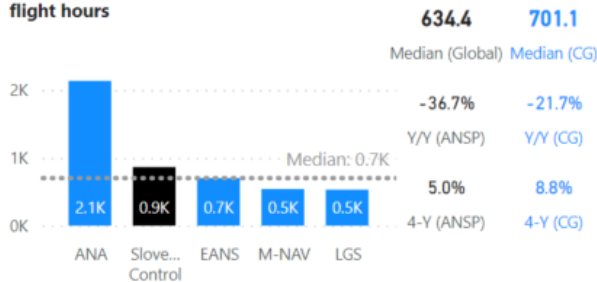


Total costs (USD) in 2021 decreased by 12.5% compared to 2020. ATCO in OPS employment costs rose by only 1.0% and amounted to 32% of Total costs. IFR flight hours increased by 42.8% but remained 36.9% below 2019 values. ATCO in OPS rose by 10.7%, however were still 19.7% below 2019.

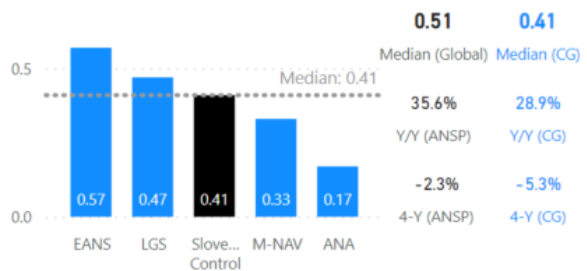
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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

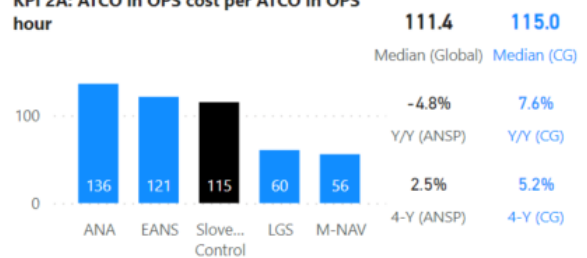


KPI 2B: ATCO in OPS hour productivity



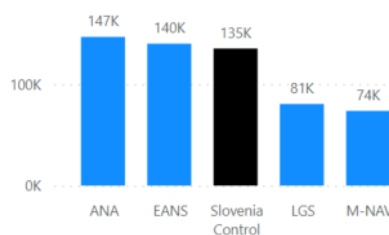
Comparing Slovenia Control with other ANSPs in Comparator Group 3, in terms of Total cost per IFR flight hour (863.8USD), Slovenia Control was above the median value (701.1 USD) calculated for the CG. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of Slovenia Control was equal to CG's median value (0.41).

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

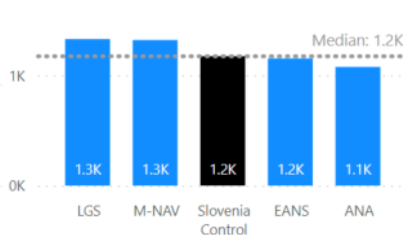


Slovenia Control's ATCO in OPS cost per ATCO in OPS hour was 115.0 USD, the median of the CG.

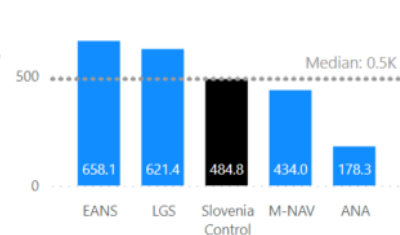
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Slovenia Controls' Annual employment cost per ATCO in OPS was 135K USD, the median of the group. Annual working hours per ATCO in OPS were 1,176, again the median of the CG. Annual IFR hours per ATCO in OPS reached 484.8.

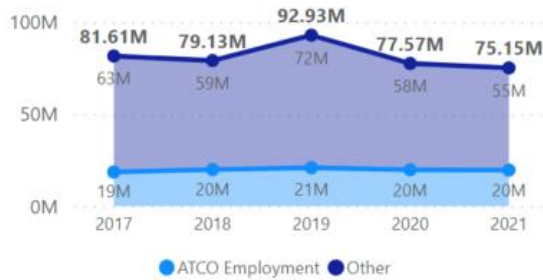


SMATSA, Serbia and Montenegro
Continental data

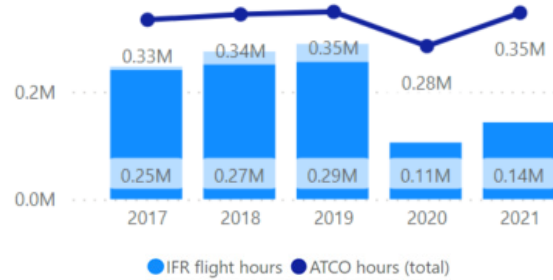


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

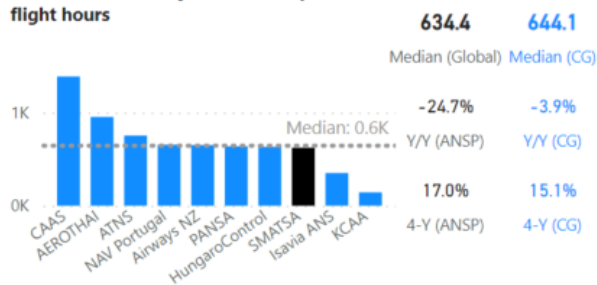


SMATSA's total costs for 2021 reduced by roughly 3.1% in comparison to 2020 figures, with ATCO costs accounting for 26.0% of total costs during 2021. Whilst IFR flight hours showed growth for SMATSA in 2021, increasing by 35.7%, this still remained 50.5% below 2019 levels. ATCO hours returned to 2019 levels through a growth of 21.8% year on year.

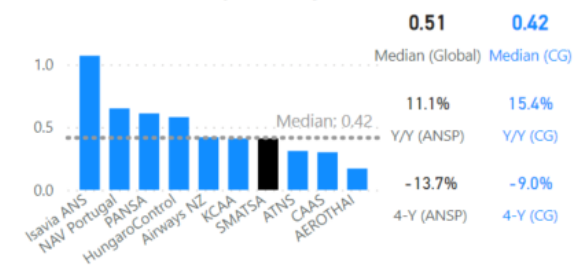
Performance in 2021 (key KPIs compared to CG)

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

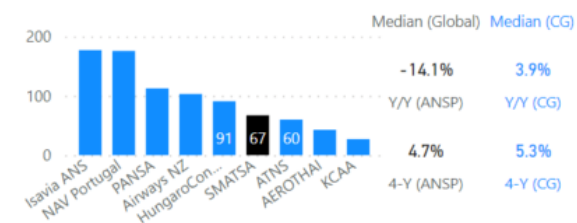


KPI 2B: ATCO in OPS hour productivity



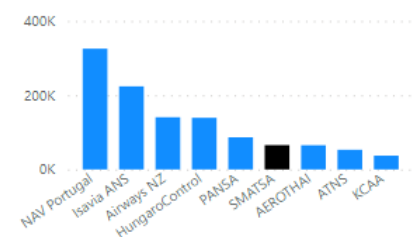
Comparing SMATSA with other ANSPs in Comparator Group 2, SMATSA had one of the lowest Total costs per IFR flight hours for the CG at 622.0 USD, slightly under the CG median. For ATCO in OPS hour productivity, SMATSA was narrowly below the CG's median at 0.41.

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

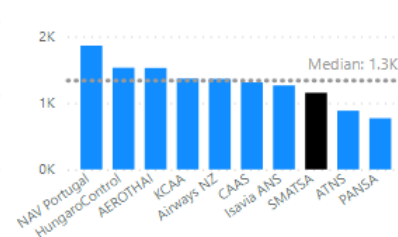


In ATCO in OPS cost per ATCO in OPS hour, SMATSA had one of the median figures at 67.1 USD.

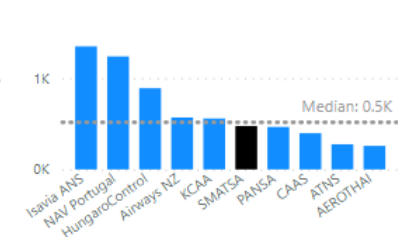
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Annual employment cost per ATCO in OPS for SMATSA was one of the CG's lowest figures at 77.5K USD, similar to AEROTHAI. Annual working hours per ATCO in OPS were below the CG's median value (1.3K), growing 23% to 1,154. SMATSA was just below the CG's median for Annual IFR hours per ATCO in OPS, giving 0.5K for the year.



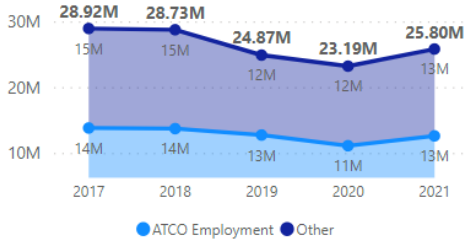
Airservices Australia, Australia

Oceanic data

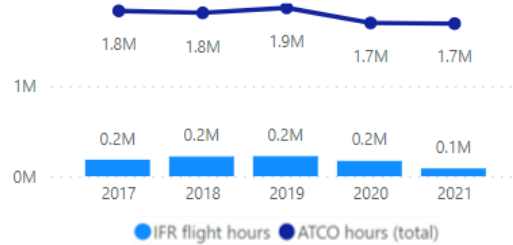


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

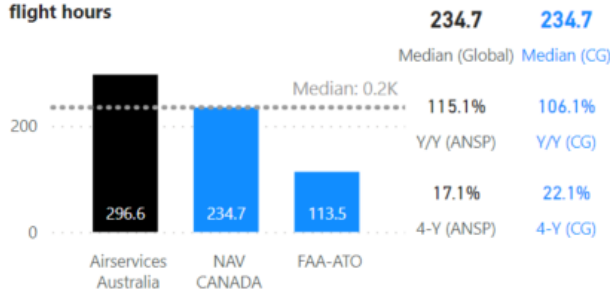


Total costs (USD) in 2021 increased by 11.2% compared to 2020. ATCO in OPS employment costs increased by 18.2% and amounted for around 50.4% of total costs. IFR flight hours reduced by 50.0% during 2021 and remained well below 2019 levels. Compared to 2020 ATCO hours remained without fluctuation at 1.7M.

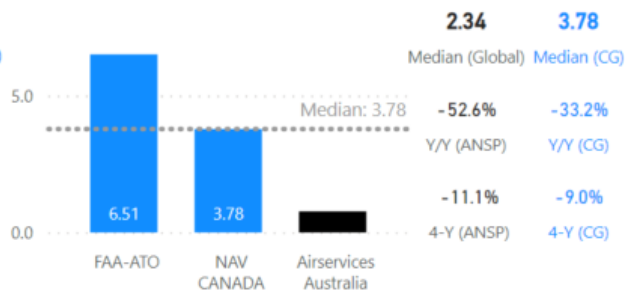
Performance in 2021 (key KPIs compared to CG)

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

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

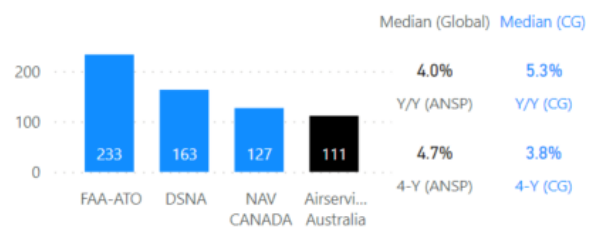


KPI 2B: ATCO in OPS hour productivity



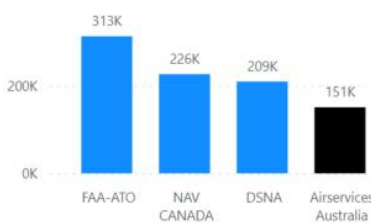
Comparing Airservices Australia with other ANSPs in Comparator Group 1, in terms of Total cost per IFR flight hour (296.6 USD) Airservices Australia was slightly above the median value (234.7 USD, calculated for the CG). ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of Airservices Australia was 0.77 with the CG's median value being 3.78.

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

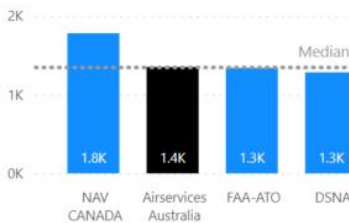


Airservices Australia's ATCO in OPS cost per ATCO in OPS hour was 111 USD, the lowest compared to the CG performance.

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



Airservices Australia's Annual employment cost per ATCO in OPS was 151K USD, the lowest in the CG. KPI 3B, Annual working hours per ATCO in OPS was slightly above the CG's median with 1.4K. Annual IFR hours per ATCO in OPS were well below the rest of the CG, showing 1K for the year.



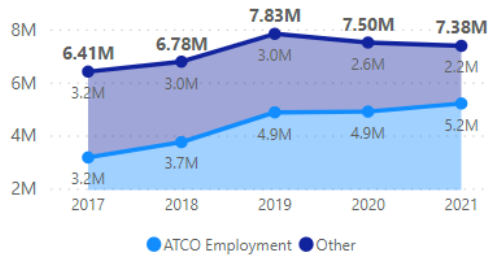
Airways NZ, New Zealand

Oceanic data

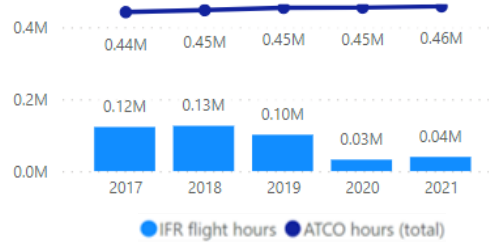


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

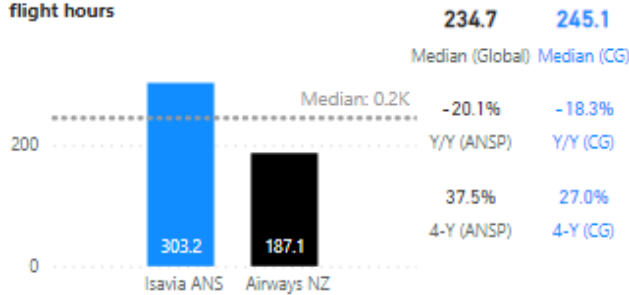


Total costs in USD during 2021 for Airways NZ decreased by 1.7% compared to 2020. ATCO in OPS employment costs increased by 6.1% over the year to a peak over the reporting period. IFR flight hours increased by 33.3% from 2020 but remained 60.0% under 2019 levels.

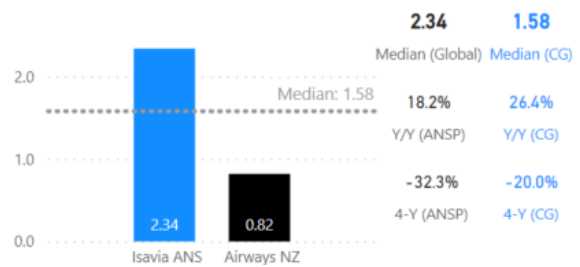
Performance in 2021 (key KPIs compared to CG)

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

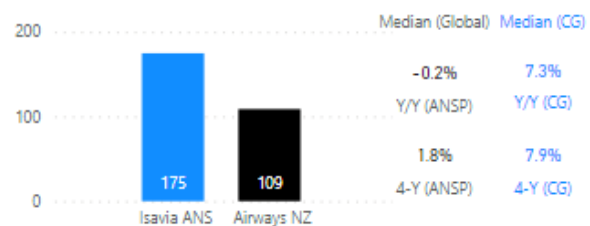


KPI 2B: ATCO in OPS hour productivity



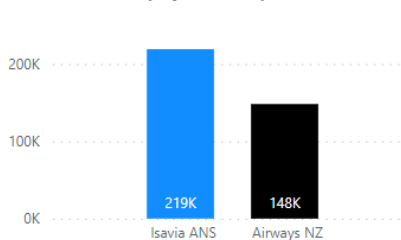
Comparing Airways NZ with other ANSPs in Comparator Group 2, Airways NZ had lower Total cost per IFR flight hour (187.1 USD). In ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours), Airways NZ was well below the CG's median value with 0.82.

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

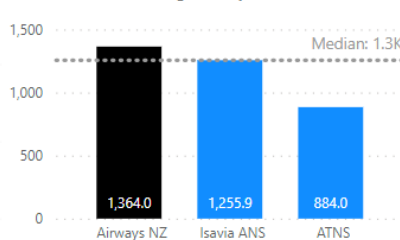


Airways NZ's ATCO in OPS cost per ATCO in OPS hour was 109 USD.

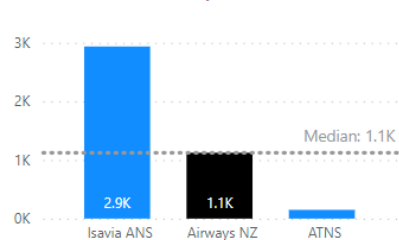
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Airways NZ held the lower value of 148K USD for Annual employment per ATCO in OPS, 61K below Isavia ANS. For Annual working hours per ATCO in OPS, Airways NZ had the largest value at 1,364. Airways NZ was at the CG's median value in terms of Annual IFR hours per ATCO in OPS.

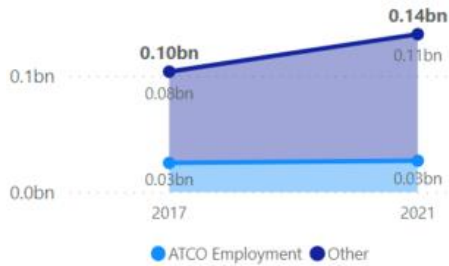


DSNA, France
Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

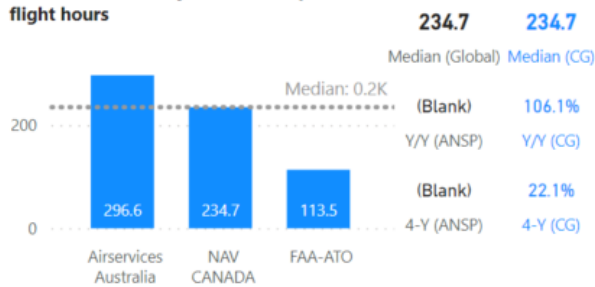


DSNA did not provide data for 2018, 2019 nor 2020, and therefore year-on-year comparison is possible for 2021. DSNA's total costs (USD) in 2021 was 0.14bn, largely composed of a non-ATCO costs (0.11bn). DSNA did not submit 2021 Oceanic IFR flight hours and therefore no comparison is possible for KPI1, KPI2B or KPI 3C.

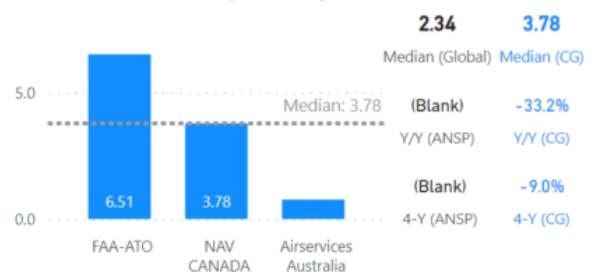
Performance in 2021 (key KPIs compared to CG)

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

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

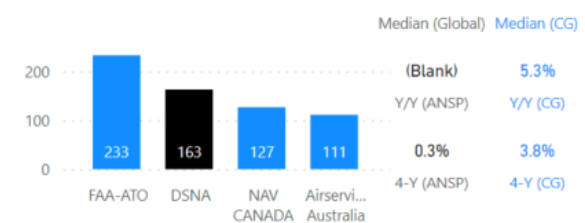


KPI 2B: ATCO in OPS hour productivity



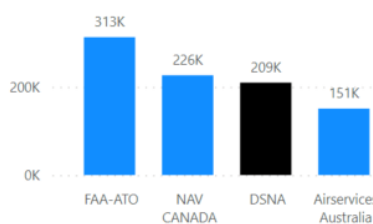
DSNA did not submit data for Total costs per IFR flight hours and ATCO in OPS hour productivity during 2021, and hence no comparison is available.

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

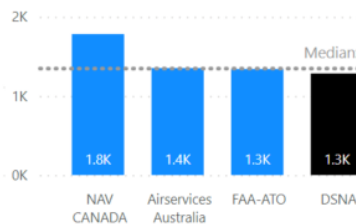


DSNA ATCO in OPS cost per ATCO in OPS hour was 163 USD, slightly above the CG's median (145 USD).

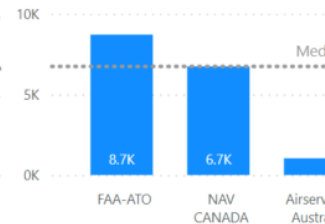
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Annual employment cost per ATCO in OPS for DSNA was 209K USD, closely to the CG's median. In terms Annual working hours per ATCO in OPS, DSNA and FAA-ATO performed similarly with 1.3K. DSNA did not submit data for Annual IFR hours, and hence no comparison is available for KPI 3C.

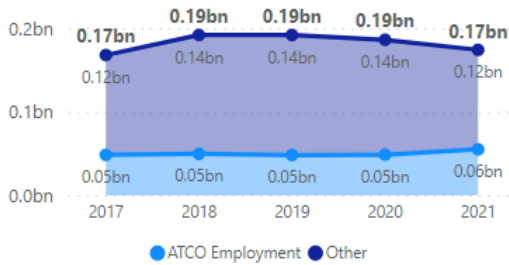


FAA-ATO, United States
Oceanic data

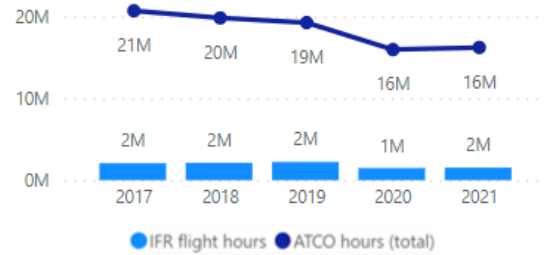


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

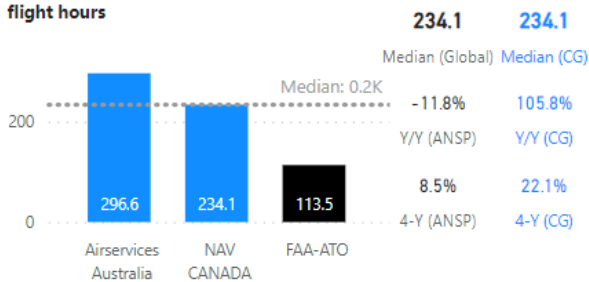


The FAA-ATO reduced their Total costs (in USD) by 0.2bn during 2021, owing to a reduction in non-ATCO employment costs during the year. ATCO in OPS employment hours in 2021 remained consistent with 2020.

