



Polish Air Navigation
Services Agency

ANNUAL REPORT

2021

KEY RESULTS

FOREWORD

ORGANISATIONAL STRUCTURE

EVENTS 2021

CORE ACTIVITY

AIR TRAFFIC AND DELAYS 2021

IMPLEMENTATION OF THE PERFORMANCE PLAN

ENSURING SAFETY AND SECURITY

INFRASTRUCTURE, COMMUNICATION, NAVIGATION AND SURVEILLANCE

PANSA PRO-ECOLOGY ACTIVITIES

ATC TRAINING CENTRE

HUMAN RESOURCES

STRENGTHENING OF PANSA NATIONAL AND INTERNATIONAL
POSITION

PANSA PROPRIETARY SOLUTIONS

FINANCIAL RESULTS

KEY RESULTS

SELECTED PERFORMANCE INDICATORS	2019	2020	2021
Number of en route flights ('000)	912	377	473
Number of controlled IFR flight hours ('000)	512	221	272
Number of terminal operations ('000)	444	194	238
Average en-route ATFM delay (min/flight)	0.12	0.00	0.07
Employment (in persons at the year end)	1,979	1,912	1,879
Employment - ATCO in OPS	583	597	591
Total sales revenues ('000) PLN	951,294	771,342	1,196,051
Revenue from en-route navigation services ('000) PLN	798,019	625,258	963,586
Revenue from terminal navigation services ('000) PLN	130,823	122,385	208,773
Profit / Loss on sales ('000) PLN	18,445	-114,272	572,701
Net Profit / Loss ('000) PLN	6,792	-86,166	405,028

ORGANISATIONAL STRUCTURE

Organisational structure of the Polish Air Navigation Services Agency as at 31 December 2021

PANSO President's Division

- President's Office
- Training
- Strategy, International Affairs and Project Management
- Purchasing
- Safety and Security
- HR

Division of the Vice-President for Air Navigation

- ATM Operations
- IT and CNS

Division of the Vice-President for Financial and Administrative Matters

- Finance and Accounting
- Administration

Mission

Providing safe and seamless air traffic by means of effective management of airspace.

Vision

- An organisation with a strong position in the European market for air navigation service providers.
- Innovative organisation, investing in knowledge and development.
- An organisation that bridges the gap between Eastern and Western Europe in the area of staff and service provision.

KEY PANSAT'S ACTIVITIES AREAS:

SAFETY – ensuring and maintaining air traffic safety;

CAPACITY – ensuring the required airspace capacity and air traffic services while minimising delays;

ENVIRONMENT – ensuring sustainability of air navigation services while minimising the negative impact on environment, reducing the pollutant emission and minimising the noise;

COST EFFICIENCY – providing high quality of services at a reasonable price that allows the Agency to develop and strengthen the company's financial stability.

Operational and technical objectives:

- ATM system development
- Development of ATFCM/ASM functions
- TWR systems development
- Ensuring ANS continuity
- Development of traffic management systems for unmanned aerial vehicles

Business objectives:

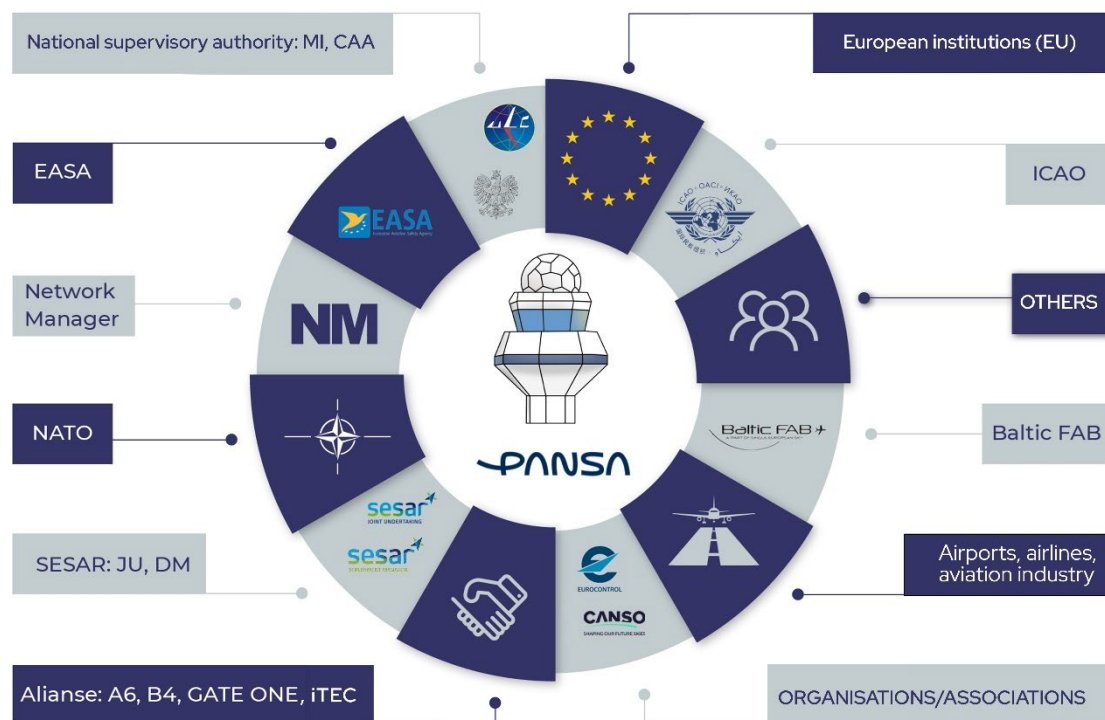
Business objectives represent a set of activities and initiatives aimed at strengthening the organisation's position in its domestic and international environment, including enhancing financial security through revenue diversification:

- The Polish Air Navigation Services Agency among the key air navigation service providers (ANSPs) in Europe
- Provision of Business to Business (B2B) services
- Development of research and development activities
- Building a strong international position of the Agency

Relations with partners:

- Stakeholders
- Partnerships
- Air Navigation Service Providers
- Institutional governance
- Business environment

Fig. 1. Relations with partners



Source: Own elaboration.

Events 2021

January 2021

Poland's first ILS CAT IIIB in operation in Gdansk

As the first in Poland – and one of the few in Europe – the extended Category IIIB ILS system has been in operation at Gdansk Airport (EPGD) since January 2021. Thus, Gdansk airport has

gained the ability to carry out Category IIIB landing operations on runway direction "29" in low visibility conditions (LVP).

CP_FIS – an innovative, safety-enhancing solution for the Flight Information Services

New contingency procedures (Contingency Plans FIS - CP_FIS) have come into force for the Flight Information Services (FIS). With the innovative CP_FIS solution, in the event of a breakdown, the work of FIS flight information officers will be able to continue uninterrupted from the back-up positions set up.