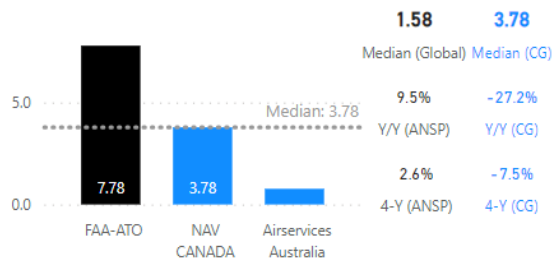
Performance in 2021 (key KPIs compared to CG)

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

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

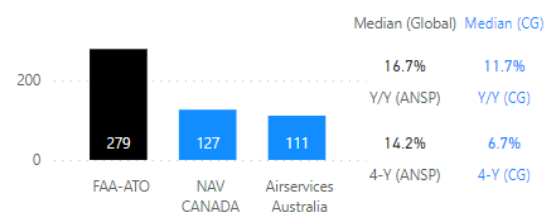


KPI 2B: ATCO in OPS hour productivity



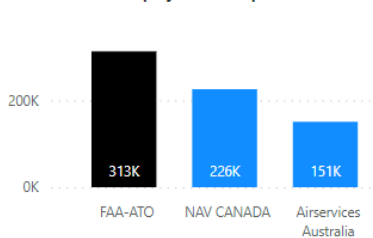
Comparing FAA-ATO with other ANSPs in Comparator Group 1, FAA-ATO had the lowest Total cost per IFR flight hours with 113.5 over half that of the CG's median. Conversely, FAA-ATO's ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) was the largest in the CG at 7.78, nearly double that of NAV CANADA.

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

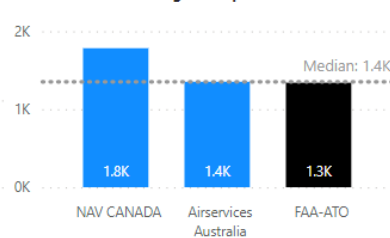


FAA-ATO's ATCO in OPS cost per ATCO in OPS hour was 279 USD.

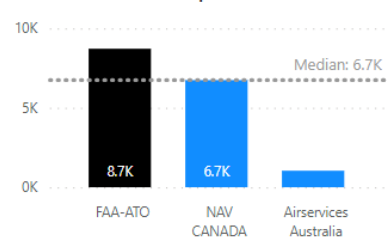
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



FAA-ATO's Annual employment cost per ATCO in OPS was 313K USD, the largest in the CG. The FAA-ATO's Annual working hours per ATCO in OPS were close to CG's median at 1.3K. In terms of Annual IFR hours per ATCO in OPS, FAA-ATO was the CG leader with 8.7K, ca. 2K above the CG's median.

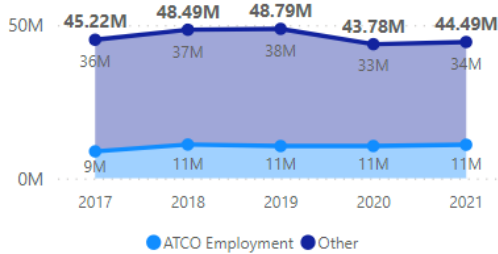


Isavia ANS, Iceland
Oceanic data

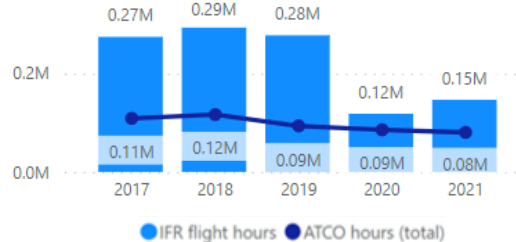


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours



Total costs (USD) in 2021 increased by 1.6% mostly driven by increased non-ATCO employment costs. ATCO employment costs remained at 11M, as in the fourth year in a row. There was a relatively substantial increase in IFR flight hours, by 25.0% during the year, whilst ATCO hours decreased by 0.01M. Both values remained well below 2019 figures.

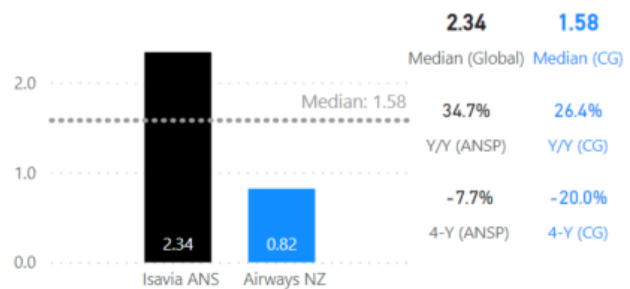
Performance in 2021 (key KPIs compared to CG)

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

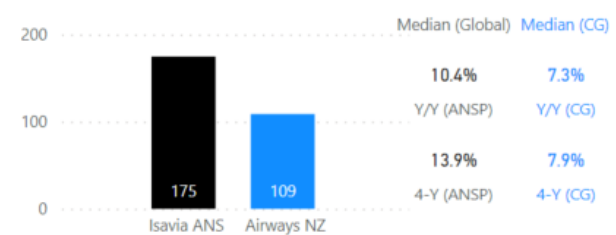


KPI 2B: ATCO in OPS hour productivity



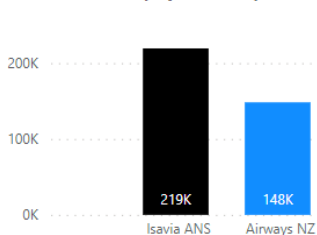
Comparing Isavia ANS with other ANSPs in Comparator Group 2, Isavia ANS had higher total cost per IFR flight hours (303.2) than Airways NZ. On the other hand, Isavia ANS led the ATCO in OPS hour productivity at 2.34, which was at the global median (2.34).

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

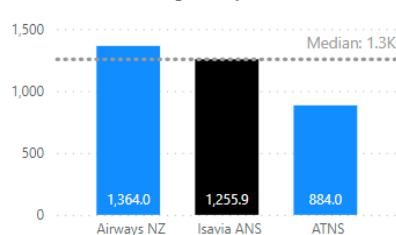


In terms of ATCO in OPS cost per ATCO in OPS hour, Isavia ANS had the largest value of the two oceanic ANSPs in the CG2 at 175 USD.

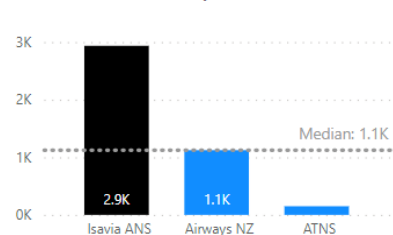
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Isavia ANS' Annual employment per ATCO in OPS was 219K USD, significantly larger than that of Airways NZ. In terms of the annual working hours per ATCO in OPS, Isavia ANS was at the CG's median, with 1,256 hours. Isavia ANS was again the group leader with Annual IFR hours per ATCO in OPS, being more than double that of the CG's median with 2.9K.

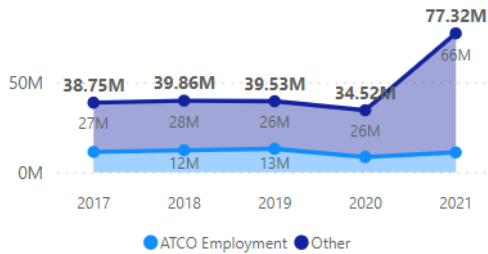


NAV CANADA, Canada
Oceanic data

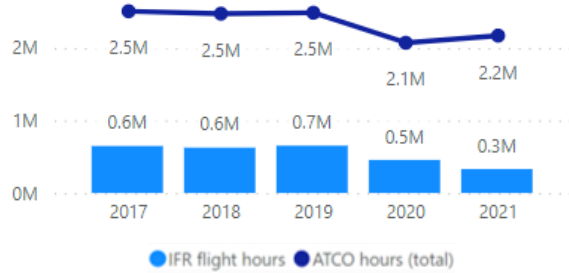


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

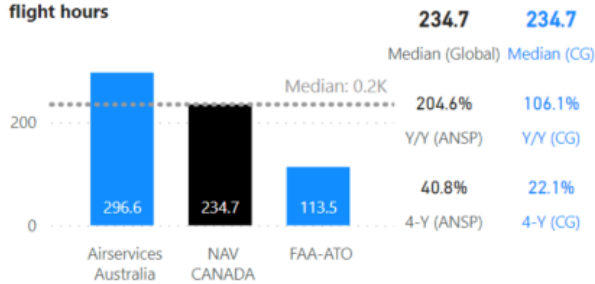


NAV CANADA's total costs (USD) vastly increased during 2021, over doubling to 77.32M, largely as a result of increased non-ATCO costs from 2020. Whilst the costs increased, IFR flight hours reduced for NAV CANADA by 40.0%, alongside an increase in ATCO hours by 0.1M.

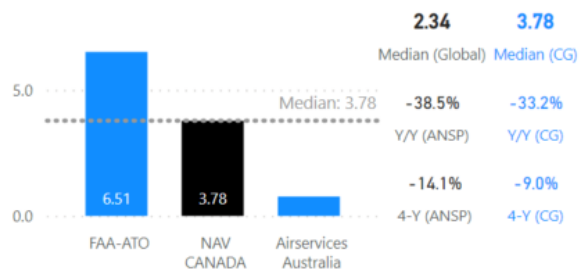
Performance in 2021 (key KPIs compared to CG)

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

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



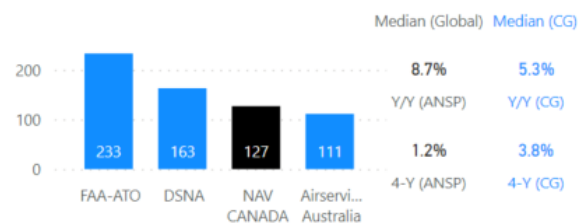
KPI 2B: ATCO in OPS hour productivity



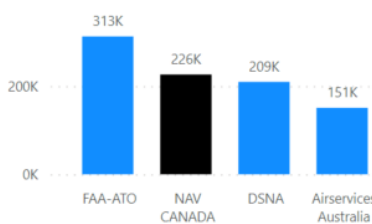
Comparing NAV CANADA with other ANSPs in Comparator Group 1, in terms of Total cost per IFR flight hour, NAV CANADA was at the median value calculated for the CG (234.7 USD). ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of NAV CANADA was at the CG median as well (3.78).

NAV CANADA ATCO in OPS cost per ATCO in OPS hour was 127 USD.

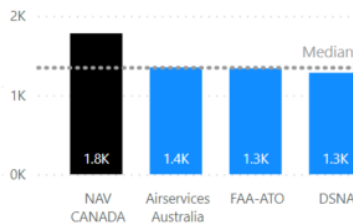
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



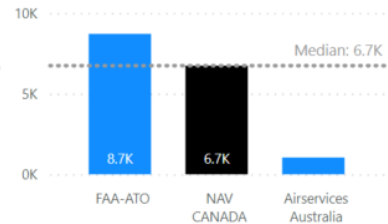
KPI 3A: Annual employment cost per ATCO in OPS



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 NAV CANADA was at the CG's median at 226K USD. NAV CANADA was the CG leader in terms of Annual working hours per ATCO in OPS with 1.8K. For Annual IFR hours per ATCO in OPS, NAV CANADA was at the median of the CG with 6.7K hours.



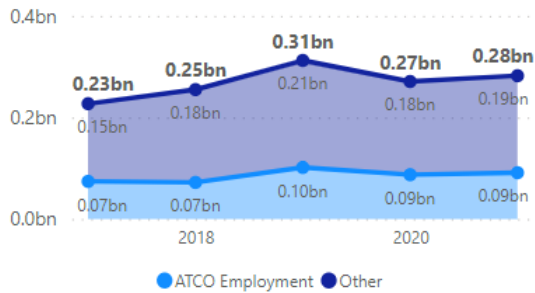
AAI, India

Joint Continental and Oceanic data

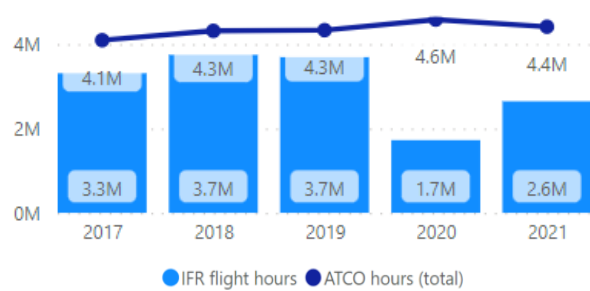


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

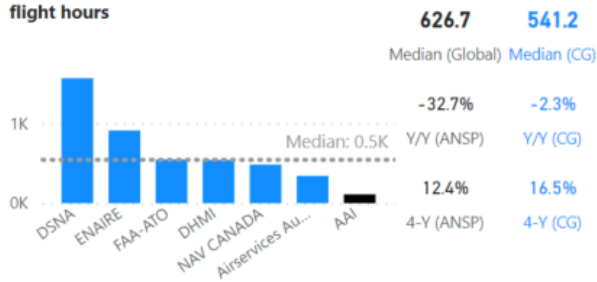


Total costs (USD) in 2021 increased by 4.2% compared to 2020. ATCO Employment costs remained stable at 0.09bn, accounting for 32.0% of Total costs. Whilst IFR hours increased by 53.4% during 2021, they still remained 28.4% below 2019 value. ATCO in OPS hours were reduced by 3.7% but remained above 2019 levels by 1.9%.

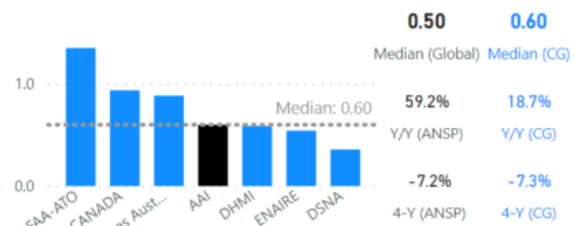
Performance in 2021 (key KPIs compared to CG)

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

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

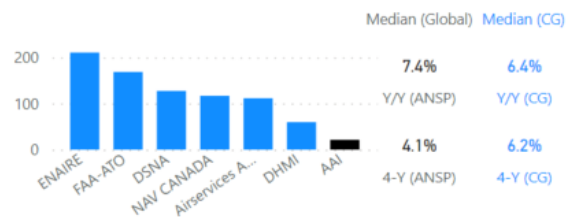


KPI 2B: ATCO in OPS hour productivity



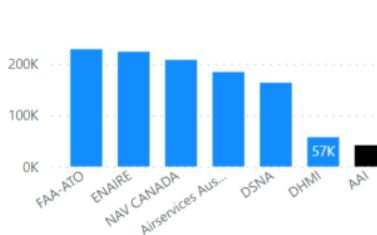
Comparing AAI with other ANSPs in Comparator Group 1, AAI had the lowest Total cost per IFR flight hour with 109.7 USD, significantly below the median at 541.2. AAI sat at the median of the CG in terms of ATCO in OPS hours productivity, at 0.60.

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

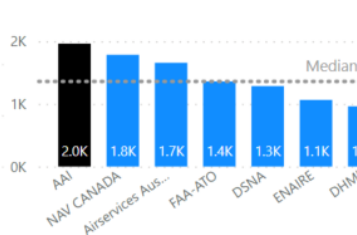


AAI's ATCO in OPS costs per ATCO in OPS hour was the lowest of the group at 21.2 USD.

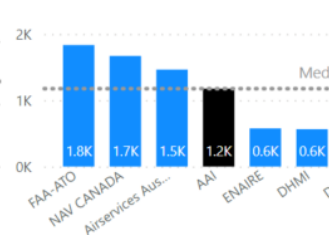
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



AAI had the lowest Annual employment cost per ATCO in OPS of 41,649 USD but produced the highest working hours per ATCO in OPS with 2.0K, far greater than the CG's median. Annual IFR hours per ATCO in OPS fell at the median of the group at 1,175 hours per ATCO.



AEROTHAI, Thailand

Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours



Total costs (USD) in 2021 decreased by 36.7% compared to 2020. ATCO in OPS employment costs accounted for 27.0% of Total costs, compared to 28.0% in 2020. IFR flight hours decreased by 55.9%, further below 2019 values. ATCO in OPS hours decreased by 34.8% compared to 2020 and by 53.1% compared to 2019.

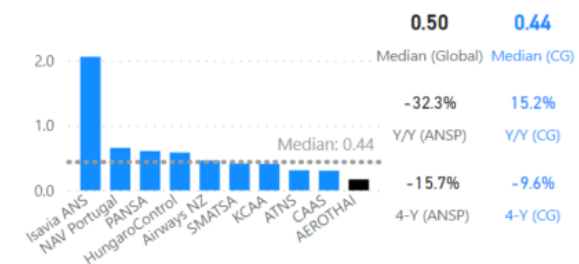
Performance in 2021 (key KPIs compared to CG)

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

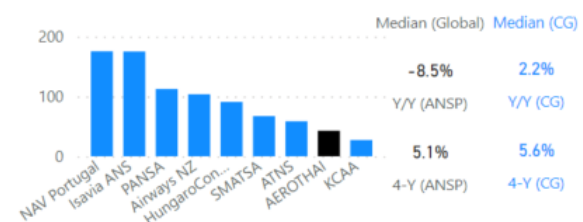


KPI 2B: ATCO in OPS hour productivity



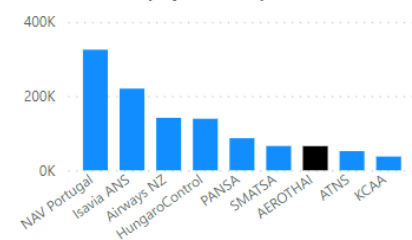
Comparing AEROTHAI with other ANSPs in Comparator Group 2, in terms of Total cost per IFR flight hour (952 USD) AEROTHAI was above the median value (634.4 USD, calculated for the CG). On the other hand, ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of AEROTHAI was the lowest (0.17), below the CG's median value (0.44).

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

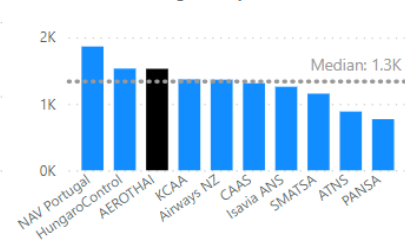


AEROTHAI's ATCO in OPS costs per ATCO in OPS hour was 42.7 USD.

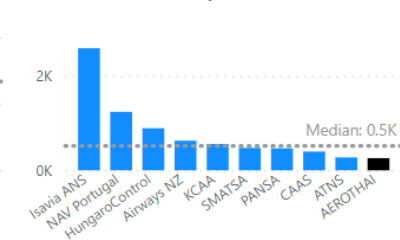
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



AEROTHAI's Annual employment cost per ATCO in OPS was 65K USD. Annual working hours per ATCO in OPS were 1,528, slightly above the CG's median value (1.3K). Annual IFR hours per ATCO in OPS reached 258, ca. half of CG's median value (517).

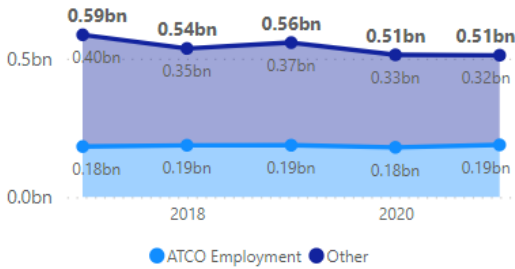


Airservices Australia, Australia
Joint Continental and Oceanic data

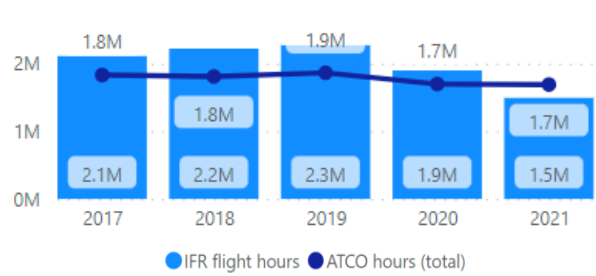


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

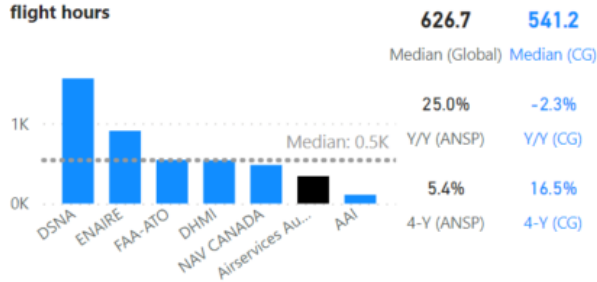


Airservices Australia saw minimal change in their yearly Total cost of 0.51bn USD. Whilst ATCO Employment costs rose by 5.0%, accounting for 37% of 2021 Total costs (USD) – up from 35% in 2020. IFR flight hours decreased by 21.3% during 2021 and remained below 2019 figures by 34.2%.

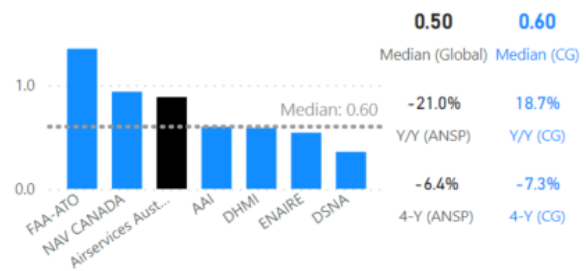
Performance in 2021 (key KPIs compared to CG)

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

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

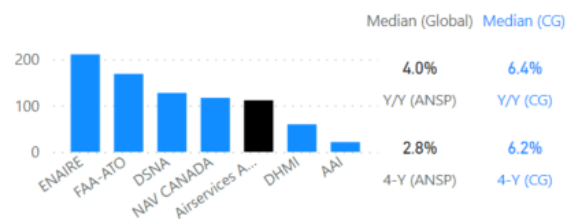


KPI 2B: ATCO in OPS hour productivity



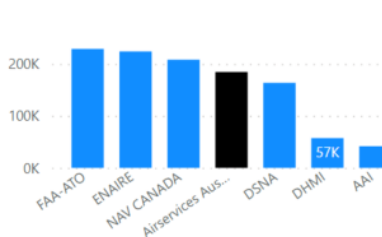
Comparing Airservices Australia with other ANSPs in Comparator Group 1, Airservices Australia had a relatively low Total cost per IFR flight hours at 342 USD. Airservices Australia produced the third highest ATCO in OPS hour productivity, ca. 45% above the CG’s median.

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

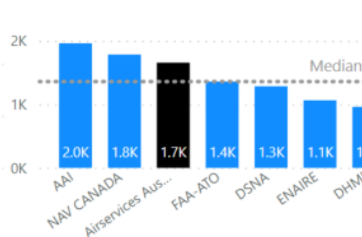


Airservices Australia performed very similarly to DSNA and NAV CANADA for KPI 2A, at 111.4 USD ATCO in OPS cost per ATCO in OPS hour.

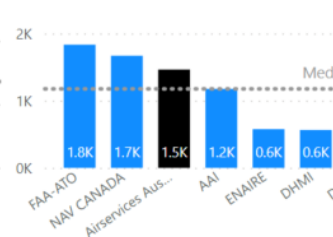
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Airservices Australia’s Annual employment cost per ATCO in OPS was 184K USD, a median value in the CG 1. Annual working hours per ATCO in OPS were 0.4K above the median at 1.7K. Airservices Australia had the second highest IFR hours per ATCO in OPS during 2021 with 1.5K hours.

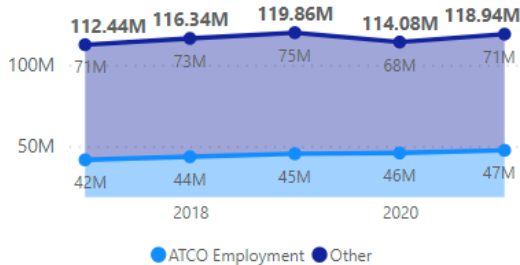


Airways NZ, New Zealand
Joint Continental and Oceanic data

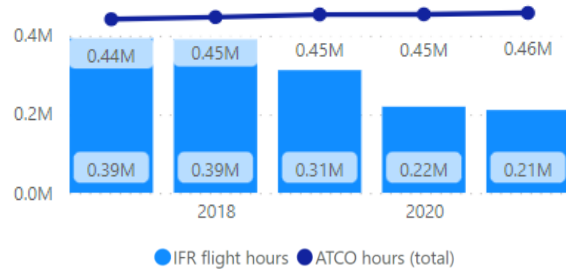


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

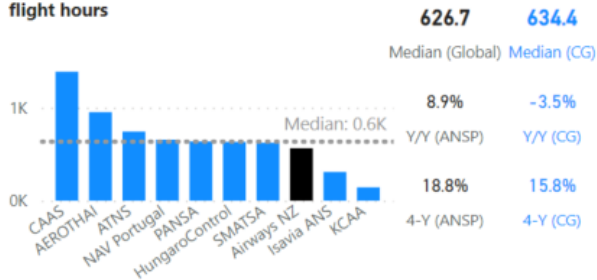


Total costs (USD) for Airways NZ increased by 6.6% during 2021 when incorporating both continental and oceanic data. ATCO Employment costs increased by around 3.6% and accounted for around 40.0% of Airways NZ's Total costs during 2021. IFR flight hours dropped by around 3.9% during 2021, taking Airways NZ to 32.5% less IFR hours than in 2019. On the other hand, ATCO hours increased by only 0.9% in comparison to 2019 data.

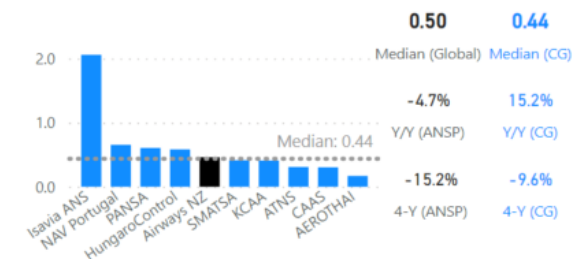
Performance in 2021 (key KPIs compared to CG)

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

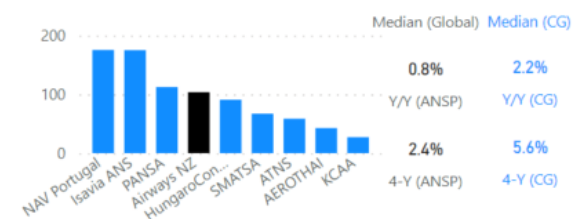


KPI 2B: ATCO in OPS hour productivity



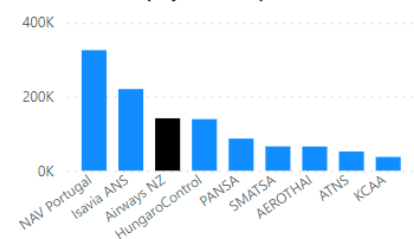
Comparing Airways NZ with other ANSPs in Comparator Group 2, Airways NZ around the median for the whole Comparator Group. Total costs per IFR hour were 564, similarly to SMATSA. ATCO in OPS hour productivity was just above the median, with 0.46.

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

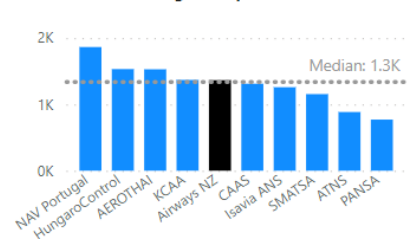


Airways NZ returned 103.7 USD for ATCO in OPS cost per ATCO in OPS hour.

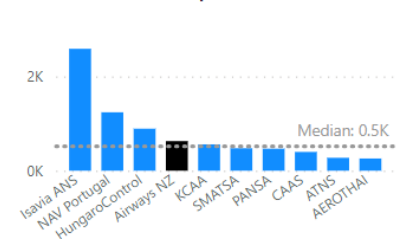
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Airways NZ's Annual employment cost per ATCO in OPS was slightly above median at 141K USD for 2021, rising almost 2.5% from 2020 figures. Annual working hours per ATCO in OPS were 1,364, sitting at the CG's median. Annual IFR hours per ATCO in OPS were 628, again just above the CG's median.

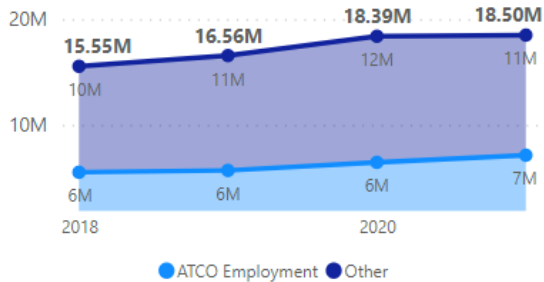


ANA, Luxembourg
Joint Continental and Oceanic data

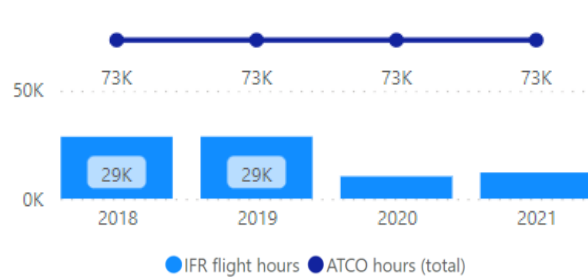


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

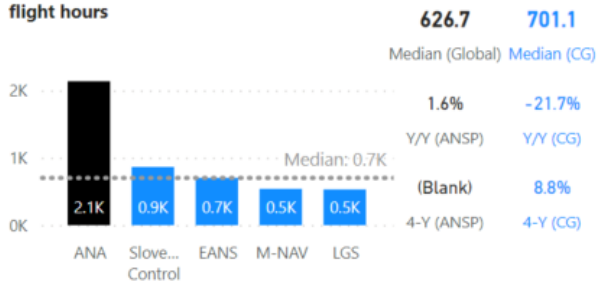


Total costs (USD) increased by 0.6% for 2021 to 18.50M. ATCO in OPS employment costs increased by 10.4% whilst other costs decreased to 11M. ATCO in OPS employment costs amounted to 39.0% of total costs for ANA. ATCO hours were relatively consistent across the four reported years at 73K, whilst IFR flight hours remained well below the 2019 levels.

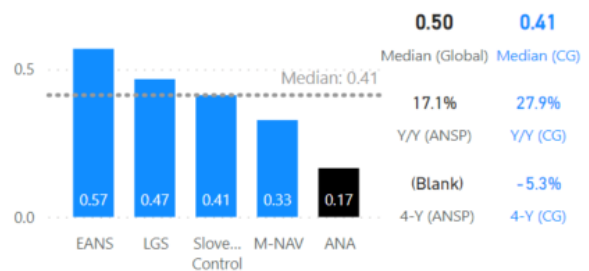
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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

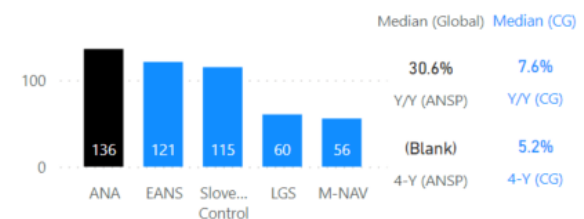


KPI 2B: ATCO in OPS hour productivity



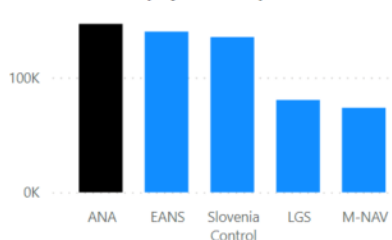
Comparing ANA with other ANSPs in Comparator Group 3, ANA had the highest Total costs per IFR flight hours among the CG ANSPs with 2.1K. On the other hand, ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) was the lowest (0.17) for ANA, well below the half of the CG's median value (0.41).

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

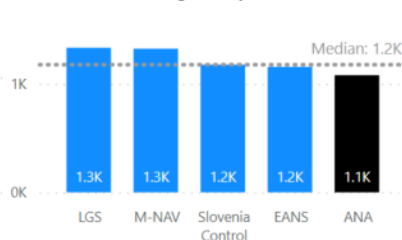


ANA's ATCO in OPS cost per ATCO in OPS hour was 136 USD.

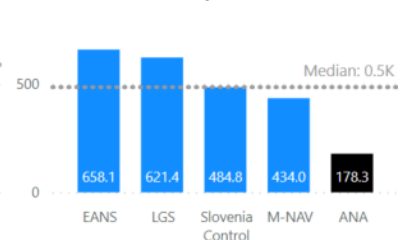
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



ANA's Annual employment cost per ATCO in OPS fell well above the CG's median at 147K USD. Annual working hours per ATCO in OPS for ANA fell just below the median at 1.1K. ANA had the lowest Annual IFR hours per ATCO in OPS of 178.3 just a third of the CG's median value (0.5K).

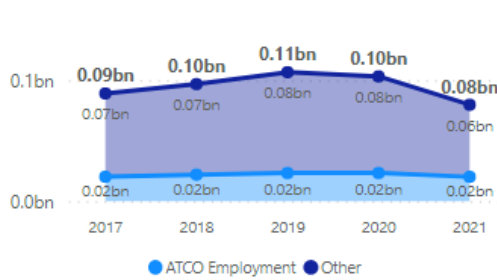


ATNS, South Africa
Joint Continental and Oceanic data

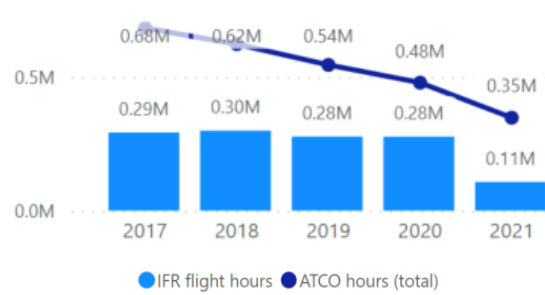


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

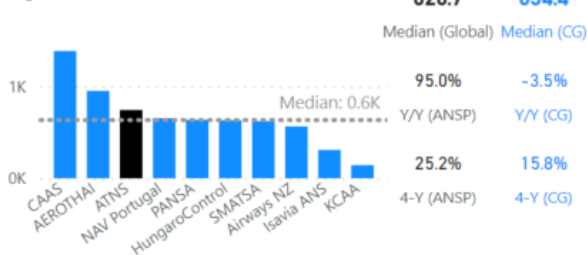


Total costs (USD) in 2021 decreased by 22.7% compared to 2020. Similarly, ATCO in OPS employment costs decreased by 13.3% compared to 2020 values and amounted for 25% of Total costs. IFR flight hours saw a similar trend and decreased by 61.2% in 2021. ATCO in OPS hours decreased by 27.4% compared to 2020 and by 36.2% compared to 2019.

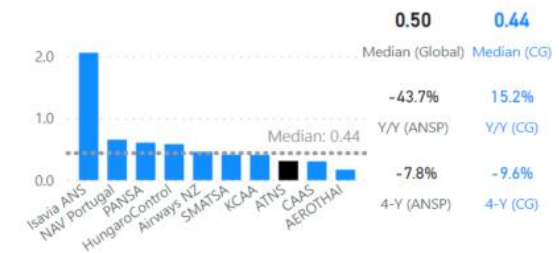
Performance in 2021 (key KPIs compared to CG)

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



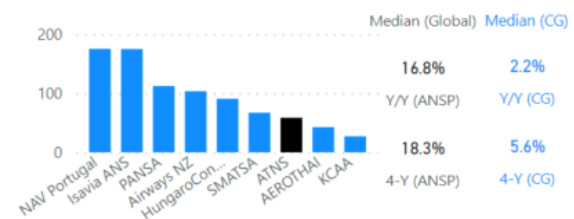
KPI 2B: ATCO in OPS hour productivity



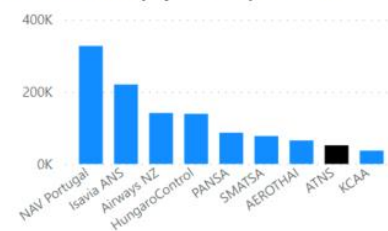
Comparing ATNS with other ANSPs in Comparator Group 2, Total cost per IFR flight hour was 744 USD, above the CG's median value (634.4 USD). ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of ATNS was one of the lowest (0.31) of the Group alongside CAAS and AEROTHAI.

ATNS's ATCO in OPS cost per ATCO in OPS hour was 58.5 USD.

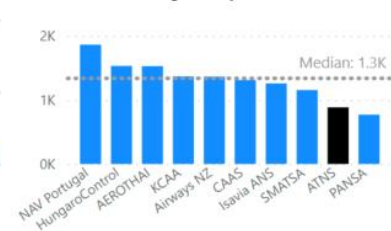
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



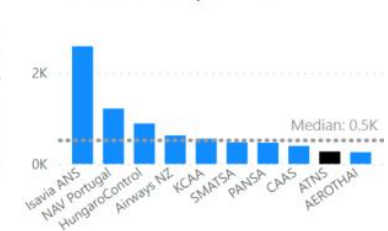
KPI 3A: Annual employment cost per ATCO in OPS



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 52K USD, far below the group leader NAV Portugal. Annual working hours per ATCO in OPS were 884, significantly below the CG's median value (1.3K). Likewise, Annual IFR hours per ATCO in OPS were 273, the second lowest value of the CG after AEROTHAI.

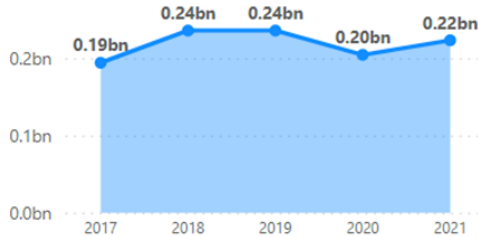


CAAS, Singapore
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

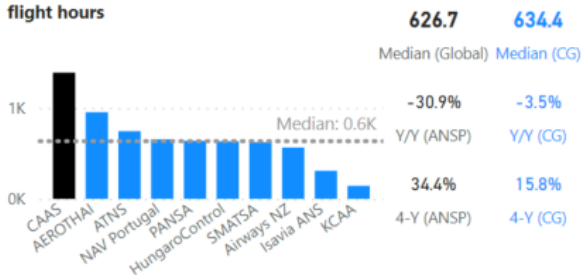


CAAS did not submit data for total costs during 2021, and hence no comparison is available. ATCO hours remained relatively constant in 2021 at 0.53M. There was a large increase in IFR flight hours respective to 2020, growing by 56.0% to 0.16M, however the IFR flight hours still remained significantly (65.0%) below 2019 levels.

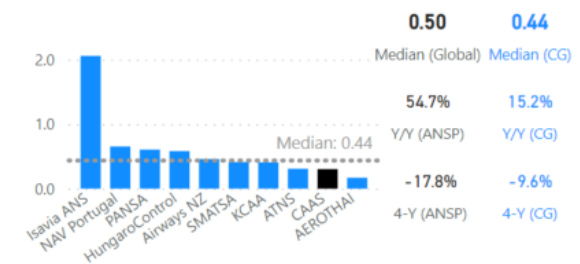
Performance in 2021 (key KPIs compared to CG)

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



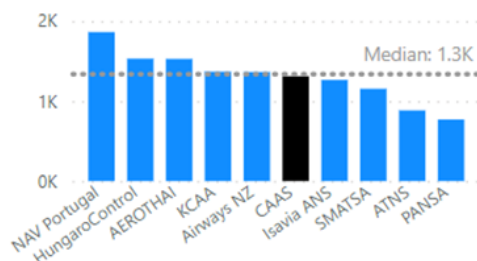
KPI 2B: ATCO in OPS hour productivity



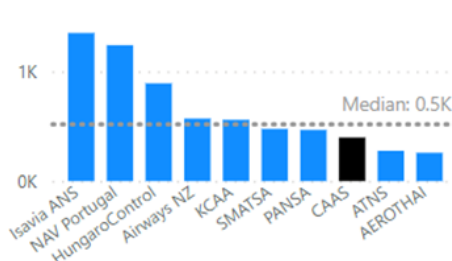
Comparing CAAS with other ANSPs in Comparator Group 2, CAAS had the highest Total cost per IFR flight hour (1,387 USD), twice the CG's median (634.4 USD). ATCO in OPS hour productivity grew on 2020's value to 0.30, however this was still under the CG's median of 0.44, and nearly half that of the global median.

No data was available for CAAS's ATCO in OPS cost per ATCO in OPS hour.

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 just below the group median at 1,311 hours, broadly unchanged from 2020. Annual IFR hours per ATCO in OPS reached 398 hours, around 20.0% less than the group median.

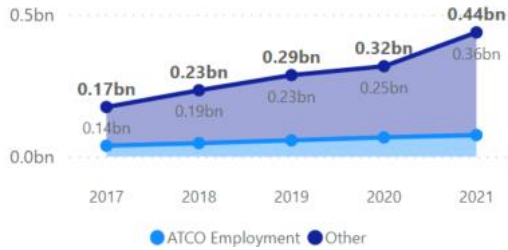


DHMI, Türkiye
Joint Continental and Oceanic data

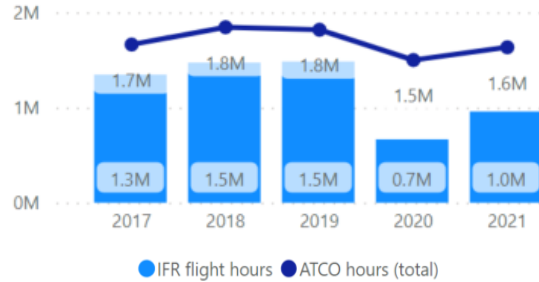


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

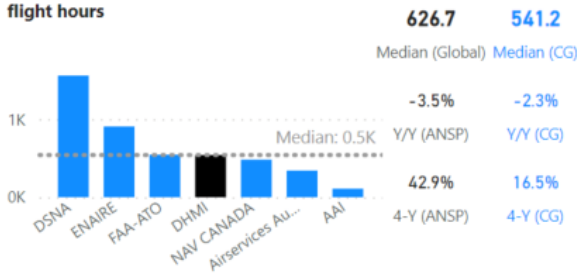


Total costs (USD) in 2021 increased by 38.2% compared to 2020, by 0.12bn (USD). ATCO in employment costs accounted for 19% of costs during 2021 for DHMI at 0.08bn USD, showing an increase of ca. 21.5% on 2020. IFR flight hours increased by 44.0% during 2021 but remained 35.4% below 2019 levels. ATCO hours increased by 0.1M (9.0%), but again fell short of 2019 by 10.1%.

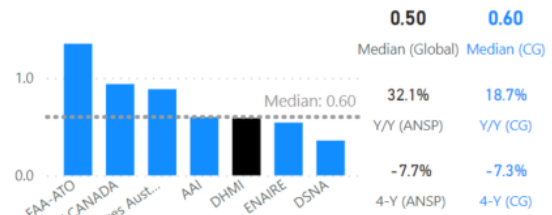
Performance in 2021 (key KPIs compared to CG)

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

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



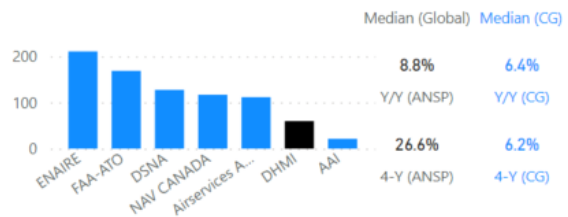
KPI 2B: ATCO in OPS hour productivity



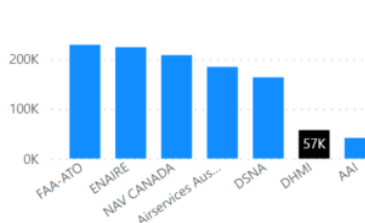
Comparing DHMI with other ANSPs in Comparator Group 1, DHMI had a Total cost per IFR flight hours close to the group media, sitting at 541.2 USD for 2021. For KPI 2B, ATCO in OPS hour productivity, DHMI was just under the CG's median value (0.60) at 0.59.

For ATCO in OPS costs per ATCO in OPS hour DHMI had one of the comparator group's second lowest values, returning 59.5 USD for 2021.

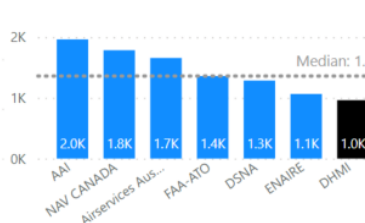
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



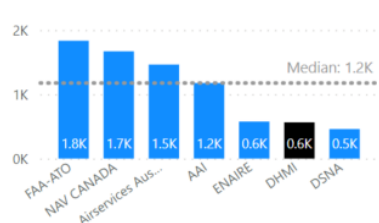
KPI 3A: Annual employment cost per ATCO in OPS



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 significantly below the next largest ANSP in the CG, DSNA, at 57.2K USD for 2021. Annual working hours per ATCO in OPS were 0.96K, the smallest in the comparator group. Annual IFR working hours per ATCO in OPS were under half of the CG's median value (ca. 1.2K) at 0.56K.

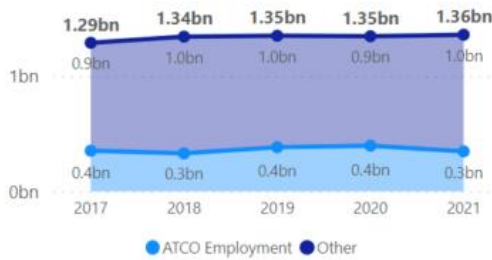


DSNA, France
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

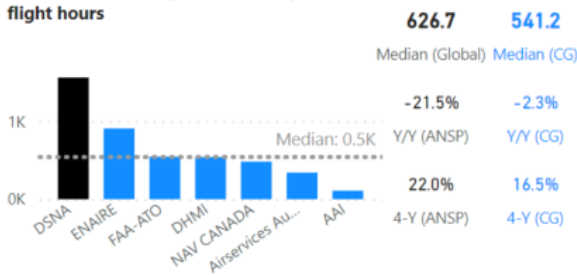


Total costs (USD) in 2021 increased by 13.2% compared to 2020. ATCO in OPS employment costs decreased by 12.4% and amounted to 23% of Total costs. IFR flight hours increased by 50.5% but were still 45.0% below 2019. ATCO in OPS hours increased by 4.7% compared to 2020 and by 5.7% compared to 2019.