The CP_FIS solution is based on VoIP (Voice over Internet Protocol) technology, which is a cloud-based sharing of digital radio resources.

February 2021

SDDC – another state-of-the-art system launched by the Polish Air Navigation Services Agency

Another PANSO's project strengthening the safety of air operations in the Polish sky has been launched: the Surveillance Data Distribution Cloud (SDDC). The new system will ensure the highest safety standards in air traffic and, with fast transmission and instant data analysis, flight times will be reduced, which will have a positive impact on the environment. This creates a win-win situation for everyone: airlines, airports and, above all, air passengers.

PansaUTM version 1.2 with new features for UAV controllers and pilots deployed operationally

New functionalities for controllers and pilots of UAVs (Unmanned Aerial Vehicles) are the main new features of the PansaUTM system version 1.2, which, has been operationally deployed in Poland. Most of the updates in the new version of the system are relevant to air traffic controllers and flight information services (FIS) information officers, but the new version also includes improvements for UAV operators and pilots.

PANSO has launched five state-of-the-art radio communication stations

PANSO has been investing in state-of-the-art technological solutions to maintain the highest level of safety in air traffic. The Agency has launched five new radio communication stations, through which radio communication between aircraft and air traffic services is provided. The centres are used for the purposes of Area Control services (ACC), Flight Information Services (FIS) and Operational Air Traffic (OAT). The facilities deployed are equipped with state-of-the-art digital radio equipment allowing for the establishment of a communications infrastructure model based on VoIP technology.

March 2021

Dual degree programmes of PANSO and Poznań University of Technology have been launched

Practical (dual) degree programmes organised jointly with PANSO at the Faculty of Civil and Transport Engineering commenced at Poznan University of Technology in March. The new programme will help train professionals prepared to work in the aviation industry.

April 2021

New DVOR/DME radio beacon "OKC" in Warsaw

A new DVOR/DME radio beacon "OKC" Okęcie at Warsaw's Fryderyk Chopin Airport has been operationally launched. With the new technology, PANSO is strengthening security at Poland's largest airport.

The DVOR/DME (Doppler VOR) radio beacon is, along with the ILS (Instrumental Landing System), the primary ground-based navigation aid used by aircraft crews.

PANSO is stepping up overseas expansion. It will provide services in Lithuania

PANSO's Flight Inspection Unit has won another tender in Lithuania. The Agency's aircraft called Parrot for three years will be providing AGL & PAPI flight inspection services.

From May 2021 to May 2024, besides flights planned for Oro Navigacija, PANSO provides Aeronautical Ground Lighting (AGL) and Precision Approach Path Indicator (PAPI) services to Lithuanian Airports.

Collaboration with the military during Aviation Detachment 2021

The adaptation of Polish airspace, planning the course and scope of the exercise, but above all the provision of air traffic control services – these are the PANSO's main tasks as part of the Aviation Detachment 2021 exercise.

The exercise involved 24 US fighters, including 20 heavy F-15s and four multi-role F-16s, as well as an AWACS (Airborne Warning And Control System) early warning aircraft and a British KC-135 flying tanker, and Polish F-16 as well as MiG-29 fighters.

June 2021

PANSO begins testing of iTEC v3 system

Poland is the first in Europe to implement the latest generation of the ATM system in Polish and European skies. Air Traffic Controllers have begun testing the iTEC v3 system. The system is a fully digital control of aircraft movements. iTEC v3 will initially be deployed in Poznan and will eventually be used by the air navigation services of major European countries.

Digitalisation of the airspace allows faster and more accurate processing of data such as aircraft trajectories, which means that an air traffic controller is not only able to track its current position, but also see where it will be in a precisely defined period of time.

August 2021

Aviation in the fight against fires. PANSO support during LAS 2021 exercise

PANSO took part in the national rescue and firefighting exercise LAS 2021. This is a major test, organised once every few years, of the services' readiness to fight large forest fires. Almost half a thousand firefighters, 150 vehicles, as well as aircraft, helicopters and drones were involved in one of the largest nationwide rescue exercises in Poland. The main objective of the exercise was to test the preparedness of the rescue and firefighting system's forces and resources to combat the effects of prolonged and extensive forest fires.

PANSO's Flight Inspection Unit strengthens its position in Moldova

PANSO's Flight Inspection Unit was selected for the second time by the Moldavian Air Navigation Service Provider – MoldATSA, to perform annual flight inspection of air navigation aids.

The contract signed by the Polish and Moldovan air navigation agencies follows a good evaluation of the work carried out by PANSO crews in 2020 and covers the in-flight check of instrument landing systems (ILS), very high-frequency Omni-directional range beacons (DVOR) and distance measuring equipment (DME) in Chisinau. Inspection and measurement flights in Moldova took place in October 2021.

September 2021

PANS participated in the Inter-FAB workshop in Vilnius

The Inter-FAB research workshop, "Climate change and the role of air traffic control", features talks on climate change and its impact on air traffic management.

The meeting in Vilnius also provided an opportunity for bilateral talks with the Lithuanian counterpart, Oro Navigacija. New technologies in the ATM system were addressed, the PansaUTM system was presented and iTEC (Interoperability Through European Collaboration) was discussed.

The workshop was organised by FABEC in collaboration with Baltic FAB, of which PANS is a member, as well as Vilnius Gediminas Technical University and the German Aviation Research Society (G.A.R.S.). It brings together leading scientists, air navigation service providers, policy makers and climate experts to explore the role played by air traffic control in delivering sustainable aviation services for the whole of Europe.

PANS at the world trade fair WAC 2021

The Polish Air Navigation Services Agency participated in the World ATM Congress in Madrid. The highlight of the Polish proposal at the world's largest trade fair was the system PansaUTM – Europe's first and only operationally deployed drone flight coordination system. In Madrid, PANS, together with Indra, a global leader in technology solutions for aviation, launched cooperation in the iNM project, which is crucial in building the Single European Sky.

November 2021

Poland airspace management with the most advanced features

The airspace management system - CAT 3.0 - has been launched operationally. New functionalities included in the latest version of the CAT system include visualisation of radar data and alerts based on it. Poland is the only country so far to use such an advanced technology in this area.

Radar visualization data is an innovative part of airspace management service improvement. From now on, there are not only airspace areas shown on the CAT system display and information about their usage or reservation, but also aircraft data operating in the specific area.

December 2021

Automated runway condition monitoring system

Testing of the RCAMS (Runway Condition Awareness and Monitoring System) began in December. It is an innovative solution developed jointly with the Interdisciplinary Centre for Mathematical and Computer Modelling of the University of Warsaw (UW ICM) and MicroStep-MIS in cooperation with Airbus and Dassault, which will enable continuous assessment of the runway's condition by reporting on its friction, temperature and water or snow coverage.