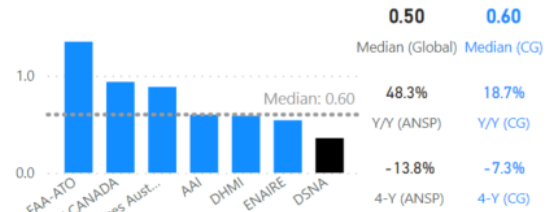
Performance in 2021 (key KPIs compared to CG)

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

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

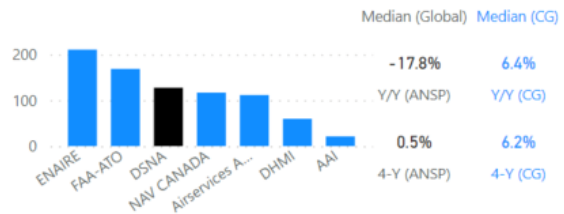


KPI 2B: ATCO in OPS hour productivity



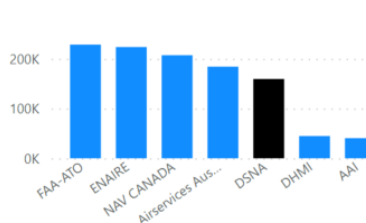
Comparing DSNA with other ANSPs in Comparator Group 1, DSNA had the highest Total cost per IFR flight hour (1.6K USD), three times the median value (541.2 USD, calculated for the CG). On the contrary, ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of DSNA was the lowest (0.36), significantly below the CG' median value (0.60).

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

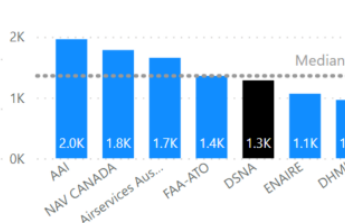


DSNA's ATCO in OPS cost per ATCO in OPS hour was 127.4 USD.

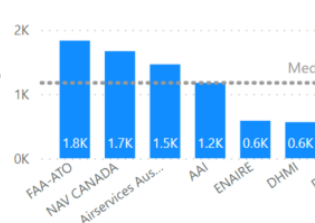
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



DSNA's Annual employment cost per ATCO in OPS was 156K USD, ca. 70K USD below the group leader FAA-ATO. Annual working hours per ATCO in OPS were 1.3K, slightly below the CG's median value (1.4K). Annual IFR hours per ATCO in OPS sat at the CG's lowest, with 0.5K.

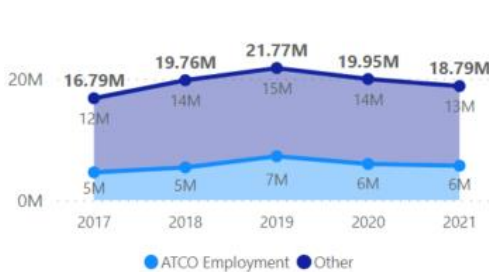


EANS, Estonia
Joint Continental and Oceanic data

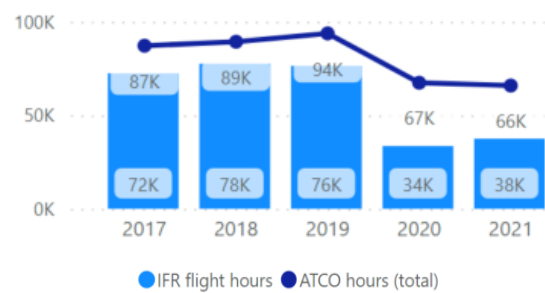


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

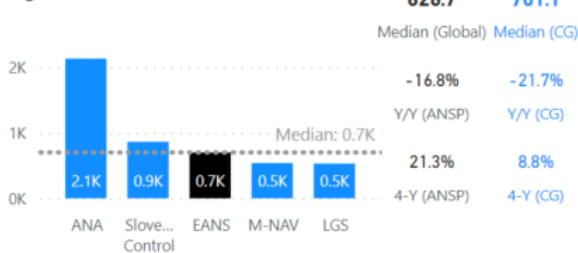


EANS' Total costs in USD during 2021 decreased by 5.8% to 18.79M, owing mostly to a decrease of 4.7% in non-ATCO employment costs. ATCO Employment costs accounted for around 30.0% of Total costs during 2021. IFR flight hours increased by 11.8% on 2020 but remained 50.9% below 2019 levels. ATCO in OPS Employment hours decreased only by 1K in 2020, but by 29.7% compared to 2019 figures.

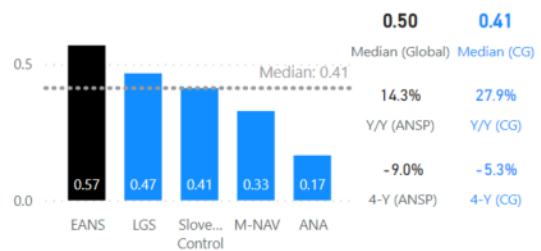
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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



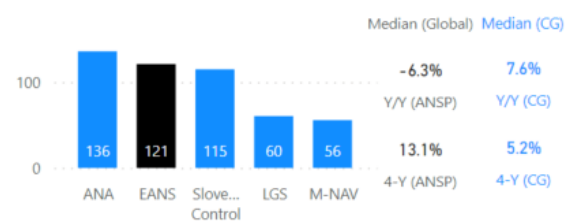
KPI 2B: ATCO in OPS hour productivity



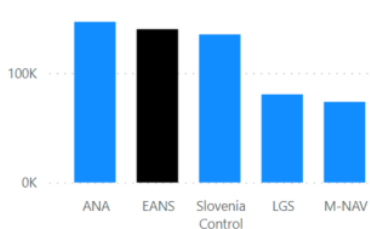
Comparing EANS with other ANSPs in Comparator Group 3, EANS had the median Total costs per IFR flight hours at 713.3 USD for the year. EANS performed above the CG's median for ATCO in OPS hour productivity, with 0.57.

EANS' ATCO in OPS cost per ATCO in OPS hour was 121.1 USD.

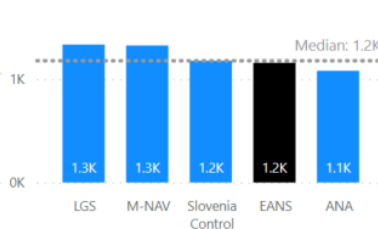
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



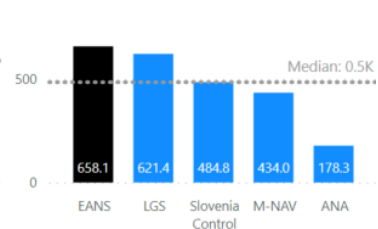
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



EANS' Annual employment cost per ATCO was very similar, yet just above Slovenia Control's figures for 2021 at 140K USD. Annual working hours per ATCO in OPS were just below the median at 1,157 for 2021. Annual IFR hours per ATCO in OPS reached 658.1, the highest of the group.



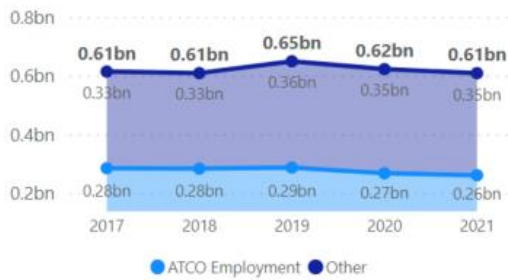
ENAIRe, Spain

Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

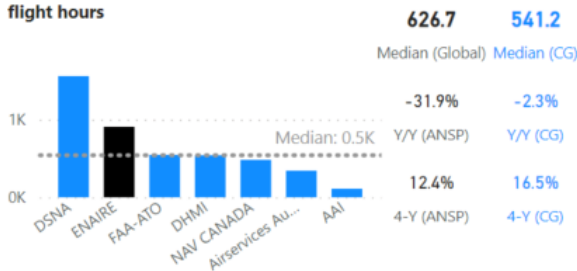


ENAIRe's Total costs for 2021 (USD) fell by 2.2% to 0.61bn. ATCO in OPS employment costs decreased by 2.6%, accumulating to 43.0% of costs during 2021. There was a minimal reduction (-0.5%) in ATCO hours during 2021 for ENAIRe, which remained at the 1.7M mark. IFR flight hours, however, increased by 38.9% to 1.0M during 2021.

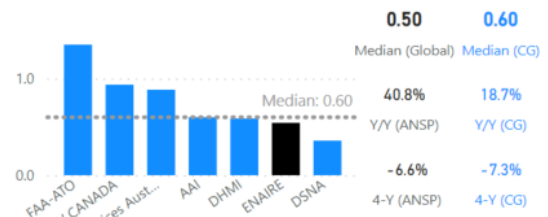
Performance in 2021 (key KPIs compared to CG)

Comparator Group 1 (>1mil IFR flight hours: AAI, Airservices Australia, DHMI, DSNA, ENAIRe, FAA-ATO, NAV CANADA)

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

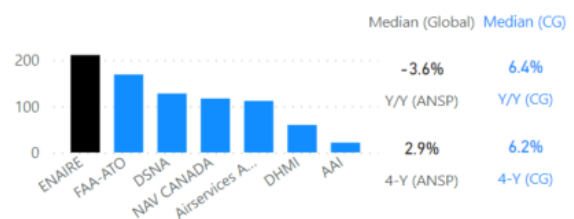


KPI 2B: ATCO in OPS hour productivity



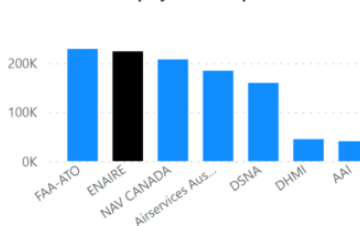
Comparing ENAIRe with other ANSPs in Comparator Group 1, ENAIRe had the second largest Total cost per IFR flight hour (908 USD). ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) returned at 0.54 for 2021, slightly below the CG's and global median values.

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

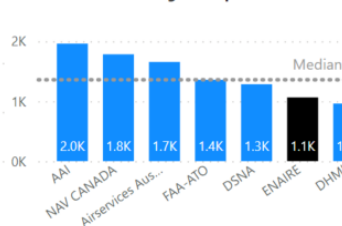


ENAIRe's ATCO in OPS costs per ATCO in OPS hour was 211 USD – the highest among the CG ANSPs.

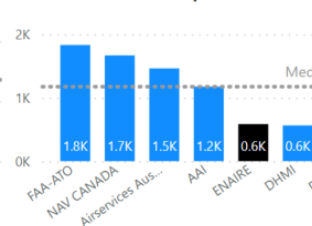
KPI 3A: Annual employment cost per ATCO in OPS



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 224K USD, slightly below the CG leader, FAA-ATO. ENAIRe recorded one of the lowest Annual working hours per ATCO in OPS in 2021 (1,064). Annual IFR hours per ATCO in OPS were 576 for ENAIRe in 2021.

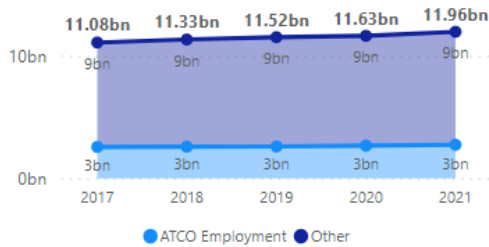


FAA-ATO, United States
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

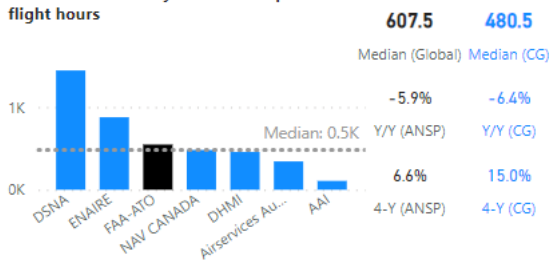


FAA-ATO Total costs (USD) in 2021 increased by 2.9% compared to 2020 costs, however there were only small increases to both ATCO employment costs and Other costs during the year, with ATCO in OPS costs increasing by just 2.6%. IFR flight hours increased by 6.9% during 2021 yet remained below 2019 levels by around 20.8%. ATCO hours remained fairly constant at 16M (+1.6%).

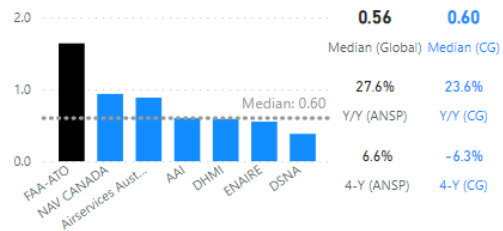
Performance in 2021 (key KPIs compared to CG)

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

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



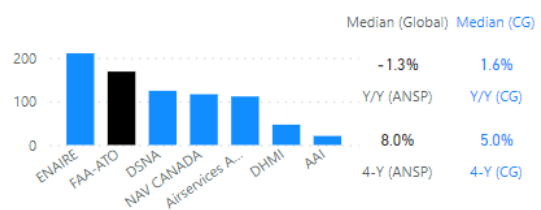
KPI 2B: ATCO in OPS hour productivity



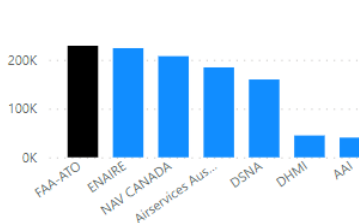
Comparing FAA-ATO with other ANSPs in Comparator Group 1, FAA-ATO had a Total cost per IFR flight hours close to the median of the CG at 546.22 USD. For ATCO in OPS hour productivity, the FAA-ATO was the comparator group leader at 1.64, significantly higher than the next closest ANSP, NAV CANADA.

For ATCO in OPS cost per ATCO in OPS hour, the FAA-ATO was 168.48 USD.

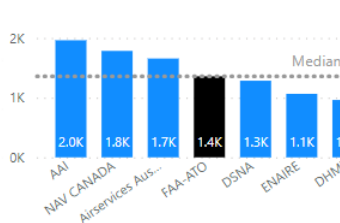
KPI 2A: ATCO in OPS cost per ATCO in OPS hour



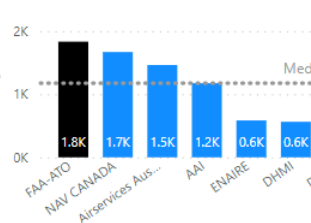
KPI 3A: Annual employment cost per ATCO in OPS



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 the highest of the group, at 228K USD. Annual working hours per ATCO in OPS were at the CG's median with 1.4K. Annual IFR hours per ATCO in OPS for FAA-ATO were the highest for the CG (1.8K), significantly greater than the CG's mean (1.2K).



HungaroControl, Hungary

Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

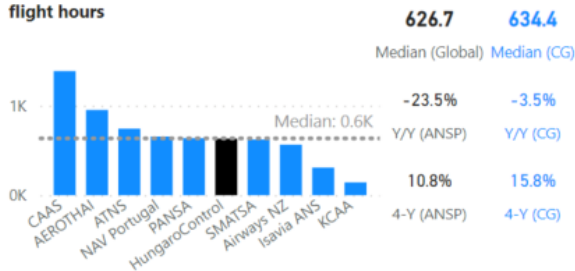


In 2021, the Total costs for HungaroControl rose slightly by 1.2%, with Other Costs rising by 10M to 0.08bn during the year, accounting for just over 75.0% during the year. ATCO in Employment costs remained at a stable level at 0.03bn. IFR flight hours saw an increase of around a third to 0.16M, whilst ATCO in OPS employment hours remained constant at the 0.28M level.

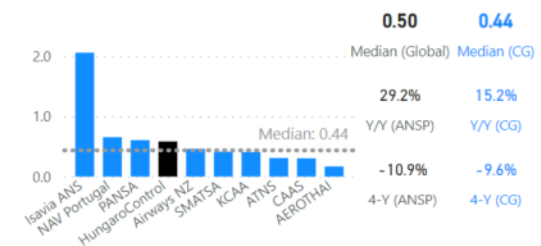
Performance in 2021 (key KPIs compared to CG)

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

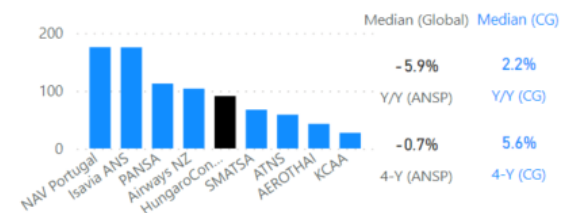


KPI 2B: ATCO in OPS hour productivity



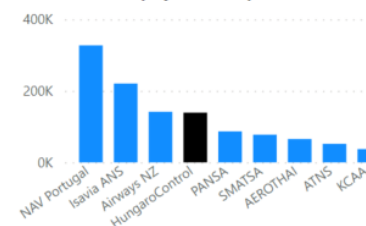
Comparing HungaroControl with other ANSPs in Comparator Group 2, HungaroControl had one of the lowest Total costs per IFR flight hour (632 USD), close to the median CG value of 634.4 USD. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of HungaroControl was again close to the median at 0.58.

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

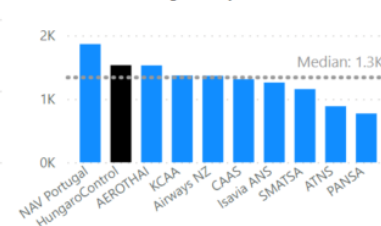


HungaroControl's ATCO in OPS cost per ATCO in OPS hour was 90.9 USD.

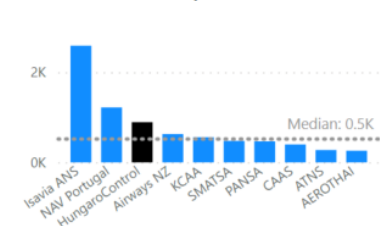
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



HungaroControl's Annual employment cost per ATCO in OPS decreased to 139K USD, similar to Airways NZ figures. Annual working hours per ATCO in OPS came in above the median at 1,531, similarly to AEROTHAI's figures during 2021. HungaroControl's Annual IFR hours per ATCO in OPS had a relatively large yearly increase to 829 for 2021.

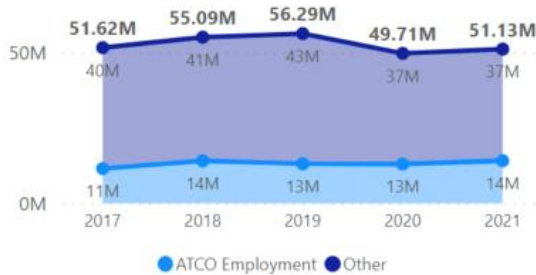


Isavia ANS, Iceland
Joint Continental and Oceanic data

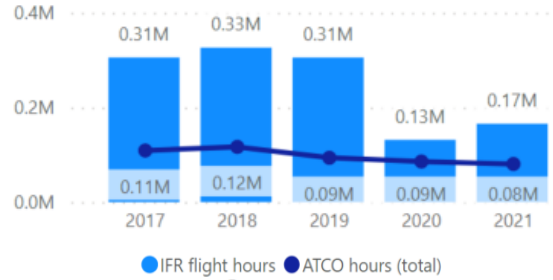


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

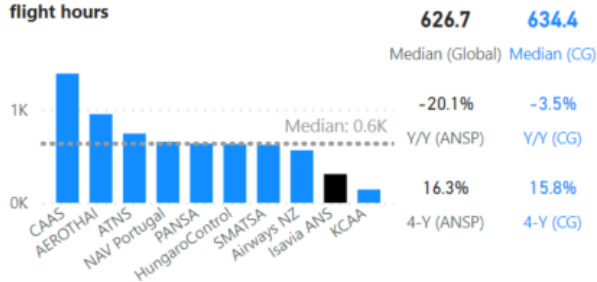


Total costs (USD) in 2021 increased by 2.9% compared to 2020 to 51.13M. ATCO in OPS employment costs increased by 8.5% and accounted for 28% of Total costs, Other costs remained relatively constant at 37M. IFR flight hours increased by 25.9% but were still 45.8% below 2019 levels. ATCO in OPS hours decreased by 6.1% in comparison to 2020 and 14.0% against 2019.

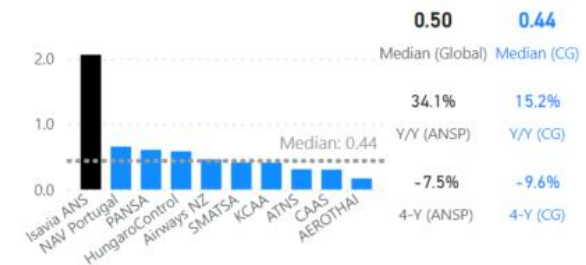
Performance in 2021 (key KPIs compared to CG)

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

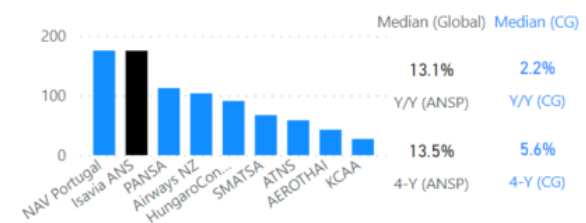


KPI 2B: ATCO in OPS hour productivity



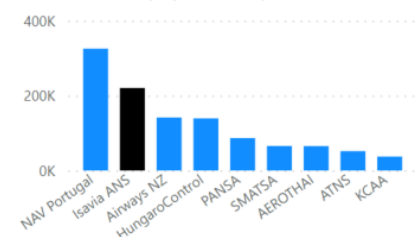
Comparing Isavia ANS with other ANSPs in Comparator Group 2, Isavia ANS had a relatively low Total cost per IFR flight hour (309 USD), less than half of the median value (634.4 USD, calculated for the CG). On the other side, ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of Isavia ANS was the highest (2.06), more than four times the CG's median value (0.44).

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

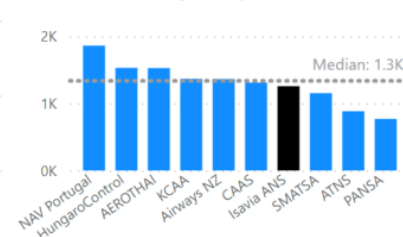


Isavia ANS performed very similarly to NAV Portugal for KPI 2A, at 175.2 USD ATCO in OPS cost per ATCO in OPS hour.

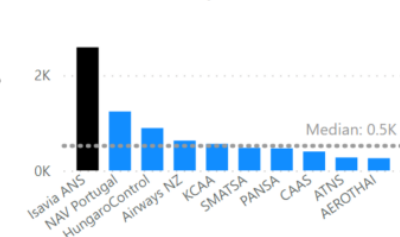
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Isavia ANS' Annual employment cost per ATCO in OPS was 220K USD, the second highest of the CG. Annual working hours per ATCO in OPS were 1.26K, slightly below the CG's median value (1.3K). Annual IFR hours per ATCO in OPS for Isavia ANS were the highest for the CG (2.6K), significantly greater than the CG's mean (0.5K).

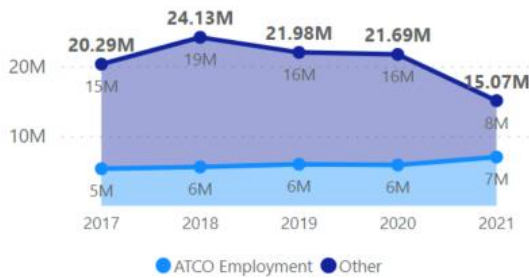


KCAA, Kenya
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

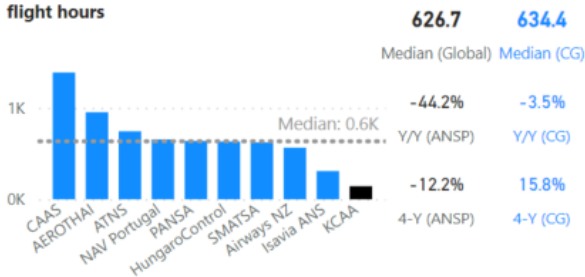


Total costs (USD) in 2021 fell by 30.5% compared to 2020. Whilst Other costs had the greatest decrease, reducing by roughly 50% from 2020 figures, ATCO employment costs rose by 1M. IFR flight hours rose by 20.9% from 2020 and aligned closely with 2019 figures. ATCO hours reduced by 10.0% during 2021.

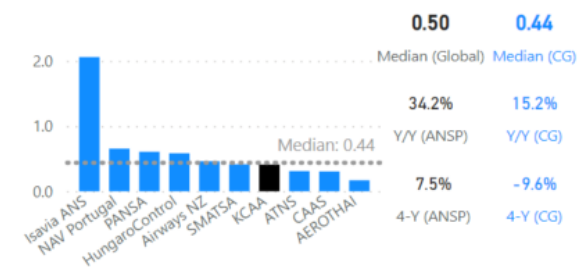
Performance in 2021 (key KPIs compared to CG)

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

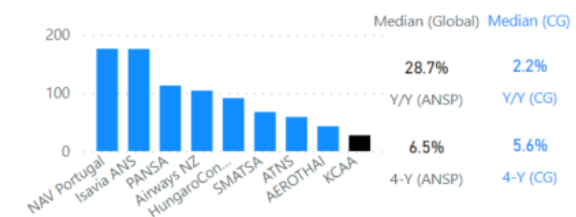


KPI 2B: ATCO in OPS hour productivity



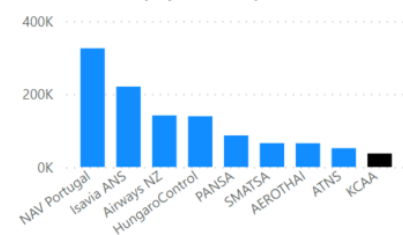
Comparing KCAA with other ANSPs in Comparator Group 2, KCAA had the lowest Total cost per IFR flight hour at 143 (USD), far less than the group median (634.4 USD). ATCO in OPS hour productivity rose by 34% compared to 2020 figures to 0.41, slightly below the CG's median.

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

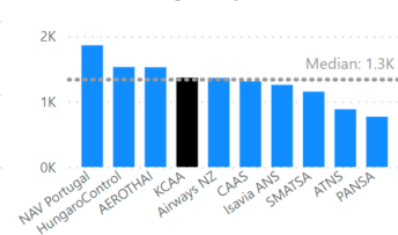


ATCO in OPS cost per ATCO in OPS hour was again the lowest of the CG at 27.1 USD.

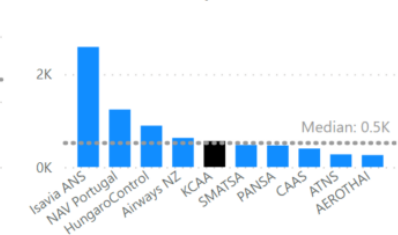
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



KCAA's Annual employment cost per ATCO in OPS was the CG's lowest value at 37K USD during 2021, far away from the group leader, NAV Portugal (ca. 325K USD). Annual working hours per ATCO in OPS were slightly above the CG's median at 1,368. For KCAA's Annual working IFR hours per ATCO in OPS, fell on the CG's median at a value of 559 for 2021.



LGS, Latvia

Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

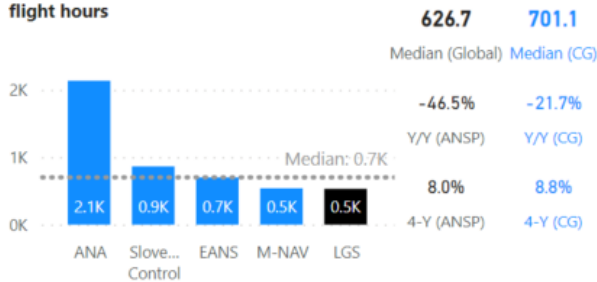


Total costs (USD) in 2021 for LGS decreased by 18.9% to 17.91M, the lowest over the 5-year reporting period. ATCO employment costs remained stable at ca. 4M. IFR flight hours saw a significant increase of 20.6%, yet still 48.3% below 2019 levels. ATCO hours, increased 3.1% from 2020.

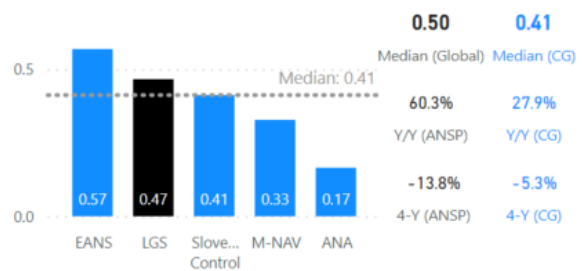
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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

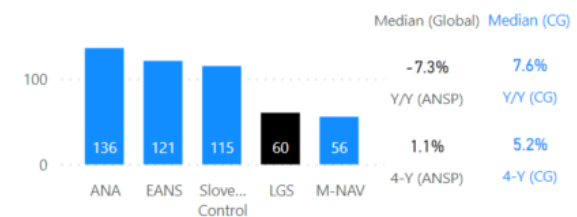


KPI 2B: ATCO in OPS hour productivity



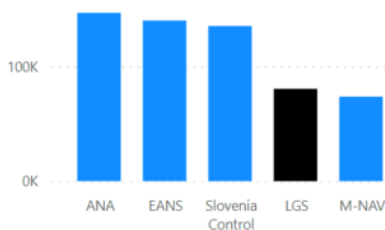
Comparing LGS with other ANSPs in Comparator Group 3, LGS had the lowest Total cost per IFR flight hour at 0.5K well below the median value (701.1 USD), calculated for the CG. On the other hand, the ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of LGS was the second highest (0.47), slightly more than the CG's median (0.41).

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

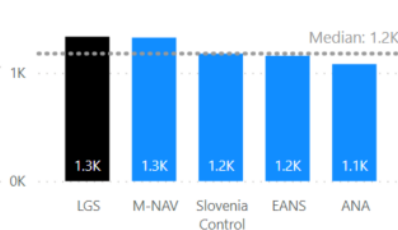


LGS' ATCO in OPS cost per ATCO in OPS hour was the second lowest of the group at 60.4 USD.

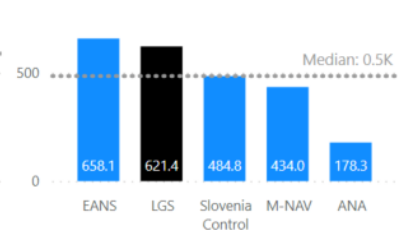
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



LGS' Annual employment cost per ATCO in OPS was 81K, around 7K more than the lowest ANSP in the CG (M-NAV). Annual working hours per ATCO in OPS for LGS were the highest for the group at 1.3K, around 0.1K greater than the group median. LGS was the second highest ANSP in Annual IFR hours per ATCO in OPS with 621.4.



M-NAV, North Macedonia
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

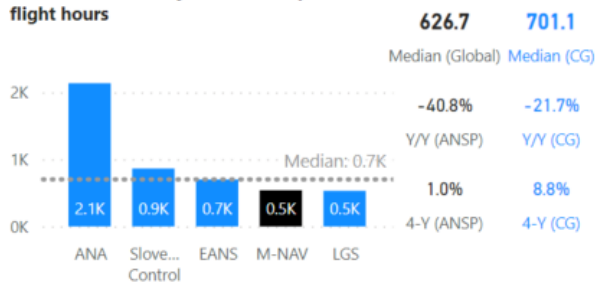


M-NAV's Total costs for 2021 (USD) fell by 6.4% to 14.28M. ATCO in OPS employment costs decreased by around 1M USD. ATCO in OPS employment costs represented 31% of Total costs during 2021. IFR hours rose during 2021, however these remained around 29.7% below 2019 figures. ATCO hours fell by 1.0% but showed a growth of 10.8% compared to 2019 figures.

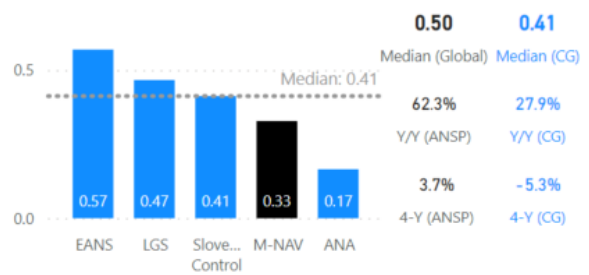
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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

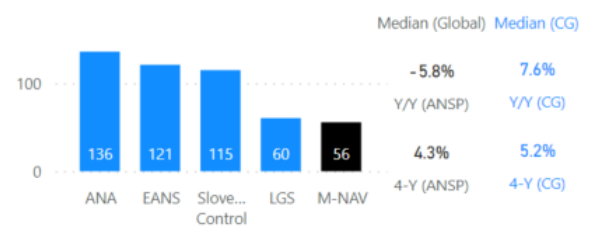


KPI 2B: ATCO in OPS hour productivity



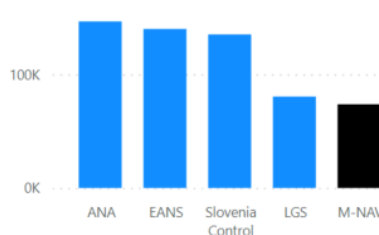
Comparing M-NAV with other ANSPs in Comparator Group 3, M-NAV's Total costs per IFR flight hours fell below the group median, but similarly to that of the lowest ANSP, LGS. Similarly, for ATCO in OPS hour productivity, M-NAV fell below the CG's median at 0.33, still significantly below the group's highest, EANS.

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

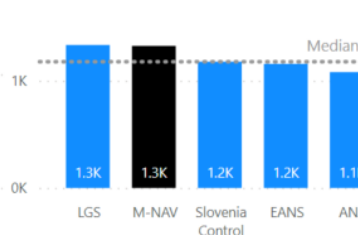


ATCO in OPS cost per ATCO in OPS hour was 55.7 USD, the lowest of the group.

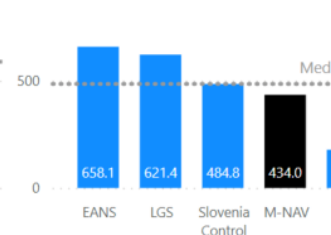
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



M-NAV's Annual employment cost per ATCO in OPS was the lowest of the group at 73.7K USD, almost half that of the CG leader, ANA. Annual working hours per ATCO in OPS were slightly above the CG's median at 1.3K. Annual IFR hours per ATCO in OPS were 434.0, just below the CG's median.

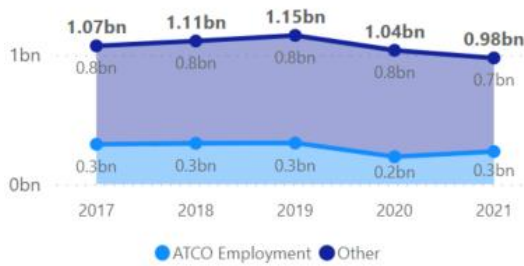


NAV CANADA, Canada
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

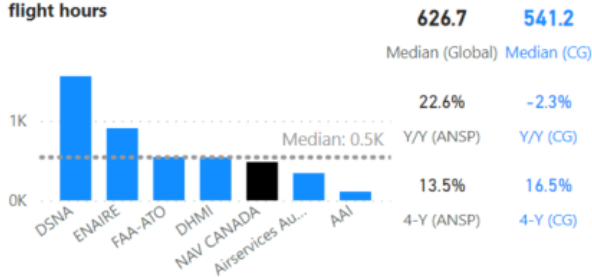


NAV CANADA's Total costs (USD) in 2021 were reduced by 5.7% down to 0.98bn, the lowest over the 5-year reporting period. ATCO in OPS employment costs increased by 18.6% and returned to 2019 value with 0.3bn. IFR flight hours decreased by 24.3% in comparison with 2020 levels. ATCO in OPS hours increased by 4.8% to 2.2M compared to 2020.

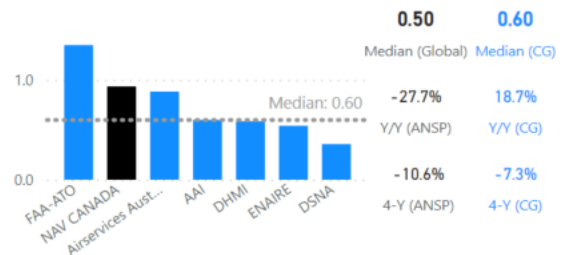
Performance in 2021 (key KPIs compared to CG)

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

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

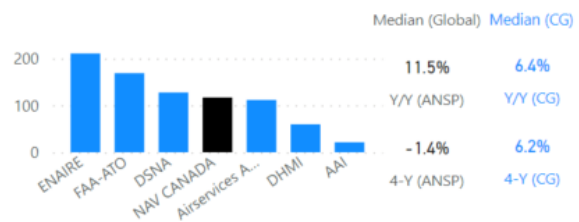


KPI 2B: ATCO in OPS hour productivity



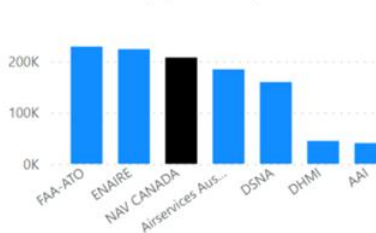
Comparing NAV CANADA with other ANSPs in Comparator Group 1, NAV CANADA sat just below the CG's median value of Total cost per IFR flight hour (481.8 USD). ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of NAV CANADA was the second highest with 0.94.

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

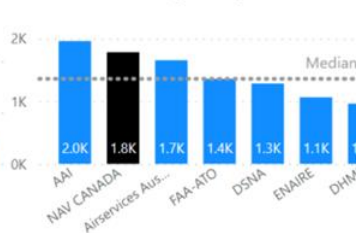


NAV CANADA's ATCO in OPS cost per ATCO in OPS hour was 116.7 USD.

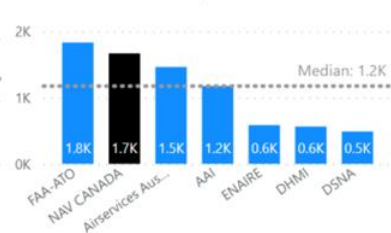
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



NAV CANADA's Annual employment cost per ATCO in OPS was 208K USD, ca. 20K below the group leader FAA-ATO. Annual working hours per ATCO in OPS were 1.8K, above the CG's median value (1.4K). Annual IFR hours per ATCO in OPS reached 1.7K, ca. 1K less than the group leader FAA-ATO.



NAV Portugal, Portugal
Joint Continental and Oceanic data

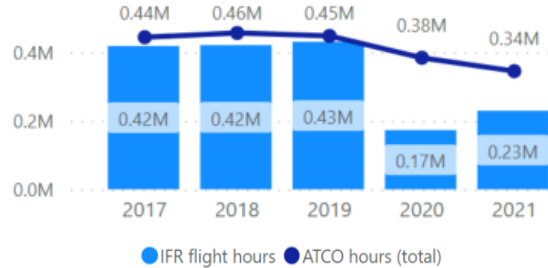


Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

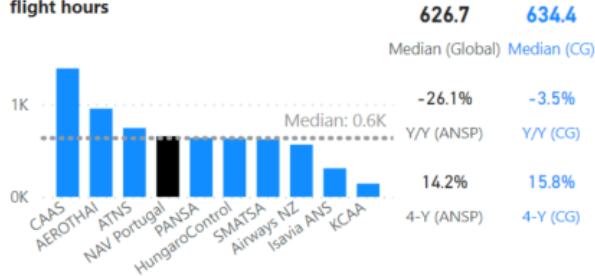


For NAV Portugal, Total costs (USD) reduced slightly, but remained close to the 0.11bn mark. The ATCO Employment costs fell by 11.9% and accounted for 41.0% of total costs. ATCO hours reduced by 10.2% in 2021 and remained 22.9% below 2019 figures. IFR flight hours increased by 30.4% over 2020 but were nearly half that of 2019.

Performance in 2021 (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

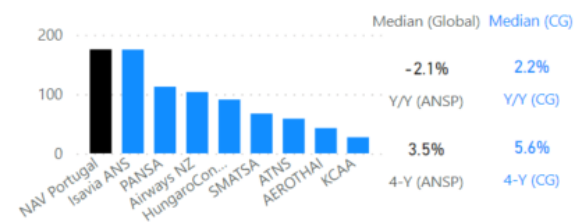


KPI 2B: ATCO in OPS hour productivity



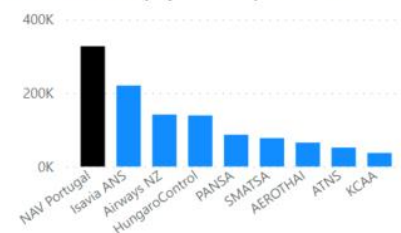
Comparing NAV Portugal with other ANSPs in Comparator Group 2, NAV Portugal fell just above the median for Total costs per IFR flight hours at 655 USD, however remained far below the CG leader, CAAS. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) for NAV Portugal was 0.65, the second largest of the CG.

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

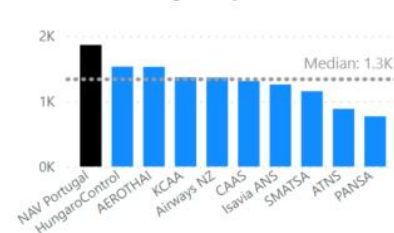


NAV Portugal's ATCO in OPS costs per ATCO in OPS hour was 175.5 USD.

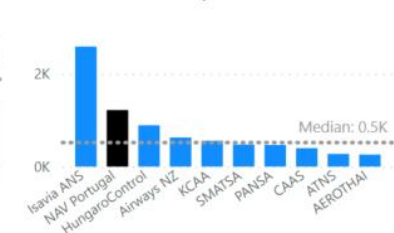
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



NAV Portugal was the group leader for Annual employment cost per ATCO in OPS at 327K USD, around 100K USD more than Isavia ANS. Again, for Annual working hours per ATCO in OPS, NAV Portugal was the CG leader at 1,863. Annual IFR hours per ATCO in OPS reached 1.2K, far below Isavia ANS.

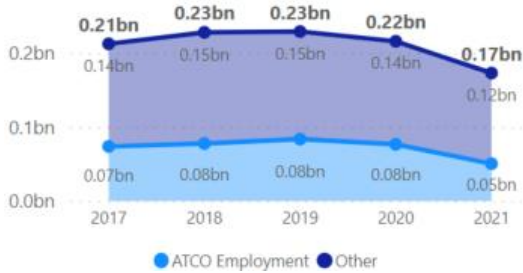


PANSNA, Poland
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

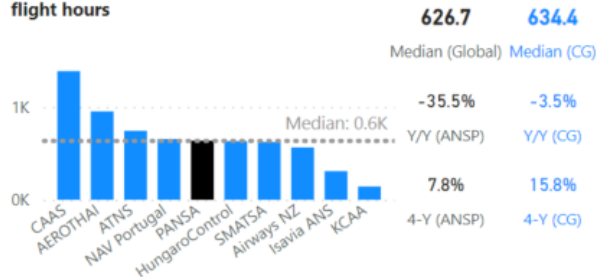


Total costs (USD) in 2021 for PANSNA decreased by 19.9% during the year, with ATCO costs providing the biggest decrease of 34.3%. IFR flight hours showed growth for PANSNA in 2021, increasing by 23.0%, however these remained 47.7% lower than in 2019. ATCO hours remained consistent at 0.45M, however these also remained below 2019 levels by 28.2%.

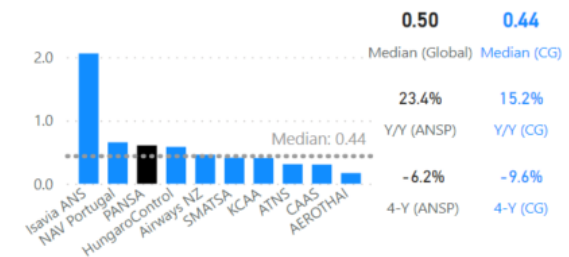
Performance in 2021 (key KPIs compared to CG)

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

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

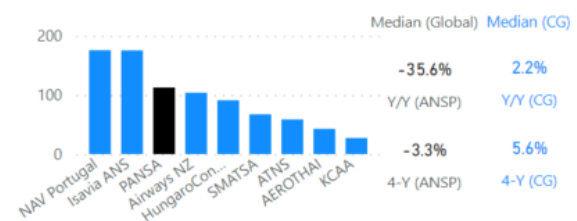


KPI 2B: ATCO in OPS hour productivity



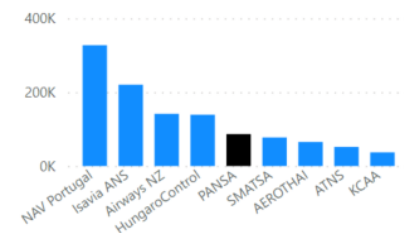
Comparing PANSNA with other ANSPs in Comparator Group 2, PANSNA had a Total costs per IFR flight hour (637 USD) very close to CG median value of 634.4 USD. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of PANSNA was higher than the CG's median at 0.61.

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

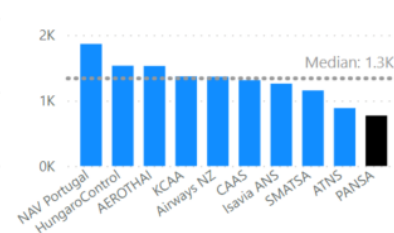


PANSNA's ATCO in OPS cost per ATCO in OPS hour was 112.5 USD.

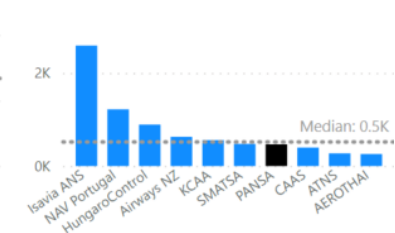
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



The Annual employment cost per ATCO in OPS for PANSNA in 2021 was 87K USD, relatively close to the median for the CG. Annual working hours per ATCO in OPS for PANSNA were the lowest of the CG at 770. PANSNA's Annual IFR hours per ATCO in OPS were close to the CG's median, rising 23% on 2020 values to 467.

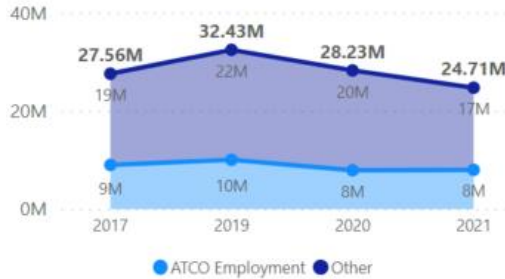


Slovenia Control, Slovenia
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

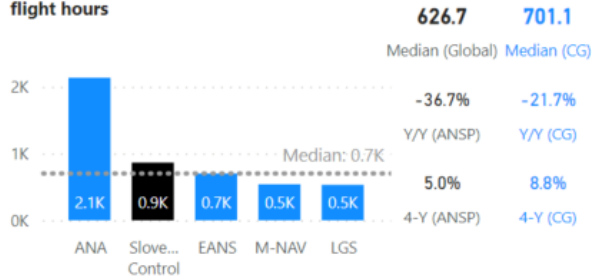


Total costs (USD) in 2021 decreased by 12.5% compared to 2020. ATCO in OPS employment costs rose by only 1.0% and amounted to 32% of Total costs. IFR flight hours increased by 42.8% but remained 36.9% below 2019 values. ATCO in OPS rose by 10.7%, however were still 19.7% below 2019.