The back-up EPWW COM CENTRE is ready

PANSO has launched a twin module of the ECG (EATM Communication Gateway) system, i.e. a module that transmits aeronautical data such as flight plans, NOTAM and METEO. The module is designed in such a way that, in the event of a system failure, it will almost immediately take over the functions of the ECG's main communication system and thus the operational work. This will ensure an uninterrupted supply of flight data to air traffic control systems.

CORE ACTIVITY

The Polish Air Navigation Services Agency is a state legal entity responsible for airspace management, air traffic flow and the provision of air navigation services (ATM/ANS), to the following extent:

1. Air Traffic Services (ATS), (including: Air Traffic Control services (ATC, i.e. ACC, APP, TWR) and Flight Information Services (FIS)),
2. Air Traffic Flow Management (ATFM),
3. Airspace Management (ASM),
4. Communications Services (COM),
5. Navigation Services (NAV),
6. Surveillance Services (SUR),
7. Aeronautical Information Services (AIS).

In addition, PANSO:

1. Provides airspace users with meteorological information produced by institutions certified in meteorological services;
2. Provides design of flight procedures;
3. Provides in-flight control of aerial communication, navigation and airspace surveillance equipment and systems;
4. Provides training and consultation on ANS;
5. Conducts research and development activities in the field of ANS;
6. Purchases, maintains and upgrades ATM/CNS infrastructure;
7. Ensures coordination of search and rescue operations;
8. Serves as flight schedule coordinator for Krakow Airport.

Air traffic control is exercised at three levels:

- **area control** – area control service – established for the purpose of air traffic control with respect to controlled flights. It is performed by Area Control Centre (ACC) Warsaw using surveillance radars;
- **approach control** – approach control service – established for the purpose of air traffic control with respect to arrival and departure of controlled flights. In Poland,

four radar approach control units have been established (APP Warszawa, APP Gdańsk, APP Kraków, APP Poznań) to provide services using surveillance equipment;

- **airport control** – aerodrome control service – established for the purpose of aerodrome air traffic control. Fifteen aerodrome control units have been established, some of which (TWR EPBY, TWR EPLB, TWR EPLL, TWR EPRA, TWR EPSC, TWR EPSY, TWR EPRZ, TWR EPZG) also exercise procedural approach control.

PANSO also provides **Flight Information Services (FIS)** in uncontrolled space. A flight information unit handles traffic in an area characterised by a considerable diversity of aircraft and airspace users with different levels of skill and experience. The Flight Information Service provides a viable buffer against violations of controlled space and also plays an important role in the formation of good pilot habits. FIS cooperates with search and rescue (SAR) services within the scope of alerting services.

In view of the global crisis in aviation and sharp decline in air traffic, the priorities of the Polish Air Navigation Services Agency had to be redefined. PANSO's strategy priorities are to maintain and develop a highly qualified workforce, ensure safety, optimise costs and invest in new technologies.

The current situation has confirmed the importance PANSO's efforts to implement technological solutions, especially in the field of **digitisation of processes and systems**.

The **development and implementation of digital solutions** is the direction taken by the Agency in the context of post-pandemic challenges, including in particular increased air traffic.

OPERATIONAL ACTIVITY

Comprehensive airspace management

As part of its efforts to ensure the required airspace capacity (also in the medium and long term, after air traffic recovery), in 2021 the Agency continued the operational development of the PEGASUS_21 air traffic management system and the STAM (Short Term ATFCM Measures) space capacity management support system.

The Polish Air Navigation Services Agency undertook activities towards the targeted implementation of P_21/ iTEC in cooperation with leading European ANSPs, both within the currently developed V2 version and the future version of the planned iTEC V3, based on a unified operational concept for the entire ATM system.

Operational use was made of and work continued to further improve the AMAN (Arrival Manager) tool, which facilitates the management of the landing approach sequence for aircraft to Warsaw and Modlin.

The implemented in-house PANSO software for airspace management (CAT 2.0) was used in line with the FRA (Free Route Airspace) requirements, while striving to continuously develop the functionality of the application. The new CAT system version – 3.0 – was launched operationally in November 2021.

Efforts have been made regarding POLFRA, the Free Route Airspace, with the aim of increasing its functionality by, among other things, extending the vertical limits of the FRA, reducing the number of restrictions and thus enabling air operators to operate flights in a variant as close as possible to their preferred trajectory (shortest time, most economical and environmentally sensitive).

The task continued, in terms of the cross-border FRA between ACC Warsaw and ACC Vilnius and ACC Warsaw and ACC Bratislava – the work took place as scheduled and the project was implemented on 24 February 2022. The Traffic Complexity Tool (TCT), a tool to support the management of ATFCM in all its phases, and the capacity management support system, STAM (Short Term ATFCM Measures), were implemented, thus fulfilling the requirements of the Common Project 1 regulation. This tool supports air traffic flow management in all phases of

ATFCM. In addition, TCT's capabilities will be used for space modelling and 'fast-time' motion simulations.

Implementation of the three-layer division of airspace sectors continued.

Work was carried out on the reorganisation of the airspace in the FIR EPWW with regard to the separation of the lower layer of the ACC as separately managed not including the STH and including the STH (Solidarity Transport Hub).

Working technologies and air traffic control service procedures were implemented and maintained to enable CDO (Continuous Descent Operations) landing and CCO (Continuous Climb Operations) take-off techniques by aircraft crews.

AIR TRAFFIC

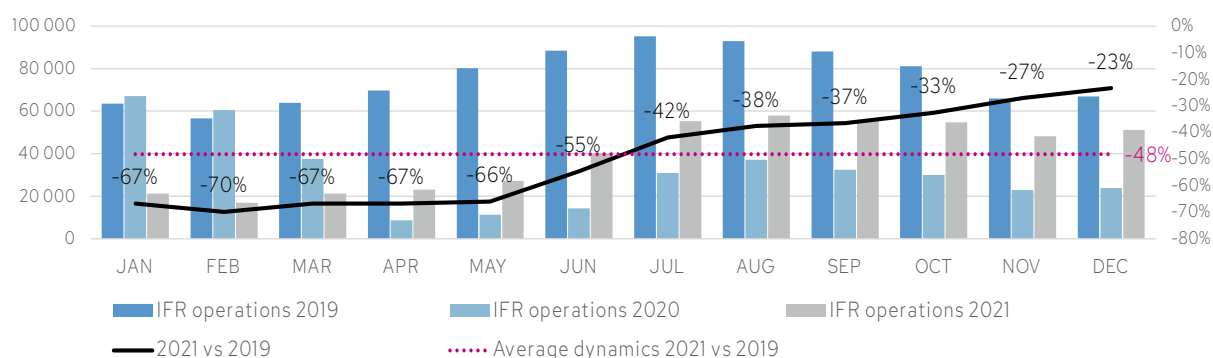
IFR operations handled by PANSAT in 2021:

1. en-route traffic – 473,196 MVS;
2. terminal traffic – 238,124 MVS.