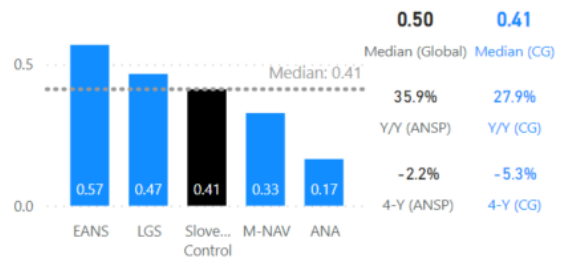
Performance in 2021 (key KPIs compared to CG)

Comparator Group 3 (<100k IFR flight hours: ANA, EANS, LGS, M-NAV, Slovenia Control)

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

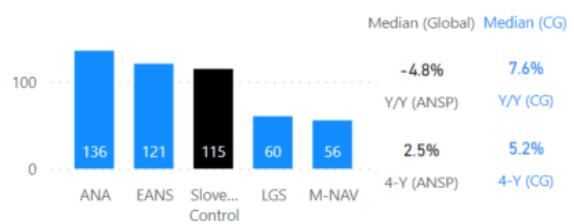


KPI 2B: ATCO in OPS hour productivity



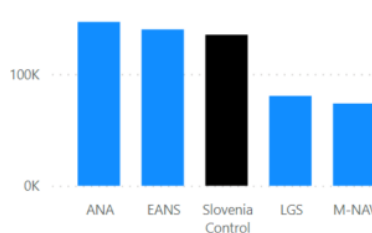
Comparing Slovenia Control with other ANSPs in Comparator Group 3, in terms of Total cost per IFR flight hour (863.8USD), just above the median value (701.1 USD) calculated for the CG. ATCO in OPS hour productivity (IFR flight hours per ATCO in OPS hours) of Slovenia Control was equal to CG's median value (0.41).

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

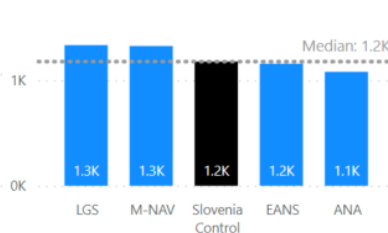


Slovenia Control's ATCO in OPS cost per ATCO in OPS hour was 115.0 USD, the median of the CG.

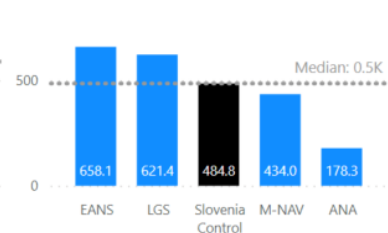
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Slovenia Controls' Annual employment cost per ATCO in OPS was 135K USD, the median of the group. Annual working hours per ATCO in OPS were 1,176, again the median of the group. Annual IFR hours per ATCO in OPS reached 484.8.

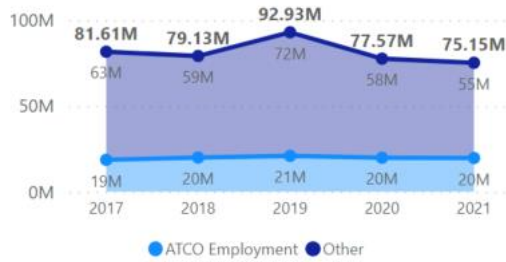


SMATSA, Serbia and Montenegro
Joint Continental and Oceanic data



Statistics (2017-2021)

Total costs (USD)



IFR flight and ATCO hours

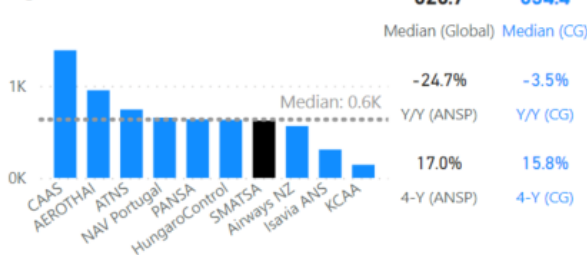


SMATSA's total costs for 2021 reduced by roughly 3.1% in comparison to 2020 figures, with ATCO costs accounting for 26.0% of total costs during 2021. Whilst IFR flight hours showed growth for SMATSA in 2021, increasing by 35.7%, this still remained 50.5% below 2019 levels. ATCO hours returned to 2019 levels through a growth of 21.8% year on year.

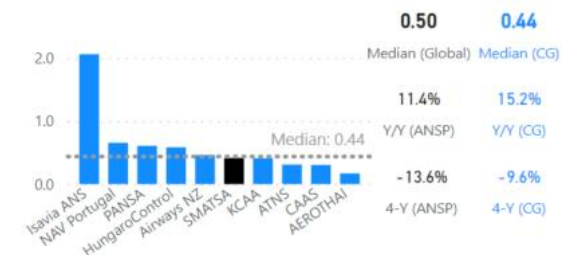
Performance in 2021 (key KPIs compared to CG)

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

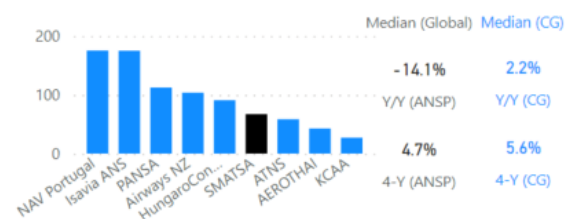


KPI 2B: ATCO in OPS hour productivity



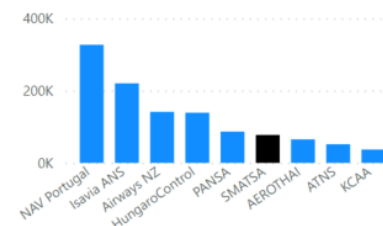
Comparing SMATSA with other ANSPs in Comparator Group 2, SMATSA had one of the lowest Total costs per IFR flight hours for the CG at 622.0 USD, slightly under the CG median. For ATCO in OPS hour productivity, SMATSA was narrowly below the CG's median at 0.41.

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

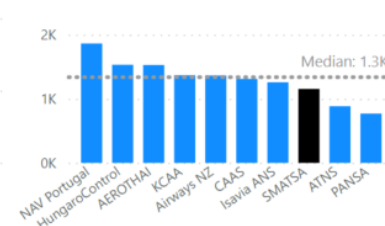


In ATCO in OPS cost per ATCO in OPS hour, SMATSA had one of the median figures at 67.1 USD.

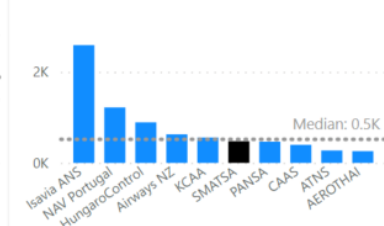
KPI 3A: Annual employment cost per ATCO in OPS



KPI 3B: Annual working hours per ATCO in OPS



KPI 3C: Annual IFR hours per ATCO in OPS



Annual employment cost per ATCO in OPS for SMATSA was one of the CG's lowest figures at 77.5K USD, similar to PANSA. Annual working hours per ATCO in OPS were below the CG's median value (1.3K), growing 23% to 1,154. SMATSA was just below the CG's median for Annual IFR hours per ATCO in OPS, giving 0.5K for the year.

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 2021, 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.

2021 performance data for European ANSPs has been kindly provided by EUROCONTROL, alongside data for the years 2017 – 2021 to facilitate historical trends analysis, which are completed with the extended set of ANSPs to ensure validity of any trend analysis. European ANSP members of the CANSO GBWG, who also submit data to EUROCONTROL have their ACE 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 2017-2021 data collection cycle, a PowerBi dashboard was produced in November 2022, 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.

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. KPI Data for 2021 is converted using exchange rates provided by each ANSP or using data available from the Organisation for

Economic Co-operation and Development (OECD) website. Exchange rates for some countries are unavailable using OECD; International Monetary Fund (IMF) exchange rates have been used in such situations.

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. Between 2015 and 2016, the USD appreciated against most other world currencies, meaning each USD buys more foreign currency. Despite a dip in 2017, the USD once again strengthened in 2018. This change in the relative value of the dollar effectively lowers the price that ANSPs incur in USD.

Growth rates: Data is presented from 2021 and then for the one-year and four-year trends. The trend over four years is calculated as the compound annual growth rate (four-year CAGR). This shows the overall trend between 2017 and 2021 but masks the fluctuations that may have taken place over the intervening years. In addition, if 2017 was an outlier, this trend may not be representative of the trend over this timeframe. Individual ANSP results for Four-Year CAGR should therefore be interpreted alongside contextual information.

The trend analysis is presented above the 2021 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 IMF 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 three below. (Source: PRU D1).
Per centage surveillance coverage at 30,000ft – primary radar	Surveillance coverage from primary radar.
Per centage surveillance coverage at 30,000ft – secondary radar	Surveillance coverage from secondary radar.
Per centage surveillance coverage at 30,000ft – ADS-B	Surveillance coverage from ADS-B.
Per centage surveillance coverage at 30,000ft – Space based ADS-B	Surveillance coverage from space-based ADS-B.
Per centage ADS-C coverage at 30,000 ft	Surveillance coverage from ADS-C.
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.

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.

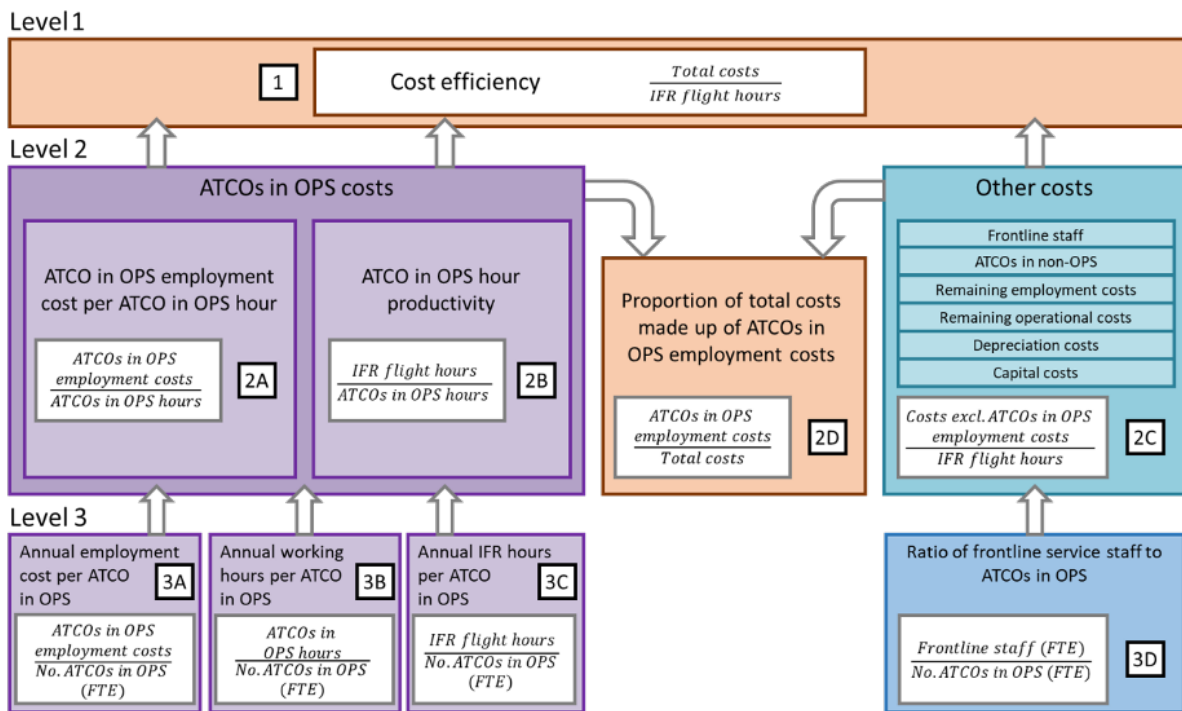


Figure 32: CANSO ANS performance framework

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 2020 and 2021 ANSP continental (C) and oceanic (O) data, are detailed in the summary table below.

KPI		CONTINENTAL/ OCEANIC	2020 AVERAGE	2021 AVERAGE	YEAR- ON-YEAR CHANGE
Continental and Oceanic Cost Efficiency and Productivity Performance Indicators					
1	Cost per IFR flight hour	C	USD 1,141	USD 942	-17.44%
		O	USD 189	USD 227	20.37%
2A	ATCO in OPS employment cost per ATCO in OPS hour	C	USD 120	USD 118	-1.84%
		O	USD 128	USD 153	19.89%
2B	ATCO in OPS hour productivity	C	0.42	0.51	21.60%
		O	3.42	2.61	-23.57%
2C	Cost excluding ATCOs in OPS employment costs per IFR flight hours	C	USD 815	USD 669	-17.88%
		O	USD 110	USD 143	30.05%
2D	Employment costs of ATCOs in OPS as a per centage of Total costs	C	29%	30%	3.30%
		O	38%	36%	-4.83%
3A	Annual employment cost per ATCO in OPS	C	USD 148,300	USD 151,417	2.10%
		O	USD 175,805	USD 211,120	20.09%
3B	Annual Working hours per ATCO in OPS	C	1,334	1,343	0.71%
		O	1,290	1323	2.59%
3C	Annual IFR hours per ATCO in OPS	C	538	665	23.61%
		O	4,284	3,451	-19.44%
3D	Ratio of frontline service staff to ATCO in OPS	C	1.25	1.11	-11.17%
		O	0.86	0.85	-0.96%
Joint Continental and Oceanic Cost Efficiency Performance Indicators					
CO1	Cost per IFR flight hour	C + O	USD 1,167	USD 940	-19.47%
CO2D	Employment costs of ATCOs in OPS as a per centage of Total costs	C + O	29%	29%	2.07%

Table 5: Average performance for all KPIs in 2020 and 2021

ANNEX 4: CONTEXTUAL DATA

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

ANSP: AIRPORTS AUTHORITY OF INDIA (AAI)

- **Does your ANSP have stated objectives? If so, what are they?**
 - To be the pre-eminent ANSP with global recognition
 - To adopt state of the art technology to drive safe navigation in Indian airspace
- **In your opinion what are the main drivers or issues for performance within your region?**
Air traffic growth
- **What are the main initiatives you are undertaking to improve your performance?**
Space based ADS-B
- **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**
COVID-19 pandemic

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	3,570,000	6,400,000	
Per centage surveillance coverage at 30,000ft – primary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	100%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	100%	
Per centage surveillance coverage at 30,000ft – ADS-C	0%	100%	
Number of FIRs	1	3	
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	46	0	
Number of stand-alone towers	24	0	
Number of co-located ACC, approach, and tower facilities	18	0	

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**
 COVID-19 caused Thailand to temporary close its border as well as temporary stop all domestic flights in April 2020. Domestic flight resumed operations in May 2020, while international flight resumed as semi commercial flight in November 2020. July 2021, domestic flights were temporary suspended operation to and from highly infected areas. The domestic flights resumed in September 2021.

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	
Per centage surveillance coverage at 30,000ft – primary radar	5%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage 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: AIRSERVICES AUSTRALIA

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

Our stated purpose is to “CONNECTING PEOPLE WITH THEIR WORLD SAFELY”

We provide safe, secure, efficient and environmentally responsible services to the aviation industry and community. As defined in the Air Services Act 1995, our purpose is to:

- Provide facilities and services for the safety, regularity and efficiency of air navigation within Australian-administered airspace. This includes providing air traffic services, aviation rescue firefighting services, aeronautical information, radio navigation and telecommunications services
- Promote and foster civil aviation in Australia and overseas.

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

While responding to the impacts of the pandemic and building the foundation for change, we have remained committed to achieving our purpose to connect people with their world safely. We continue to remain focused on the following objectives:

- Adjust our services to be scalable and more closely aligned to customer requirements while maintaining safety as the first priority
- Become a more inclusive and agile organisation by building a culture of trust, care and accountability
- Accelerate the introduction of digitised services to prepare for future operating environments and improve productivity
- Transform our asset base to align capability to service demand and shift capital commitments to operating expenses

- **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 continuing spread of COVID-19 virus in Financial Year 2021 and the resulting slower than anticipated recovery in aviation market has presented ongoing challenges to our operation. Air traffic patterns changed substantially from the long-standing norms. We have seen significantly reduced international commercial air traffic, a disrupted pattern for domestic air traffic. Our airways revenue was 56 per cent lower than the previous year at \$327 million, 70 per cent lower compared with FY2019.

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	7,692,000	44,008,000	
Per centage surveillance coverage at 30,000ft – primary radar	30%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	39%	5%	
Per centage surveillance coverage at 30,000ft – ADS-B	98%	11%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – ADS-C	100%	100%	
Number of FIRs	2	2	

Facilities

Number of ACC facilities	2	2
Number of co-located ACC and approach facilities	2	0
Number of stand-alone approach facilities	2	0
Number of co-located approach and tower facilities	12	0
Number of stand-alone towers	15	0
Number of co-located ACC, approach, and tower facilities	2	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**
 - Fluctuating traffic levels in response to government-initiated lockdowns due to COVID-19 affecting revenue.
 - Particularly within our Oceanic operations which are just starting to pick back up again and an extended lockdown for Auckland in Aug/Sep of 2021.

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	
Per centage surveillance coverage at 30,000ft – primary radar	40%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	90%	5%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – ADS-C	100%	100%	
Number of FIRs	1	1	
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 COVID-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 eight per cent. This is also reflected by the higher income which increased by 13.7 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 Runway separation for tower. 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 returned in 2021, but it was below 2019 levels which had a negative impact on revenues. Operationally, this enabled us to meet our targets for congestion and taxi-out delay.

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	4,000	0	
Per centage surveillance coverage at 30,000ft – primary radar	0%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	0%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage 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?**
To be a safe, efficient provider of Air Traffic Management Services
- **In your opinion what are the main drivers or issues for performance within your region?**
ASBU Implementation, Safety Performance and COVID-19 Recovery.
- **What are the main initiatives you are undertaking to improve your performance?**
Replacement of Communication equipment, Organisation re-alignment, Organisation Strategy 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**
Major Drop in Air Traffic Movements due to COVID-19 resulting in Major Revenue drop.

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	
Per centage surveillance coverage at 30,000ft – primary radar	92%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	98%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – ADS-C	0%	95%	
Number of FIRs	2	1	
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	ATNS services withdrawn from one of the stand-alone towers
Number of co-located ACC, approach, and tower facilities	2	0	

ANSP: CIVIL AVIATION AUTHORITY OF SINGAPORE (CAAS)

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

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:

- 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

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

COVID-19 has posed a huge disruption to our performance and there is a need to strengthen our resilience while making continuous improvements to build a safe, efficient, and sustainable air hub as we emerge from the COVID-19 pandemic.

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

- 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

- **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 increase in IFR flight hours as traffic recovers in FY21 from the COVID-19 lows led to an improvement in the KPIs' performance.

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	
Per centage surveillance coverage at 30,000ft – primary radar	35%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	35%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	95%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-C	100%	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	0	0	
Number of stand-alone towers	3	0	
Number of co-located ACC, approach, and tower facilities	0	0	

ANSP: LATVIJAS GAISA SATIKSME (LGS)

- Does your ANSP have stated objectives? If so, what are they?**
 Yes. LGS performs under national performance plan, therefore, the objectives (economic, environment, capacity, and safety) are aligned.
- In your opinion what are the main drivers or issues for performance within your region?**
 High volatility of traffic due to external drivers (COVID-19 pandemic, closure of BY airspace, instability on eastern borders of EU), that results in liquidity pressure to postpone crucial, safety related investments
- What are the main initiatives you are undertaking to improve your performance?**
 Due to loss of traffic, the financial performance is the most impacted. The long-term supply and demand balance is still the main challenge.
- 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 loss due to COVID-19 pandemic and traffic increase due to ban on overflying the BY airspace by EU carriers after the grounding of Ryanair jet. The latter not only positively improved financial situation but negatively impacted the environment targets.

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	95,900	0	
Per centage surveillance coverage at 30,000ft – primary radar	35%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	100%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage 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	0	0	
Number of stand-alone towers	1	0	
Number of co-located ACC, approach, and tower facilities	0	0	

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	
Per centage surveillance coverage at 30,000ft – primary radar	0%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	100%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage 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	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?**
To plan, develop, manage, regulate, and operate a safe, economically sustainable and efficient civil aviation system in Kenya
- **In your opinion what are the main drivers or issues for performance within your region?**
Safety, Operating Cost, Government Monopoly and Strategic Location of Kenya
- **What are the main initiatives you are undertaking to improve your performance?**
System Automation and Aligning to KCAA Project Implementation Masterplan
- **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 COVID-19 and Scaled Down Government Budget**

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	
Per centage surveillance coverage at 30,000ft – primary radar	40%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	100	0	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0	0	
Per centage surveillance coverage at 30,000ft – ADS-C	100	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	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.
- **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 COVID-19 crisis impacted the performance of the ANSP.

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	1,010,000	15,437,214	
Per centage surveillance coverage at 30,000ft – primary radar			
Per centage surveillance coverage at 30,000ft – secondary radar			
Per centage surveillance coverage at 30,000ft – ADS-B			
Per centage surveillance coverage at 30,000ft – Space based ADS-B			
Per centage 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?**
 Europe is strongly driven by the SES Performance and Charging scheme regulation in the EU, and Eurocontrol vision at wider level (ECAC). During 2021, Spanish performance plan (ESPP3) was reviewed accordingly to the updated EU targets and adapted to the new traffic forecasts published by STATFOR in October 2021, was sent to the European Commission in November 2021 and finally approved in April 2022. However, Europe has also been facing a war on its territory (Ukraine) since the beginning of 2022, prolonging, at least in the short-medium term, the uncertainty that began with the COVID-19 pandemic.
- 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**
 The COVID-19 pandemic continued to strongly affect the evolution of traffic during 2021, although there was a significant improvement in its recovery from the summer onwards, reaching 55 per cent of the 2019 traffic at the end of the year. The reduced levels of traffic compared to 2019, facilitated the compliance with all performance indicators except the inefficiency of the route network (KEA), which was the only indicator that failed to meet the target set in the Spanish Performance Plan. In addition, traffic was also affected by the eruption of the Cumbre Vieja volcano on the island of La Palma in September 2021, causing, among other things, traffic deviations that especially affected the KEA indicator in the airspace of the Canary Islands.