The en-route traffic in 2021 in terms of the number of total operations (MVS) was slightly lower (by 0.6%) compared to volumes included in the 2021 Plan, but significantly higher (by 25.5%) compared to 2020. The impact of the pandemic on air traffic volumes was still noticeable in 2021, however, the introduction of vaccines and a change in the countries' approach to implementing restrictions enabled an increase in air operations in 2021. Despite the observed gradual recovery of traffic in 2021, the continued impact of the COVID-19 pandemic resulted in traffic volumes at 51.9% of those recorded in 2019.

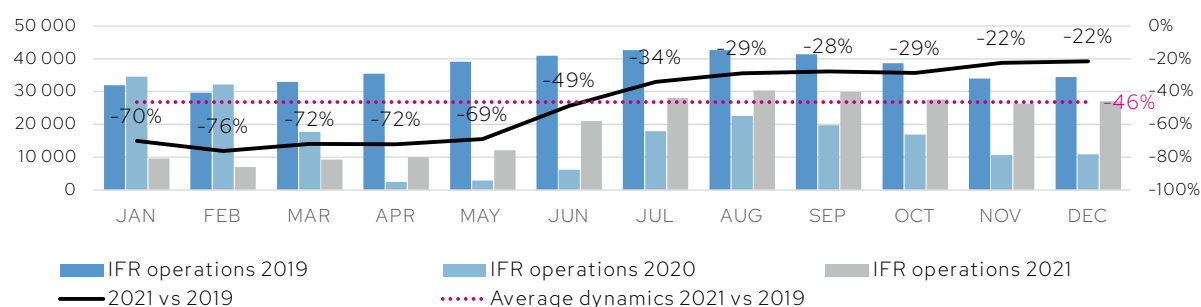
In 2021, the number of en-route service units performed, paid for by carriers from navigation fees, was 2,553,393 SUs, up from 2,115,282 SUs recorded in 2020.

Fig. 2. Air traffic dynamics (total IFR operations) at FIR Warsaw, 2021 vs 2019



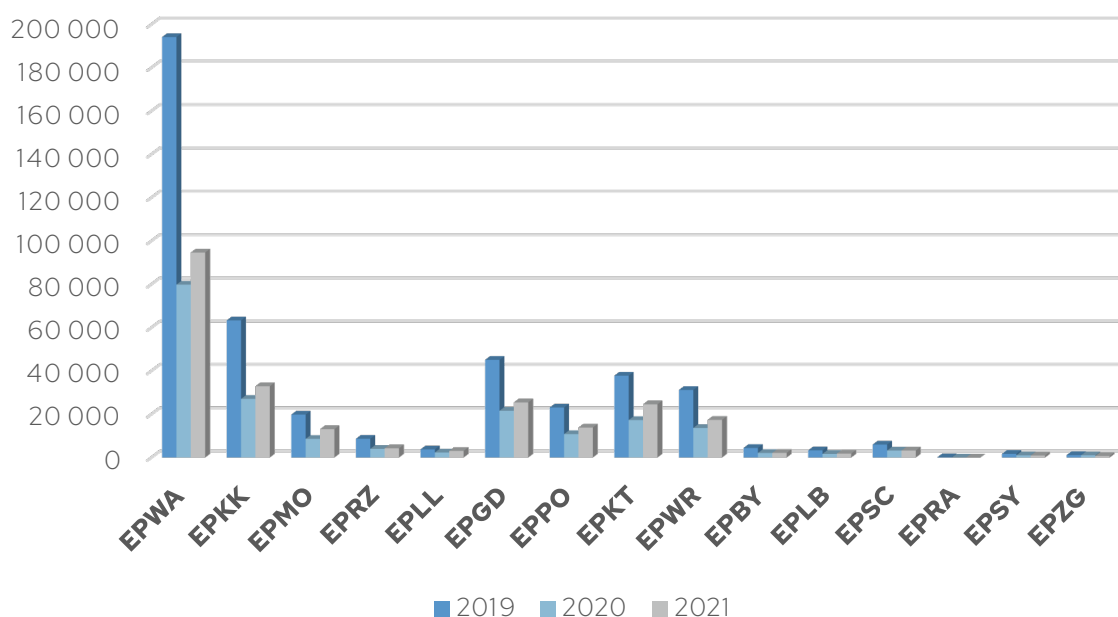
Source: Own elaboration on the basis of EUROCONTROL/PRU.

Fig. 3. Terminal traffic dynamics in years 2019–2021 (total IFR)



Source: Own elaboration on the basis of EUROCONTROL/PRU.

Fig. 4. Terminal traffic volumes in years 2019–2021 (IFR) at individual airports (MVS)



Source: Own elaboration on the basis of EUROCONTROL/PRU.

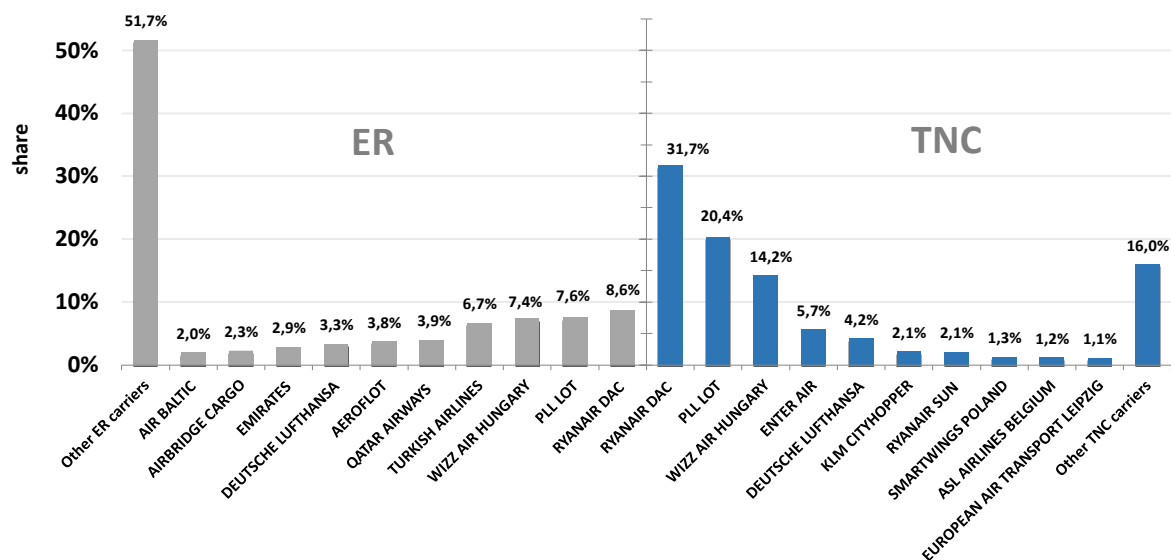
AIRSPACE USERS

Polish airports were most frequently used by low-cost carriers (LCCs), followed by network carriers and charter carriers. Ryanair DAC and Wizz Air Hungary were the leaders among LCCs. Among network carriers, PLL LOT and Deutsche Lufthansa occupied the leading position in the list of airspace users, and Turkish Airlines took the lead for en-route services. In the category of charter carriers, Enter Air, Ryanair Sun and Smartwings Poland held the largest share. This category also includes two cargo airlines: ASL Airlines Belgium and European Air Transport Leipzig, which, due to restrictions on domestic and international passenger flights to/from Poland due to the COVID-19 pandemic, were listed as major airspace users of Polish airports.

According to CAA's statistics, in 2021 the share of LCC passengers served at Polish airports in regular traffic was 56.1%. As in the previous year, Ryanair DAC, PLL LOT and Wizz Air Hungary carried the largest number of passengers at Polish airports in regular traffic. In the case of

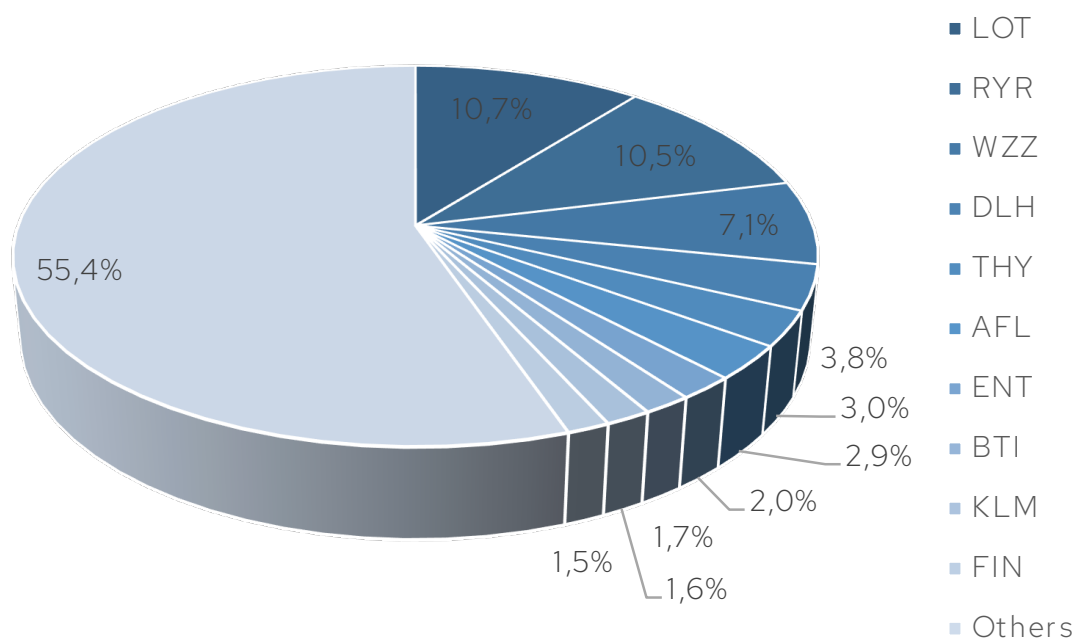
charter destinations, on the other hand, Enter Air, Ryanair Sun and Smartwings carried the most passengers.

Fig. 5. Percentage share of major air carriers in PANSA's invoiced en-route revenue and invoiced terminal revenue in 2021



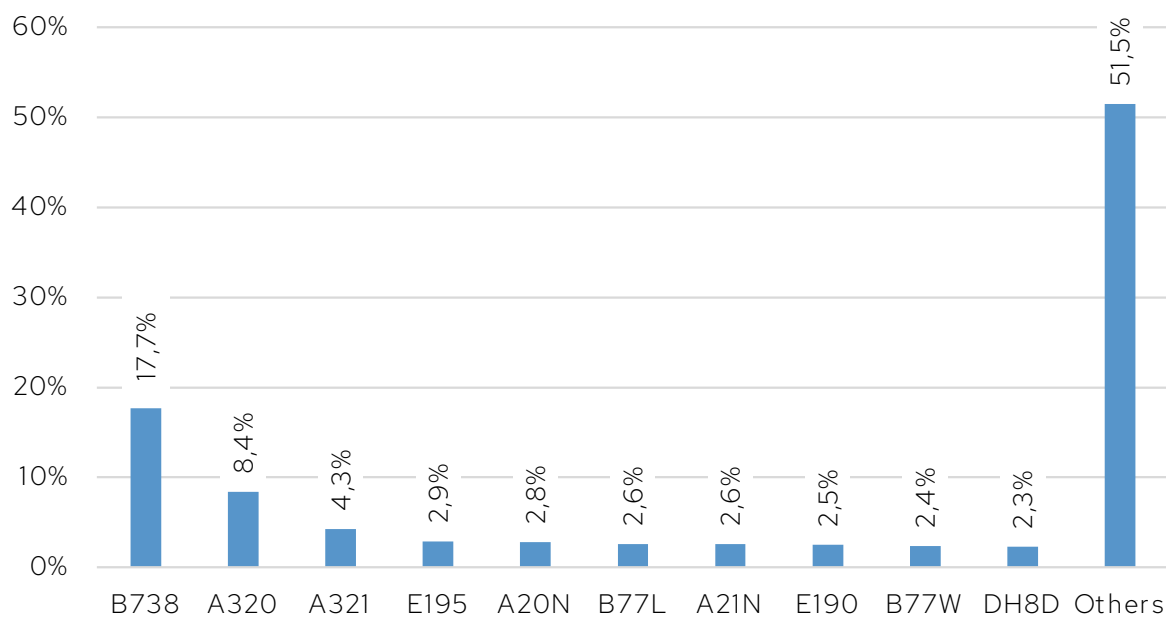
Source: Own elaboration.