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		
Per centage surveillance coverage at 30,000ft – primary radar			
Per centage surveillance coverage at 30,000ft – secondary radar			
Per centage surveillance coverage at 30,000ft – ADS-B			
Per centage surveillance coverage at 30,000ft – Space based ADS-B			
Per centage surveillance coverage at 30,000ft – ADS-C			
Number of FIRs	3	0	
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: FEDERAL AVIATION ADMINISTRATION – AIR TRAFFIC ORGANIZATION (FAA-ATO)

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

FAA Mission

- Our continuing mission is to provide the safest, most efficient aerospace system in the world.

FAA Vision

- We strive to reach the next level of safety and efficiency and to demonstrate global leadership in how we safely integrate new users and technologies into our aviation system. We are accountable to the American public and our aviation stakeholders.

FAA Values

- Safety is our passion. We work so all air and space travellers arrive safely at their destinations.
- Excellence is our promise. We seek results that embody professionalism, transparency, and accountability.
- Integrity is our touchstone. We perform our duties honestly, with moral soundness, and with the highest level of ethics.
- People are our strength. Our success depends on the respect, diversity, collaboration, and commitment of our workforce.
- Innovation is our signature. We foster creativity and vision to provide solutions beyond today's boundaries.

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	14,832,411	60,628,411	
Per centage surveillance coverage at 30,000ft – primary radar			
Per centage surveillance coverage at 30,000ft – secondary radar			
Per centage surveillance coverage at 30,000ft – ADS-B			
Per centage surveillance coverage at 30,000ft – Space based ADS-B			
Per centage surveillance coverage at 30,000ft – ADS-C			
Number of FIRs	21	5	
Facilities			
Number of ACC facilities	21	3	
Number of co-located ACC and approach facilities	3	2	
Number of stand-alone approach facilities	25	0	
Number of co-located approach and tower facilities	132	0	
Number of stand-alone towers	131	0	
Number of co-located ACC, approach, and tower facilities	1	0	

ANSP: HUNGAROCONTROL

- Does your ANSP have stated objectives? If so, what are they?**
 Try to operate effectively during the pandemic and minimise losses during the years of the crises.
- 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 COVID-19**

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	
Per centage surveillance coverage at 30,000ft – primary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	100%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – ADS-C	0%	0%	
Number of FIRs	2	0	
Facilities			
Number of ACC facilities	123	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	

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	
Per centage surveillance coverage at 30,000ft – primary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	100%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	100%	0%	
Per centage 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	

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	
Per centage surveillance coverage at 30,000ft – primary radar	25%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage 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	

Contextual data element	Continental	Oceanic	Comments
-------------------------	-------------	---------	----------

Operational data

Sq. Km. – oceanic and continental			
Per centage surveillance coverage at 30,000ft – primary radar			
Per centage surveillance coverage at 30,000ft – secondary radar			
Per centage surveillance coverage at 30,000ft – ADS-B			
Per centage surveillance coverage at 30,000ft – Space based ADS-B			
Per centage 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			

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

Yes. We have a five-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.

On the other hand, economic regulation is not oriented to encourage more and better efficiency by ANSPs. Additionally, SES regulation wasn't capable to address such extreme situations as the ones that we've experienced resulting from the COVID-19 Crisis. Future regulation should be more financially resilient allowing for instances some kind of rescue fund, that could offer some liquidity in such extreme situations.

- **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, to keep/ improve our capacity, safety and productivity indicators.

- **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 2021 was still very significant, with a 46.9 per cent drop in the number of movements compared to 2019, at the Lisbon FIR. In service units, the drop was greater in En-route (-51.0 per cent) than in Terminal (-45.5 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	
Per centage surveillance coverage at 30,000ft – primary radar	0%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	86%	15%	
Per centage surveillance coverage at 30,000ft – ADS-B	91%	26%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage 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 four 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 due to the Ukrainian and Belarusian situation.
- What are the main initiatives you are undertaking to improve your performance?**
 Airspace modernisation including TMA; Changes in the sectorisation of airspace; Shortening the flight routes; Reducing CO2 emissions; Cooperation with the military (war in the 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**
 Impact of COVID-19 pandemic; Revision of the Performance Plan for third reference period (2020-2024) in terms of cost effectiveness. Following partial closure of the Ukrainian airspace and Belarusian airspace after the incident with the Ryanair aircraft, Poland lost a lot of overflying “heavy traffic” (A380, B747, B777) going from North/West to the South/East, crossing southern half of Warszawa FIR.

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	334,000	0	
Per centage surveillance coverage at 30,000ft – primary radar	0%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage 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	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	
Per centage surveillance coverage at 30,000ft – primary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – secondary radar	100%	0%	
Per centage surveillance coverage at 30,000ft – ADS-B	0%	0%	
Per centage surveillance coverage at 30,000ft – Space based ADS-B	0%	0%	
Per centage 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's Five-Year Strategic Business Plan contains a set of Strategic Objectives. Those were set to improve general performance of the company, but basically performance of services provided. The objectives are focused on infrastructure modernisation/investments and HR performance improvements. Issues and challenges are related to COVID-19 influence on overall business capabilities and financial liquidity.

- **In your opinion what are the main drivers or issues for performance within your region?**
COVID-19

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

The completion of infrastructure modernisation program and at the same time local banks loans in order to overcome financial issues related to COVID-19 influence. At the same time continuation of ATCO and other staff training, and finalisation 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**
COVID-19 influence. Traffic demand was as such as traditional performance indicating it could be under question. The low traffic levels and income on the one side, but fixes costs on the other, severely changed possibility to adequately benchmark indicators.

Legal status: Other

Contextual data element	Continental	Oceanic	Comments
Operational data			
Sq. Km. – oceanic and continental	99,400	0	
Per centage surveillance coverage at 30,000ft – primary radar	100%		
Per centage surveillance coverage at 30,000ft – secondary radar			
Per centage surveillance coverage at 30,000ft – ADS-B			
Per centage surveillance coverage at 30,000ft – Space based ADS-B			
Per centage 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	

ANSP: MACEDONIAN AIR NAVIGATION SERVICE PROVIDER (M-NAV)

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

M-NAV strategic objectives are stated in company's Strategic business plan and are constantly promoted as such. They include achieving international and national standards in Safety, Quality and Security, optimise airspace capacity, optimise cost effectiveness, comply with associated SES Regulations, Guidelines and SES II, support national and international environment standards, enhance Human Resources Management, adopt managerial structures to future SES Requirements.

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

Progressive implementation of the objectives stated in the European ATM Master Plan Ivl 3, rapid traffic growth, enhanced regional cooperation and sharing mutual experiences for best practices.

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

The new ATM System Project, optimisation of Human Resources and flexible sectorisation on daily basis in order to reduce Europe-wide en-route delays.

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	24,900	0	
Per centage surveillance coverage at 30,000ft – primary radar			
Per centage surveillance coverage at 30,000ft – secondary radar	100%		
Per centage surveillance coverage at 30,000ft – ADS-B			
Per centage surveillance coverage at 30,000ft – Space based ADS-B			
Per centage surveillance coverage at 30,000ft – ADS-C			
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	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	1	0	

ANNEX 5: KPI DATA

CONTINENTAL

1: Continental Cost per IFR hour (USD)

Formula: Total costs (USD)/IFR flight hours

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	109.73	-32.05%	11.67%
AEROTHAI	952.44	43.49%	26.18%
Airways NZ	650.96	14.53%	13.80%
Albcontrol	656.73	-30.12%	-3.58%
ANA	2,135.46	-14.10%	-
ANS CR	893.06	-27.44%	9.05%
ANS Finland	1,021.50	-8.46%	11.92%
ARMATS	1,182.48	-27.58%	18.17%
ATNS	752.98	91.70%	24.48%
Austro Control	1,261.32	-10.49%	12.38%
Avinor (Continental)	834.24	-3.70%	7.96%
BULATSA	657.40	-26.97%	10.18%
CAAS	1,386.79	-30.10%	34.36%
Croatia Control	548.97	-43.77%	4.36%
DCAC Cyprus	383.14	-26.10%	11.99%
DFS	1,593.46	-13.17%	16.00%
DHMI	541.16	-6.54%	37.15%
DSNA	1,449.67	-11.14%	20.42%
EANS	701.06	-14.13%	20.86%
ENAIRE	907.60	-30.73%	11.92%
ENAV	1,132.79	-27.06%	10.20%
FAA-ATO	578.86	-3.84%	6.38%
HASP	366.60	-25.84%	8.03%
HungaroControl	631.52	-22.06%	10.76%
IAA	909.91	-17.11%	15.56%
Isavia ANS	351.27	-21.57%	14.36%
KCAA	143.04	-42.53%	-12.20%
LFV	963.57	-33.56%	19.48%
LGS	530.70	-21.10%	12.67%
LPS	879.88	-30.93%	5.03%
LVNL	2,890.96	-17.85%	20.04%
MATS	417.23	-20.38%	7.96%
M-NAV	539.21	-40.94%	2.64%
MOLDATSA	1,069.61	-32.83%	6.20%
MUAC	713.52	-7.64%	27.01%
NATS (Continental)	1,135.84	-24.93%	17.90%
NAV CANADA	529.78	17.57%	11.65%
NAV Portugal (Continental)	655.35	-21.23%	14.48%
NAVIAIR	1,275.63	-16.35%	20.93%
Oro Navigacija	579.98	-20.54%	1.57%
PANSA	637.28	-32.09%	7.24%
ROMATSA	932.74	-24.48%	14.02%
Sakaeronavigatsia	840.92	-13.48%	19.71%
skeyes	3,895.11	-20.74%	17.18%
skyguide	2,182.57	-19.21%	14.12%
Slovenia Control	863.76	-33.86%	5.57%
SMATSA	621.96	-28.58%	12.20%

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	2020-2021 AGR	2017-2021 CAGR
AAI	21.23	8.53%	3.37%
AEROTHAI	42.67	-7.94%	5.07%
Airways NZ	103.10	2.85%	2.42%
Albcontrol	25.04	-21.62%	-13.16%
ANA	135.95	10.43%	-
ANS CR	100.06	-11.32%	-6.58%
ANS Finland	87.15	-8.50%	-0.76%
ARMATS	21.67	11.45%	10.45%
ATNS	59.89	22.18%	17.29%
Austro Control	193.66	-5.15%	0.41%
Avinor (Continental)	154.80	1.13%	13.14%
BULATSA	149.91	-4.52%	9.95%
Croatia Control	102.20	-11.27%	-3.26%
DCAC Cyprus	63.56	2.38%	2.99%
DFS	290.45	0.16%	1.46%
DHMI	59.53	7.02%	21.49%
DSNA	125.04	0.65%	0.33%
EANS	121.08	-2.50%	9.40%
ENAIRE	210.51	-2.08%	2.94%
ENAV	178.54	0.54%	4.92%
FAA-ATO	167.53	0.98%	8.02%
HASP	63.34	8.33%	0.63%
HungaroControl	90.85	-3.52%	-0.70%
IAA	126.92	-10.87%	-1.43%
Isavia ANS	176.96	27.67%	12.16%
KCAA	27.10	32.56%	6.45%
LFV	159.12	-36.66%	4.54%
LGS	60.44	-0.99%	7.37%
LPS	95.71	-22.73%	-9.97%
LVNL	126.26	-1.58%	-12.57%
MATS	62.10	-6.05%	-1.48%
M-NAV	55.67	-4.31%	0.27%
MOLDATSA	23.66	15.64%	10.46%
MUAC	423.75	3.83%	11.64%
NATS (Continental)	208.47	-0.15%	9.19%
NAV CANADA	116.23	13.30%	-1.53%
NAV Portugal (Continental)	175.53	-5.56%	2.83%
NAVIAIR	141.66	3.27%	3.03%
Oro Navigacija	56.19	-4.23%	-0.02%
PANSA	112.48	-34.32%	-3.27%
ROMATSA	104.85	-14.84%	-2.77%
Sakaeronavigatsia	19.72	12.08%	10.15%
skeyes	206.07	-19.83%	-0.42%
skyguide	198.84	0.55%	-2.45%
Slovenia Control	114.97	-8.73%	2.46%
SMATSA	67.12	-18.54%	0.44%

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

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	69.34	5.25%	1.03%
AEROTHAI	113.90	-5.07%	6.92%
Airways NZ	100.05	3.56%	2.42%
Albcontrol	63.30	-23.15%	-12.00%
ANA	130.47	6.42%	-
ANS CR	168.37	-10.99%	-7.51%
ANS Finland	87.62	-6.54%	-0.12%
ARMATS	68.40	8.54%	16.37%
ATNS	124.70	17.03%	14.41%
Austro Control	216.88	-3.52%	0.91%
Avinor (Continental)	122.04	-8.62%	10.52%
BULATSA	330.25	-9.74%	-5.66%
Croatia Control	200.19	-10.15%	-2.67%
DCAC Cyprus	92.66	3.62%	4.50%
DFS	334.57	1.25%	1.68%
DHMI	215.66	-17.42%	5.19%
DSNA	142.68	2.69%	1.16%
EANS	185.45	-4.09%	8.50%
ENAIRE	293.22	-0.79%	3.90%
ENAV	232.60	3.63%	6.41%
FAA-ATO	167.53	0.98%	8.02%
HASP	102.01	12.87%	3.00%
HungaroControl	182.02	-8.79%	-3.60%
IAA	124.04	-6.56%	0.09%
Isavia ANS	152.15	23.38%	10.09%
KCAA	68.15	33.14%	4.31%
LFV	156.77	-35.84%	4.58%
LGS	101.59	-2.96%	6.35%
LPS	162.18	-21.49%	-9.79%
LVNL	137.21	-0.57%	-12.55%
MATS	92.61	-4.22%	-1.01%
M-NAV	152.70	-1.77%	0.33%
MOLDATSA	67.92	10.36%	15.49%
NATS (Continental)	222.89	1.46%	9.27%
NAV CANADA	118.50	10.15%	-1.96%
NAV Portugal (Continental)	265.50	-3.53%	3.56%
NAVIAIR	133.67	2.71%	3.74%
Oro Navigacija	102.84	-6.51%	-1.12%
PANSA	241.34	-35.12%	-4.11%
ROMATSA	241.52	-15.31%	-5.61%
Sakaeronavigatsia	67.07	5.33%	5.77%
skeyes	230.46	-18.88%	0.13%
skyguide	168.25	4.37%	-0.27%
Slovenia Control	174.20	-6.93%	2.91%
SMATSA	159.20	-18.53%	-0.24%

2B: Continental ATCOs in OPS hour productivity

Formula: IFR flight hours/ATCOs in OPS hours

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	0.60	59.25%	-7.21%
AEROTHAI	0.17	-32.27%	-15.71%
Airways NZ	0.42	-8.94%	-10.76%
Albcontrol	0.54	46.00%	5.06%
ANA	0.17	17.09%	-
ANS CR	0.52	43.29%	-12.42%
ANS Finland	0.27	1.72%	-9.34%
ARMATS	0.08	48.29%	-13.23%
ATNS	0.31	-43.14%	-8.90%
Austro Control	0.51	6.66%	-8.95%
Avinor (Continental)	0.46	0.66%	-5.14%
BULATSA	0.81	33.49%	0.93%
CAAS	0.30	54.73%	-17.78%
Croatia Control	0.56	56.66%	-5.03%
DCAC Cyprus	0.56	34.80%	-8.34%
DFS	0.49	21.99%	-12.52%
DHMI	0.59	32.14%	-7.75%
DSNA	0.38	31.93%	-12.29%
EANS	0.57	14.33%	-10.17%
ENAIRE	0.54	41.92%	-6.20%
ENAV	0.50	39.17%	-4.14%
FAA-ATO	1.27	5.60%	1.86%
HASP	0.53	38.84%	-7.88%
HungaroControl	0.58	29.19%	-10.95%
IAA	0.42	21.59%	-17.32%
Isavia ANS	1.07	41.81%	-4.78%
KCAA	0.41	34.25%	7.50%
LFV	0.35	8.14%	-12.91%
LGS	0.47	16.97%	-8.47%
LPS	0.38	13.28%	-15.30%
LVNL	0.28	12.61%	-14.71%
MATS	0.50	9.11%	-10.74%
M-NAV	0.33	62.28%	-0.35%
MOLDATSA	0.08	55.59%	-3.76%
MUAC	1.52	17.97%	-7.39%
NATS (Continental)	0.50	3.70%	-12.45%
NAV CANADA	0.82	-26.77%	-10.21%
NAV Portugal (Continental)	0.65	30.38%	-10.57%
NAVIAIR	0.38	-0.75%	-13.93%
Oro Navigacija	0.36	23.13%	-3.86%
PANSA	0.61	22.83%	-5.85%
ROMATSA	0.40	30.64%	-13.55%
Sakaeronavigatsia	0.20	20.83%	-11.51%
skeyes	0.29	13.77%	-7.79%
skyguide	0.53	26.81%	-7.68%
Slovenia Control	0.41	29.05%	-2.16%
SMATSA	0.41	11.40%	-13.57%

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	2020-2021 AGR	2017-2021 CAGR
AAI	74.30	-32.15%	11.79%
AEROTHAI	699.96	46.43%	26.76%
Airways NZ	404.21	15.52%	12.79%
Albcontrol	610.23	-28.48%	-1.95%
ANA	1,312.44	-18.65%	-
ANS CR	701.14	-23.84%	9.75%
ANS Finland	697.06	-7.70%	13.16%
ARMATS	922.21	-28.31%	16.12%
ATNS	561.31	84.90%	23.18%
Austro Control	882.38	-10.23%	13.34%
Avinor (Continental)	494.33	-6.37%	2.60%
BULATSA	471.89	-26.36%	10.69%
Croatia Control	364.85	-43.97%	5.75%
DCAC Cyprus	270.04	-26.92%	11.84%
DFS	996.43	-10.07%	16.01%
DHMI	439.70	-3.10%	38.58%
DSNA	924.81	-22.99%	16.76%
EANS	488.27	-13.87%	20.47%
ENAIRE	518.69	-30.53%	13.70%
ENAV	776.08	-26.74%	10.56%
FAA-ATO	447.35	-3.68%	6.76%
HASP	246.93	-27.57%	7.46%
HungaroControl	475.49	-20.93%	10.52%
IAA	608.31	-11.37%	13.94%
Isavia ANS	185.49	-29.67%	11.69%
KCAA	76.67	-57.80%	-20.75%
LFV	515.29	-24.78%	19.00%
LGS	401.12	-22.80%	11.35%
LPS	627.86	-30.58%	4.55%
LVNL	2,438.46	-18.76%	25.52%
MATS	293.10	-22.85%	7.01%
M-NAV	369.40	-40.90%	3.64%
MOLDATSA	786.39	-35.08%	3.80%
MUAC	434.54	-4.62%	32.26%
NATS (Continental)	722.22	-33.34%	14.73%
NAV CANADA	387.47	8.05%	12.42%
NAV Portugal (Continental)	387.03	-16.15%	14.13%
NAVIAIR	903.97	-22.60%	21.46%
Oro Navigacija	425.89	-19.92%	0.76%
PANSA	451.66	-23.62%	9.41%
ROMATSA	668.26	-19.43%	14.67%
Sakaeronavigatsia	744.62	-14.23%	19.15%
skeyes	3,183.11	-18.46%	19.86%
skyguide	1,808.27	-18.90%	16.35%
Slovenia Control	584.80	-35.84%	5.99%
SMATSA	459.27	-29.17%	10.93%

2D: Continental Proportion of total costs made up of ATCO in OPS employment costs

Formula: ATCO in OPS employment Costs/Total Costs

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	0.32	0.29%	-0.23%
AEROTHAI	0.27	-5.27%	-1.21%
Airways NZ	0.38	-1.38%	0.86%
Albcontrol	0.07	-23.17%	-14.27%
ANA	0.39	9.79%	-
ANS CR	0.21	-14.71%	-2.18%
ANS Finland	0.32	-1.73%	-2.20%
ARMATS	0.22	3.78%	7.72%
ATNS	0.25	12.08%	3.42%
Austro Control	0.30	-0.65%	-1.87%
Avinor (Continental)	0.41	4.33%	10.47%
BULATSA	0.28	-2.06%	-1.13%
Croatia Control	0.34	0.72%	-2.40%
DCAC Cyprus	0.30	2.77%	0.33%
DFS	0.37	-5.44%	-0.01%
DHMI	0.19	-13.34%	-3.98%
DSNA	0.23	-14.14%	-5.01%
EANS	0.30	-0.69%	0.76%
ENAIRE	0.43	-0.39%	-1.94%
ENAV	0.31	-0.96%	-0.68%
FAA-ATO	0.23	-0.55%	-0.32%
HASP	0.33	5.20%	1.12%
HungaroControl	0.25	-4.18%	0.67%
IAA	0.33	-11.56%	3.16%
Isavia ANS	0.47	14.79%	2.99%
KCAA	0.46	71.81%	12.79%
LFV	0.47	-11.84%	0.47%
LGS	0.24	7.29%	4.12%
LPS	0.29	-1.24%	1.20%
LVNL	0.16	6.38%	-14.61%
MATS	0.30	8.16%	2.24%
M-NAV	0.31	-0.15%	-1.96%
MOLDATSA	0.26	10.65%	8.07%
MUAC	0.39	-4.70%	-5.10%
NATS (Continental)	0.36	28.25%	5.77%
NAV CANADA	0.27	31.59%	-1.77%
NAV Portugal (Continental)	0.41	-8.04%	0.45%
NAVIAIR	0.29	24.39%	-1.02%
Oro Navigacija	0.27	-2.10%	2.39%
PANSA	0.29	-21.26%	-4.19%
ROMATSA	0.28	-13.68%	-1.36%
Sakaeronavigatsia	0.11	7.21%	3.99%
skeyes	0.18	-11.10%	-7.85%
skyguide	0.17	-1.85%	-7.41%
Slovenia Control	0.32	6.93%	-0.81%
SMATSA	0.26	2.39%	3.57%

3A: Continental Annual employment cost per ATCO in OPS (USD)

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

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	41,649.19	6.93%	3.27%
AEROTHAI	65,190.99	-26.74%	-0.76%
Airways NZ	140,634.18	2.85%	2.42%
Albcontrol	29,678.65	-12.50%	-16.89%
ANA	146,715.51	0.69%	-
ANS CR	112,238.62	-31.30%	-13.74%
ANS Finland	143,494.23	-3.00%	0.99%
ARMATS	31,462.79	22.45%	12.23%
ATNS	52,946.34	-12.88%	0.67%
Austro Control	251,026.29	4.28%	-1.36%
Avinor (Continental)	237,471.64	0.55%	12.31%
BULATSA	116,134.56	-2.74%	-3.14%
Croatia Control	135,209.91	-10.72%	-2.99%
DCAC Cyprus	121,909.89	8.31%	2.58%
DFS	307,500.82	3.38%	4.56%
DHMI	57,222.91	10.78%	14.94%
DSNA	160,556.29	0.65%	0.33%
EANS	140,028.01	-1.33%	3.74%
ENAIRE	223,993.50	0.22%	-1.61%
ENAV	189,343.67	8.85%	1.40%
FAA-ATO	227,620.13	4.14%	2.03%
HASP	93,876.84	8.33%	0.63%
HungaroControl	139,102.98	-3.88%	-1.17%
IAA	187,594.76	-10.75%	-2.74%
Isavia ANS	223,864.11	10.23%	3.98%
KCAA	37,074.80	25.93%	5.10%
LFV	246,622.58	-36.24%	2.80%
LGS	80,522.83	-1.97%	3.61%
LPS	132,832.25	-10.91%	-12.55%
LVNL	200,610.72	-1.15%	-11.59%
MATS	112,863.15	-8.04%	-2.54%
M-NAV	73,705.67	-5.29%	0.91%
MOLDATSA	34,949.91	17.09%	11.30%
MUAC	403,760.17	0.59%	5.95%
NATS (Continental)	223,324.08	5.76%	3.43%
NAV CANADA	207,337.10	50.72%	2.54%
NAV Portugal (Continental)	327,105.00	0.91%	3.72%
NAVIAIR	210,157.25	4.44%	3.12%
Oro Navigacija	88,581.25	-3.77%	-0.60%
PANSA	86,612.88	-33.99%	-10.92%
ROMATSA	123,427.20	-12.02%	-3.01%
Sakaeronavigatsia	30,060.28	12.08%	10.15%
skeyes	249,610.72	2.75%	-1.26%
skyguide	270,777.86	-1.83%	-1.14%
Slovenia Control	135,230.38	1.22%	-2.22%
SMATSA	77,458.21	0.19%	-0.69%