Fig. 6. Percentage share of air carriers in the total number of IFR operations in FIR Warsaw in 2021



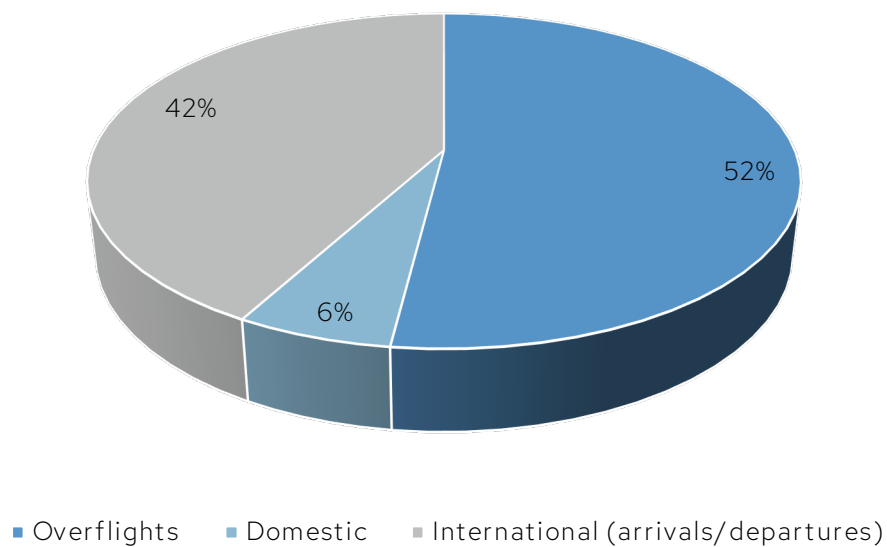
Source: Own elaboration.

Fig. 7. Percentage share of main aircraft types in the total number of IFR operations in FIR Warsaw in 2021



Source: Own elaboration.

Fig. 8. Traffic structure



Source: Own elaboration on the basis of PRU/EUROCONTROL data.

En-route delays

The volume and complexity of air traffic in Polish airspace significantly affects both en-route and terminal delay values.

Since mid-March 2020, there has been a sharp decline in air traffic due to the COVID-19 pandemic. Overall, less IFR (Instrument Flight Rules) operations were handled in 2020-2021 than in 2019, a year with historically highest traffic levels. In 2020, the number of IFR operations represented 41% and in 2021 nearly 52% of the number of operations in 2019. The significant decrease in traffic and its strong correlation with delays had a direct impact on the reduction of the en-route and terminal delay indicator.

In 2021, the average en-route ATFM delay was 0.07 min/flight, the same as the target set for Poland in the revised PP RP3, for 2021 (while being significantly lower than the target set in the original PP RP3 of November 2019 of 0.30 min/flight). The revised PP RP3 takes into account the significant decrease in the number of air operations and sets the level of en-route and terminal delays for Poland accordingly.

Terminal delays

Similarly to en-route delays, the value of the terminal delay indicator in 2021 was determined by the level of traffic from/to Polish airports, which was significantly lower than in 2019 due to the pandemic. The number of airport operations (IFR arrivals) in 2021 was more than 46% lower than in 2019.

In 2021, terminal delays, including ATC delays, were generated exclusively for EPPO, EPWA and EPWR airports. The value of the terminal delay indicator for Poland in the analysed period was 0.002 min/arrival, with an annual target set at 0.02 min/arrival within the revised PP RP3. As was the case for en-route delays, this figure was significantly lower than the target set in the original draft PP RP3 of November 2019 of 0.35 min/arrival.

The terminal delay indicator in 2021 was affected by delays generated by ATC, which accounted for 60%, weather conditions (27%) and airport delays (13%). The congestion of air traffic streams at arrivals and reduced operational staffing at arrivals are the main reasons for ATC delays reported in 2021.

IMPLEMENTATION OF THE PERFORMANCE PLAN

Safety:

In accordance with Commission Implementing Regulation (EU) 2019/317, the key safety performance indicator is the minimum level of the effectiveness of safety management to be achieved by air navigation services providers certified to provide air traffic services (ATS). The level of implementation of the following safety management objectives is measured using the following key indicators:

- safety policy and objectives;

- safety risk management;
- safety assurance;
- safety promotion;
- safety culture.

The safety targets set in PP RP3 for 2021 at level C in all five areas have been achieved. In all of these five areas, the Agency achieved a D level – above the target set.

Based on the results obtained from the monitoring of the key safety performance indicator and the conclusions of the analysis based on the CANSO tool, the improvement action plan was updated, detailed in the “Roadmap for SMS development in PANSO” – a document specifying the directions of SMS development in order to increase its maturity level in PANSO.

In terms of the resulting Safety Performance Indicators (SPIs) and safety level monitoring in 2021, PANSO continued to monitor the SPIs as defined by CAA as part of the National Safety Plan (NSP).

Capacity

En-route air traffic

The number of en-route operations performed in Polish airspace due to the ongoing COVID-19 pandemic in 2021 decreased by 48.1% compared to 2019.

Tab. 1. Total en-route traffic in 2019-2021 (MVS, SU)

Category	Total	
	MVS	SU
2019	912,455	4,971,806
2020	376,969	2,145,811
2021	473,196	2,585,928
Change 2021/2019 (%)	-48.1%	-48.0%
Change 2021/2020 (%)	25.5%	20.5%

Source: Own elaboration.

In contrast, en-route traffic in 2021 in terms of the number of total operations (MVS) was significantly higher (by 25.5%) compared to volumes in 2020.

Despite the observed gradual recovery of traffic in 2021, the continued impact of the COVID-19 pandemic resulted in traffic volumes at 51.9% of those recorded in 2019.

Tab. 2. En-route delays in 2019-2021

Category	2019	2020	2021
En-route delays (min/flight)	0.12	0.00	0.07
Target for a given year (min/flight)	0.23	0.30	0.07

Source: Own elaboration.

Terminal air traffic

Tab. 3. Total terminal traffic in 2019-2021 (MVS, SU-L)

Category	Total	
	MVS	SU-L
2019	443,679	246,373
2020	194,403	105,905
2021	238,124	132,008
<i>Change 2021/2019 (%)</i>	-46.3%	-46.4%
<i>Change 2021/2020 (%)</i>	22.5%	24.6%

Source: Own elaboration.

In 2021, terminal traffic, in terms of the number of movements (MVS), amounted to 238,124, up 22.5% on the previous year. The number of service units performed was 127,351 SU-L, up 24.6% on 2020. The highest number of terminal movements (MVS) in 2021 was recorded at Warsaw Chopin Airport (94,666 MVS).

Tab. 4. Terminal delays for EPWA and other airports

Category	2019	2020	2021
Terminal delays Poland (min/flight), of which:	0.39	0.02	0.00
a) EPWA	0.86	0.04	0.00
b) other airports	0.02	0.01	0.00
Target for a given year (min/flight)	0.04	0.45	0.02

Source: Own elaboration.

Environment

The environmental impact of air transport within the performance scheme is monitored through the horizontal en-route flight efficiency indicator, which corresponds to the difference between the length of the en-route part of the actual trajectory derived from surveillance data and the corresponding portion of the great circle distance.

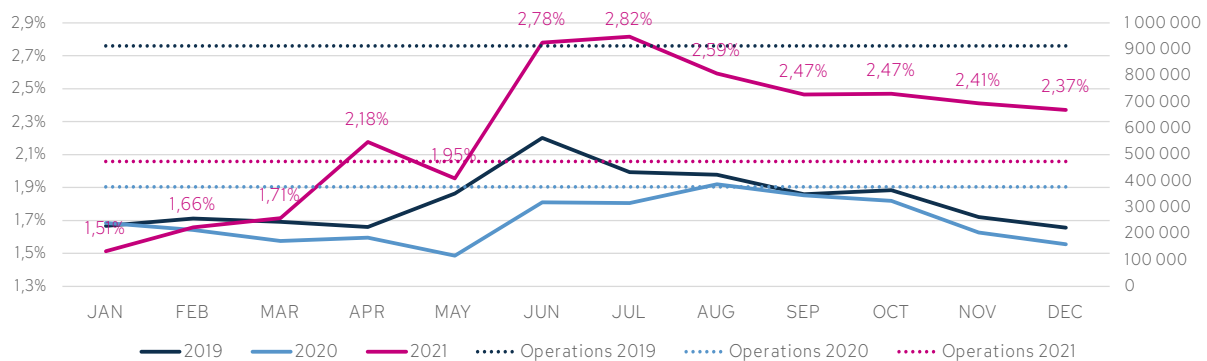
In the revised PP RP3, Poland's 2021 target for the en-route horizontal flight efficiency indicator for the actual trajectory (KEA) was 1.65% (it was reduced relative to the target set in the original PP RP3 of November 2019 of 1.84%, in order to align with the benchmark for Poland indicated by the European Commission/Performance Review Body), while actual performance was higher at 2.33%. Despite significantly lower traffic in 2021 compared to 2019, there was a significant increase in KEA.

The en-route horizontal flight efficiency indicator for the actual trajectory on a monthly basis (HFE) – which is closely correlated with KEA – shows the deviation in the length of the actual trajectory compared to the length of the allocated great circle distance for each month. Only in January 2021 was the HFE below the KEA target on an annualised basis. As of June 2021, with a significant increase in traffic compared to 2020 and decreasing deviations compared to 2019,

HFE and KEA indicators reached record high values. The analysis indicated that this was related to the decisions of aircraft users, in particular flights avoiding conflict areas in Ukraine and Belarusian space, following the incident with the forced landing of a Ryanair aircraft in Minsk in May 2021. EU carriers are discouraged from flying through Belarusian airspace, which for many connections means flying longer routes and significantly affecting traffic flows in Polish airspace. In addition, due to the low total traffic level compared to RP2, the number of flights with a higher HFE indicator had a disproportionate impact on the overall monthly and annual result.

The above indicates, as in previous years, a negligible impact of ANSPs on the HFE/KEA indicator.

Fig. 9. HFE indicator (Poland), 2019-2021



Source: Own elaboration on the basis of EUROCONTROL/PRU.

Cost efficiency

The year 2021 is the second period of a new regulatory perspective within the European Union's air navigation services performance scheme - the third reference period (RP3), covering the years from 2020 to 2024, when the Agency pursued actions to achieve the performance targets related to its scope of responsibility set in four key areas: safety, environment, capacity and cost efficiency.

In terms of en-route services, the revised PP RP3 sets a single common target for the combined years 2020-2021. Thus, the achievement of the target in question in the en-route area is also affected by the performance of 2020.

The unit cost performance in 2021 (and in the combined 2020-2021 period) relative to the draft PPD RP3 figure of November 2019 was primarily affected by the decline in air traffic caused by the COVID-19 pandemic.

Tab. 5. Implementation of cost-efficiency targets in 2021

KPA	Indicator		2021 target	2021 target	2021 performance
			(draft PP RP3 11.2019, 2021 Annual Plan)	(revised PP RP3 05.2022)	
Cost efficiency	The Determined Unit Cost (DUC) for en-route in the part concerning PANSO (in PLN at 2017 prices)		1 72.47	280.75	239.58
	The Determined Unit Cost (DUC) for terminal in the part concerning PANSO (in PLN at 2017 prices)	Warsaw	405.48	763.52	537.13
		Other airports	697.78	1,511.88	1,020.63

Source: Own elaboration.

ENSURING SAFETY AND SECURITY

The mission of PANSO is to ensure safe and smooth air traffic through efficient airspace management. We strive to ensure that safety plays a dominant role in all areas of air traffic management and air service provision.

To continuously improve the Safety Management System (SMS), PANSO performs cyclic tests of the system maturity (based on EASA, CANSO and EUROCONTROL guidelines). The results

of the tests allow to identify all areas that need improvement. Such an approach is key to developing and implementing new methods, tools and ways of information flow.

As regards the SMS, we use tools that allow for quick and proactive identification of safety problems. We place great emphasis on disseminating knowledge and building common awareness in terms of safety management in the aviation environment.

Our approach to safety management is diverse and includes:

1. promoting comprehensive understanding of all aspects of safety;
2. learning from incidents and accidents;
3. promoting the Just Culture principle (looking for causes rather than blaming parties for causing the events);
4. sharing data and best practices for the benefit of airspace users and the whole aviation community.

There have been no aviation accidents involving ATC units with human fatalities in 2021.

At the same time, in 2021 a 45.55% increase in the number of reported incidents compared to 2020 was recorded, with a 19.43% increase in the total number of flights at FIR Warsaw. In 2021, 2,013 incidents were reported. The increase in the number of incidents reported is mainly due to the high safety awareness of operational staff and the increase in the number of flight operations relative to 2020.

The results of investigation of the incidents reported indicated that in 2021 the following incidents occurred:

1. 1 aviation incident of "A" severity class;
2. 7 aviation incidents of "B" severity class;
3. 25 aviation incidents of "C" severity class.

In 2021, the most frequently reported incidents from the priority hazard areas monitored by PANSA included:

- Airspace Infringement (AI)
- Laser category incidents

- ATM system issues
- Incidents involving RPAS
- Runway Incursion (RI)
- Separation Minima Infringement (SMI)

In 2021, 599 technical incidents were also recorded.

Working with our partners within the framework of CANSO and EUROCONTROL industry organisations, PANSO provides an expertise and experience to help implement a uniform European safety framework. In this way PANSO contributes to the safer evolution of the European sky.

Aeronautical Rescue Coordination Centre (ARCC)

It has been four years since the establishment of the Civil and Military Aeronautical Rescue Coordination Centre (ARCC).

The Centre's primary tasks are to provide, together with the other units of the ASAR (Aeronautical Search And Rescue) service, search and rescue services for all aircraft located in FIR Warsaw and to operate on the land area in the aeronautical search and rescue region coinciding with the boundaries of the relevant flight information region.

The ARCC also acts as the search & rescue point of contact (SPOC) as referred to in Paragraph 3.2.5 of Annex 12 to the Chicago Convention, in particular ensuring the reception of distress information from the international satellite search and rescue assistance system (Cospas-Sarsat).