3A: Continental Annual employment cost per ATCO in OPS (USD), PPP adjusted

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	136,033.42	3.70%	0.93%
AEROTHAI	174,022.75	-24.46%	0.98%
Airways NZ	136,472.26	3.56%	2.42%
Albcontrol	75,035.62	-14.21%	-15.78%
ANA	140,802.62	-2.97%	-
ANS CR	188,864.74	-31.04%	-14.60%
ANS Finland	144,261.03	-0.93%	1.64%
ARMATS	99,303.93	19.26%	18.24%
ATNS	110,239.07	-16.55%	-1.80%
Austro Control	281,114.25	6.08%	-0.86%
Avinor (Continental)	187,213.79	-9.15%	9.71%
BULATSA	255,837.14	-8.06%	-16.89%
Croatia Control	264,839.85	-9.60%	-2.40%
DCAC Cyprus	177,713.95	9.62%	4.09%
DFS	354,210.00	4.50%	4.80%
DHMI	207,304.97	-14.53%	-0.48%
DSNA	183,197.57	2.69%	1.16%
EANS	214,479.82	-2.94%	2.89%
ENAIRE	312,001.96	1.54%	-0.69%
ENAV	246,670.21	12.20%	2.84%
FAA-ATO	227,620.13	4.14%	2.03%
HASP	151,185.36	12.87%	3.00%
HungaroControl	278,706.11	-9.12%	-4.06%
IAA	183,324.70	-6.44%	-1.23%
Isavia ANS	192,486.36	6.52%	2.07%
KCAA	93,235.71	26.49%	2.98%
LFV	242,983.92	-35.42%	2.84%
LGS	135,351.05	-3.92%	2.62%
LPS	225,067.92	-9.48%	-12.38%
LVNL	218,014.39	-0.14%	-11.58%
MATS	168,298.29	-6.25%	-2.07%
M-NAV	202,172.56	-2.78%	0.97%
MOLDATSA	100,343.37	11.75%	16.37%
NATS (Continental)	238,781.04	7.48%	3.51%
NAV CANADA	211,395.91	46.54%	2.10%
NAV Portugal (Continental)	494,750.20	3.08%	4.46%
NAVIAIR	198,303.19	3.88%	3.83%
Oro Navigacija	162,110.24	-6.07%	-1.69%
PANSA	185,839.76	-34.80%	-11.70%
ROMATSA	284,306.28	-12.50%	-5.83%
Sakaeronavigatsia	102,211.32	5.33%	5.77%
skeyes	279,159.26	3.97%	-0.72%
skyguide	229,119.64	1.89%	1.07%
Slovenia Control	204,904.11	3.22%	-1.78%
SMATSA	183,728.96	0.20%	-1.35%

3B: Continental Annual working hours per ATCO in OPS

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

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	1,961.76	-1.47%	-0.10%
AEROTHAI	1,527.84	-20.42%	-5.55%
Airways NZ	1,364.00	0.00%	0.00%
Albcontrol	1,185.43	11.63%	-4.29%
ANA	1,079.22	-8.82%	-
ANS CR	1,121.69	-22.53%	-7.67%
ANS Finland	1,646.50	6.01%	1.76%
ARMATS	1,451.84	9.87%	1.61%
ATNS	884.00	-28.70%	-14.17%
Austro Control	1,296.20	9.94%	-1.76%
Avinor (Continental)	1,534.03	-0.58%	-0.74%
BULATSA	774.67	1.87%	-11.91%
CAAS	1,310.91	0.20%	-7.86%
Croatia Control	1,322.96	0.61%	0.28%
DCAC Cyprus	1,917.91	5.79%	-0.40%
DFS	1,058.69	3.21%	3.06%
DHMI	961.26	3.51%	-5.39%
DSNA	1,284.00	0.00%	0.00%
EANS	1,156.53	1.20%	-5.17%
ENAIRE	1,064.07	2.35%	-4.42%
ENAV	1,060.49	8.27%	-3.36%
FAA-ATO	1,356.61	2.95%	-5.58%
HASP	1,482.00	0.00%	0.00%
HungaroControl	1,531.20	-0.37%	-0.47%
IAA	1,478.00	0.14%	-1.33%
Isavia ANS	1,265.07	-13.66%	-7.29%
KCAA	1,368.00	-5.00%	-1.27%
LFV	1,549.96	0.66%	-1.67%
LGS	1,332.37	-0.99%	-3.51%
LPS	1,387.80	15.30%	-2.87%
LVNL	1,588.88	0.44%	1.11%
MATS	1,817.33	-2.12%	-1.07%
M-NAV	1,323.95	-1.03%	0.64%
MOLDATSA	1,477.33	1.26%	0.77%
MUAC	952.82	-3.12%	-5.10%
NATS (Continental)	1,071.27	5.93%	-5.27%
NAV CANADA	1,783.93	33.04%	4.14%
NAV Portugal (Continental)	1,863.50	6.85%	0.87%
NAVIAIR	1,483.49	1.14%	0.09%
Oro Navigacija	1,576.33	0.47%	-0.57%
PANSA	770.02	0.50%	-7.91%
ROMATSA	1,177.17	3.31%	-0.24%
Sakaeronavigatsia	1,524.00	0.00%	0.00%
skeyes	1,211.31	28.17%	-0.84%
skyguide	1,361.78	-2.37%	1.34%
Slovenia Control	1,176.26	10.90%	-4.56%
SMATSA	1,154.07	22.99%	-1.12%

3C: Continental Annual IFR hours per ATCO in OPS

Formula: IFR flight hours/No. ATCOs in OPS

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	1,175.72	56.91%	-7.30%
AEROTHAI	258.21	-46.11%	-20.39%
Airways NZ	569.93	-8.94%	-10.76%
Albcontrol	638.24	62.99%	0.55%
ANA	178.26	6.76%	-
ANS CR	584.80	11.01%	-19.14%
ANS Finland	442.28	7.83%	-7.74%
ARMATS	120.88	62.93%	-11.83%
ATNS	276.24	-59.45%	-21.81%
Austro Control	662.45	17.26%	-10.55%
Avinor (Continental)	698.64	0.08%	-5.84%
BULATSA	626.00	35.98%	-11.09%
CAAS	397.72	55.04%	-24.24%
Croatia Control	734.35	57.62%	-4.77%
DCAC Cyprus	1,077.92	42.60%	-8.71%
DFS	515.05	25.91%	-9.84%
DHMI	563.99	36.77%	-12.73%
DSNA	488.70	31.93%	-12.29%
EANS	658.09	15.70%	-14.82%
ENAIRE	575.95	45.26%	-10.35%
ENAV	530.79	50.67%	-7.35%
FAA-ATO	1,730.82	8.91%	-3.79%
HASP	784.44	38.84%	-7.88%
HungaroControl	891.54	28.71%	-11.37%
IAA	621.99	21.75%	-18.42%
Isavia ANS	1,350.36	22.44%	-11.72%
KCAA	558.62	27.53%	6.13%
LFV	550.15	8.85%	-14.36%
LGS	621.41	15.81%	-11.68%
LPS	527.07	30.62%	-17.73%
LVNL	443.35	13.11%	-13.75%
MATS	909.24	6.79%	-11.70%
M-NAV	434.03	60.62%	0.29%
MOLDATSA	123.40	57.55%	-3.02%
MUAC	1,447.30	14.29%	-12.11%
NATS (Continental)	539.92	9.85%	-17.06%
NAV CANADA	1,456.88	-2.58%	-6.50%
NAV Portugal (Continental)	1,219.08	39.32%	-9.80%
NAVIAIR	565.46	0.38%	-13.86%
Oro Navigacija	574.87	23.71%	-4.41%
PANSA	466.62	23.45%	-13.30%
ROMATSA	466.69	34.97%	-13.76%
Sakaeronavigatsia	312.14	20.83%	-11.51%
skeyes	350.58	45.82%	-8.57%
skyguide	723.41	23.80%	-6.44%
Slovenia Control	484.77	43.12%	-6.63%
SMATSA	476.10	37.01%	-14.53%

3D: Continental Ratio of Frontline Service Staff to ATCO in OPS

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

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	0.25	0.00%	0.01%
Airways NZ	0.54	-5.64%	-
ANA	0.31	12.63%	-
ATNS	0.85	-16.62%	-
DHMI	1.44	2.78%	-
ENAIRE	0.96	7.33%	4.18%
HungaroControl	1.17	-12.04%	-
Isavia ANS	1.50	-14.29%	-
LGS	3.24	-15.61%	-0.95%
NAV CANADA	1.45	17.13%	-
PANSA	1.33	-0.29%	-

OCEANIC

1: Oceanic Cost per IFR hour (USD)

Formula: Total costs/IFR flight hours

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
Airways NZ	187.13	-20.50%	37.54%
FAA-ATO	113.46	-9.79%	8.50%
Isavia ANS	303.16	-18.05%	16.48%
NAV CANADA	234.73	209.23%	40.68%

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	2020-2021 AGR	2017-2021 CAGR
Airways NZ	108.74	1.72%	1.84%
DSNA	163.15	-	-
FAA-ATO	233.30	-0.45%	9.20%
Isavia ANS	174.69	12.80%	13.94%
NAV CANADA	126.93	10.34%	1.13%

2A: Oceanic ATCO in OPS employment cost per ATCO in OPS hour (USD), PPP adjusted

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
Airways NZ	105.52	2.42%	1.84%
DSNA	186.16	-	-
FAA-ATO	233.30	-0.45%	9.20%
Isavia ANS	150.21	9.00%	11.85%
NAV CANADA	129.42	7.28%	0.69%

2B: Oceanic ATCO in OPS hour productivity

Formula: IFR flight hours/ATCOs in OPS hours

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
Airways NZ	0.82	18.41%	-32.25%
FAA-ATO	6.51	-8.76%	-1.95%
Isavia ANS	2.34	34.65%	-7.77%
NAV CANADA	3.78	-38.50%	-14.06%

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	2020-2021 AGR	2017-2021 CAGR
Airways NZ	55.08	-32.56%	20.19%
FAA-ATO	77.60	-16.48%	7.30%
Isavia ANS	228.41	-18.63%	14.56%
NAV CANADA	201.17	251.69%	47.56%

2D: Oceanic Proportion of total costs made up of ATCO in OPS employment costs

Formula: ATCO in OPS employment costs/Total Costs

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
Airways NZ	0.71	8.06%	9.29%
DSNA	0.25	-	-
FAA-ATO	0.32	20.95%	2.64%
Isavia ANS	0.25	2.22%	6.07%
NAV CANADA	0.14	-41.98%	-16.35%

3A: Oceanic Annual employment cost per ATCO in OPS (USD)

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

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
Airways NZ	148,323.51	1.72%	1.84%
DSNA	209,491.01	-	-
FAA-ATO	316,502.78	2.49%	3.11%
Isavia ANS	219,386.82	8.02%	3.46%
NAV CANADA	226,253.60	85.66%	6.28%

3A: Oceanic Annual employment cost per ATCO in OPS (USD), PPP adjusted

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
Airways NZ	143,934.03	2.42%	1.84%
DSNA	239,032.96	-	-
FAA-ATO	316,502.78	2.49%	3.11%
Isavia ANS	188,636.63	4.39%	1.55%
NAV CANADA	230,682.71	80.51%	5.82%

3B: Oceanic Annual working hours per ATCO in OPS

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

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
Airways NZ	1,364.00	0.00%	0.00%
ATNS	884.00	-	-20.03%
DSNA	1,284.00	-	-
FAA-ATO	1,356.62	2.95%	-5.58%
Isavia ANS	1,255.86	-4.23%	-9.20%
NAV CANADA	1,782.49	68.26%	5.09%

3C: Oceanic Annual IFR hours per ATCO in OPS

Formula: IFR flight hours/No. ATCOs in OPS

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
Airways NZ	1,123.30	18.41%	-32.25%
ATNS	149.56	-	-19.51%
FAA-ATO	8,825.13	-6.06%	-7.42%
Isavia ANS	2,935.04	28.95%	-16.26%
NAV CANADA	6,741.53	3.48%	-9.68%

3D: Oceanic Ratio of Frontline Service Staff to ATCOs in OPS

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

ANSP	KPI	2020-2021 AGR
Airways NZ	0.73	1.26%
DSNA	0.67	-
Isavia ANS	1.58	4.00%
NAV CANADA	0.43	25.00%

JOINT CONTINENTAL AND OCEANIC

COI: Combined Cost per IFR hour (USD)

Formula: Total costs / IFR flight hours

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	109.73	-32.05%	11.67%
AEROTHAI	952.44	43.49%	26.18%
Airways NZ	564.21	8.51%	18.78%
Albcontrol	656.73	-30.12%	-3.58%
ANA	2,135.46	-14.10%	-
ANS CR	893.06	-27.44%	9.05%
ANS Finland	1,021.50	-8.46%	11.92%
ARMATS	1,182.48	-27.58%	18.17%
ATNS	743.54	99.26%	25.17%
Austro Control	1,261.32	-10.49%	12.38%
Avinor (Continental)	834.24	-3.70%	7.96%
BULATSA	657.40	-26.97%	10.18%
CAAS	1,386.79	-30.10%	34.36%
Croatia Control	548.97	-43.77%	4.36%
DCAC Cyprus	383.14	-26.10%	11.99%
DFS	1,593.46	-13.17%	16.00%
DHMI	541.16	-6.54%	37.15%
DSNA	1,560.94	-4.32%	22.67%
EANS	701.06	-14.13%	20.86%
ENAIRE	907.60	-30.73%	11.92%
ENAV	1,132.79	-27.06%	10.20%
FAA-ATO	546.22	-3.76%	6.62%
HASP	366.60	-25.84%	8.03%
HungaroControl	631.52	-22.06%	10.76%
IAA	909.91	-17.11%	15.56%
Isavia ANS	308.65	-18.30%	16.28%
KCAA	143.04	-42.53%	-12.20%
LFV	963.57	-33.56%	19.48%
LGS	530.70	-21.10%	12.67%
LPS	879.88	-30.93%	5.03%
LVNL	2,890.96	-17.85%	20.04%
MATS	417.23	-20.38%	7.96%
M-NAV	539.21	-40.94%	2.64%
MOLDATSA	1,069.61	-32.83%	6.20%
MUAC	713.52	-7.64%	27.01%
NATS (Continental)	1,135.84	-24.93%	17.90%
NAV CANADA	481.82	24.52%	13.39%
NAV Portugal (Continental)	655.35	-21.23%	14.48%
NAVIAIR	1,275.63	-16.35%	20.93%
Oro Navigacija	579.98	-20.54%	1.57%
PANSA	637.28	-32.09%	7.24%
ROMATSA	932.74	-24.48%	14.02%
Sakaeronavigatsia	840.92	-13.48%	19.71%
skeyes	3,895.11	-20.74%	17.18%
skyguide	2,182.57	-19.21%	14.12%
Slovenia Control	863.76	-33.86%	5.57%
SMATSA	621.96	-28.58%	12.20%

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

Formula: ATCO in OPS employment costs/Total Costs

ANSP	KPI	2020-2021 AGR	2017-2021 CAGR
AAI	0.32	0.29%	-0.23%
AEROTHAI	0.27	-5.27%	-1.21%
Airways NZ	0.40	-0.68%	1.67%
Albcontrol	0.07	-23.17%	-14.27%
ANA	0.39	9.79%	-
ANS CR	0.21	-14.71%	-2.18%
ANS Finland	0.32	-1.73%	-2.20%
ARMATS	0.22	3.78%	7.72%
ATNS	0.25	12.08%	2.54%
Austro Control	0.30	-0.65%	-1.87%
Avinor (Continental)	0.41	4.33%	10.47%
BULATSA	0.28	-2.06%	-1.13%
Croatia Control	0.34	0.72%	-2.40%
DCAC Cyprus	0.30	2.77%	0.33%
DFS	0.37	-5.44%	-0.01%
DHMI	0.19	-13.34%	-3.98%
DSNA	0.23	-13.56%	-4.85%
EANS	0.30	-0.69%	0.76%
ENAIRE	0.43	-0.39%	-1.94%
ENAV	0.31	-0.96%	-0.68%
FAA-ATO	0.23	-0.22%	-0.26%
HASP	0.33	5.20%	1.12%
HungaroControl	0.25	-4.18%	0.67%
IAA	0.33	-11.56%	3.16%
Isavia ANS	0.28	5.49%	5.51%
KCAA	0.46	71.81%	12.79%
LFV	0.47	-11.84%	0.47%
LGS	0.24	7.29%	4.12%
LPS	0.29	-1.24%	1.20%
LVNL	0.16	6.38%	-14.61%
MATS	0.30	8.16%	2.24%
M-NAV	0.31	-0.15%	-1.96%
MOLDATSA	0.26	10.65%	8.07%
MUAC	0.39	-4.70%	-5.10%
NATS (Continental)	0.36	28.25%	5.77%
NAV CANADA	0.26	25.85%	-2.70%
NAV Portugal (Continental)	0.41	-8.04%	0.45%
NAVIAIR	0.29	24.39%	-1.02%
Oro Navigacija	0.27	-2.10%	2.39%
PANSA	0.29	-21.26%	-4.19%
ROMATSA	0.28	-13.68%	-1.36%
Sakaeronavigatsia	0.11	7.21%	3.99%
skeyes	0.18	-11.10%	-7.85%
skyguide	0.17	-1.85%	-7.41%
Slovenia Control	0.32	6.93%	-0.81%
SMATSA	0.26	2.39%	3.57%

ANNEX 6: EXCHANGE RATES

All exchange rates are the 2021 average for US Dollar per local currency. For sources please see Annex 8.

ANSP	Currency	2021 Exchange Rate
AAI	INR	0.0135
AEROTHAI	THB	0.0313
Airservices Australia	AUD	0.7512
Airways NZ	NZD	0.7092
Albcontrol	ALL	0.0097
ANA	EUR	1.1827
ANS CR	CZK	0.0461
ANS Finland	EUR	1.1827
ARMATS	AMD	0.0020
ATNS	NTD	0.0677
Austro Control	EUR	1.1827
Avinor (Continental)	NOK	0.1164
BULATSA	BGN	0.6061
CAAS	SGD	0.7463
Croatia Control	HRK	0.1572
DCAC Cyprus	EUR	1.1827
DFS	EUR	1.1827
DHMI	TRY	0.1130
DSNA	EUR	1.1827
EANA	ARS	0.0105
EANS	EUR	1.1827
ENAIRE	EUR	1.1827
ENAV	EUR	1.1827
FAA-ATO	USD	1.0000
HASP	EUR	1.1827
HungaroControl	HUF	0.0033
IAA	EUR	1.3754
Isavia ANS	ISK	0.0079
JANS	JPY	0.0091
KCAA	KSH	0.0091
LFV	SEK	0.1166
LGS	EUR	1.1827
LPS	EUR	1.1827
LVNL	EUR	1.1827
MATS	EUR	1.1827
M-NAV	MKD	0.0192
MOLDATSA	MDL	0.0566
MUAC	EUR	1.1827
NATS (Continental)	GBP	1.3754
NAV CANADA	CDN	0.8000
NAV Portugal (Continental)	EUR	1.1827
NAVIAIR	DKK	0.1590
Oro Navigacija	EUR	1.1827
PANSA	PLN	0.2591
ROMATSA	RON	0.2404
Sakaeronavigatsia	GEL	0.3106
SANS	SAR	0.2667
skeyes	EUR	1.1827
skyguide	CHF	1.0943
Slovenia Control	EUR	1.1827
SMATSA	RSD	0.0101
UKSATSE	UAH	0.0366

ANNEX 7: ACRONYMS AND ABBREVIATIONS

ACE	ATM Cost Effectiveness
ACC	Aera Control Centre
ACI	Airports Council International
ANS	Air Navigation Services
ANSP	Air Navigation Service Provider
ASK	Available Seat Kilometres
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFM	Air Traffic Flow Management
ATM	Air traffic management
CAGR	Compound Annual Growth Rate
CANSO	Civil Air Navigation Services Organisation
CNS	Communications, Navigation and Surveillance
FTE	Full Time Equivalent
GBWG	Global Benchmarking Workgroup
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
KPI	Key Performance Indicator
MET	Aeronautical Meteorological
OECD	Organisation for Economic Co-operation and Development
OPS	Operations
PPP	Purchasing Power Parity
PRU	Performance Review Unit
RPK	Revenue Passenger Kilometres
SAF	Sustainable Aviation Fuel
SIWG	Safety Intelligence Workgroup
TNSU	Terminal Navigation Service Units
USD	United States Dollar
VFR	Visual Flight Rules
YoY	Year-on-Year

ANNEX 8: SOURCES

DEFINITIONS

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

ACE BENCHMARKING REPORT DATA DASHBOARD

[EUROCONTROL ACE \(ATM Cost-Effectiveness\) Dashboard](#)

INDUSTRY TRENDS

[2021 global air passenger totals show improvement from 2020, but still only half pre-pandemic levels \(icao.int\)](#)

[ACI World confirms global traffic figures for 2021 – Airport World \(airport-world.com\)](#)

[Air Cargo Market Analysis \(iata.org\)](#)

[Airlines Financial Monitor \(iata.org\)](#)

[Annual Review 2022 \(iata.org\)](#)

[Aviation – Analysis – IEA](#)

[Coronavirus Economic Impact TH \(icao.int\)](#)

[IATA – CORSIA](#)

[Industry Statistics Fact Sheet – June 2023 \(iata.org\)](#)

[Presentation of 2021 Air Transport Statistical Results \(icao.int\)](#)

2021 PERFORMANCE DATA

[NAV CANADA announces workforce reductions and looks to streamline operation \(navcanada.ca\)](#)

[ATNS 2021 Integrated Report \(atns.com\)](#)

[Isavia ANS Annual Report \(isavia.is\)](#)

EXCHANGE RATE DATA

[International Financial Statistics - IMF Data](#)

PPP RATE DATA

[Implied PPP conversion rate](#)



CANSO



canso.org