Activities taken in this area in 2021 include: preparation for and participation in the SAREX air rescue exercise, participation in the work of the CospasSarsat committee, organisation and coordination of search and rescue operations in the Polish air search and rescue region (SRR), coordination of RCC activities with air traffic services, institutions and organisations related to the aviation environment, also conducting activities in the field of search and rescue, among other things, the Civil Aviation Authority (CAA), Ministry of National Defence, Polish Medical Air Rescue, Volunteer Water Rescue Service, Tatra Volunteer Search and Rescue, Mountain

Volunteer Search and Rescue, the army, the police, the border patrol and the Maritime Rescue Coordination Centre as well as other entities and public benefit organisations involved in the air search and rescue (ASAR) system.

INFRASTRUCTURE AND CNS/ATM INVESTMENTS

The Polish Air Navigation Services Agency has been investing in state-of-the-art technological solutions to maintain the highest level of safety in air traffic. Expenditure on the upgrade and construction of state-of-the-art CNS/ATM and facility infrastructure incurred by PANSO in 2021 amounted to PLN 94.8 million.

Tab. 6. Main significant investment projects under way in 2021 in terms of expenditures incurred

Project name	Expenditure incurred (mPLN)
iTEC system	20.95
Upgrade of the ATM system	19.37
Communication systems	13.12
Server and business infrastructure	0.55
VCS (Voice Communications System)	0.44

Source: Own elaboration.

The Agency pursues its strategic objectives in the areas of safety, capacity, environment and cost-efficiency, safeguarding its operational needs, including ensuring the continuity of air navigation services provided and the implementation of activities resulting from European air transport development programmes and strategies, i.e: ATM MP and SESAR, for which the development of a state-of-the-art infrastructure is essential.

PANSO PRO-ECOLOGY ACTIVITIES

For years, the Polish Air Navigation Services Agency has been involved in various solutions aimed at environmental protection.

The Agency ensures that, while maintaining the highest level of flight safety, its negative impact on the environment is also reduced. PANSO is making efforts to enable, among other things, the reduction of aircraft fuel consumption and carbon dioxide emissions. PANSO carries out such activities in line with the five pillars for the Green Single European Sky announced by EASA and EUROCONTROL. The pillars set out how air traffic control services may help meet the EU environmental targets for transport and significantly reduce their greenhouse gas emissions by 2050.

The main pro-environmental activities and tools used by PANSO in the operational field include:

- **Free Route Airspace (FRA)**
- **Continuous Descent Approach (CDA) – “green approach”**

Reduction of pollutant emissions – Polish Free Route Airspace (POLFRA)

Free Route Airspace (FRA) is a defined volume of airspace in which airspace users are free to plan their route between specific entry and exit points. Depending on the availability of airspace, routing is possible via intermediate waypoints, without reference to the air traffic services (ATS) route network. Flights within this airspace are subject to air traffic control. In short, the use of FRA provides the opportunity to plan to fly through a given airspace via the shortest routes, bypassing the airway network. FRA is therefore a way of overcoming the environmental dimension, efficiency and capacity issues of the aviation sector by helping to reduce fuel consumption and emissions, while improving flight efficiency. At the same time, the FRA paves the way for further improvements in airspace design and ATM operational concepts.

Tab.7. Estimated benefits from FRA (POLFRA) in Poland in 2021

Number of flights covered by FRA	Distance saved (NM)	Time saved (min)	Fuel saved (kg)	CO2 emission saved (kg)	NOx saved (kg)
266,651.0	991,424.4	138,108.0	6,100,079.4	19,277,063.2	82,989.4

Source: Own elaboration.

Reduction of pollutant emissions and aircraft noise – CDA at TMA

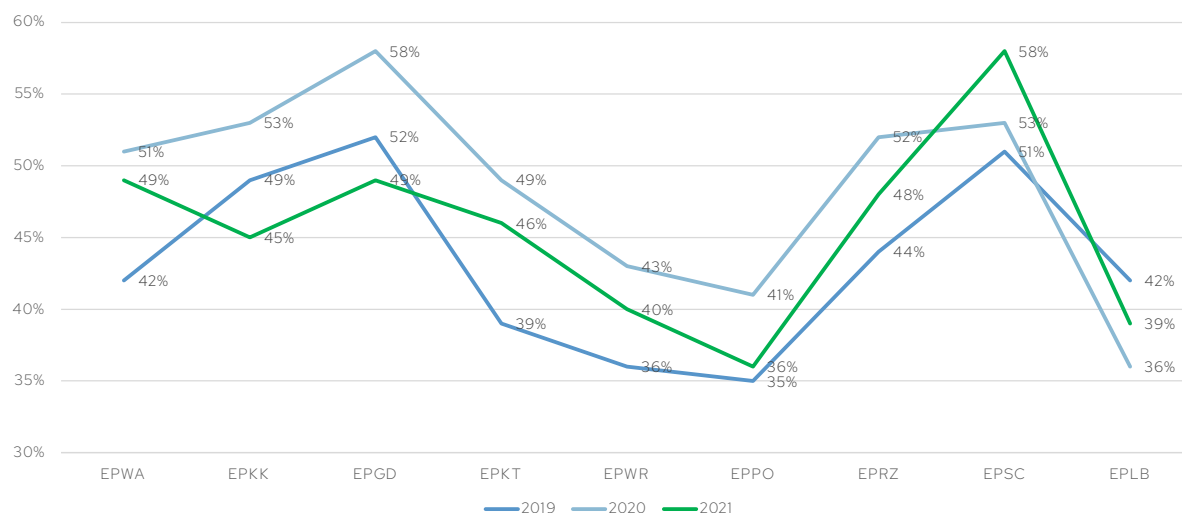
Another solution that PANSO has introduced is the so-called “green approach”, a technique known as the Continuous Descent Approach (CDA). This technique, consists in allowing the aircraft approaching destination airports to descend in a smooth and uninterrupted manner, preferably straight away from its cruising altitude. Wherever possible, controllers shall also allow pilots to self-select the optimum rate of descent with minimum engine thrust. Therefore, it is possible to significantly reduce emissions and aircraft noise. It is estimated that the use of CDA reduces fuel consumption by up to 46 kg per flight, and flight noise during descent by 1-5 dB – depending on the case and type of aircraft. PANSO has contributed to an increase in the use of CDA technology, which already concerns every second arrival at the largest airports in Poland. The record holder in this respect is Gdańsk Airport, where CDAs were applied in the case of 58% of arrivals in 2021. On the other hand, in Warsaw alone, where CDAs were used in 49% of arrivals, the resulting savings amounted to 1,066 tonnes of fuel and almost 3,000 tonnes of CO2 emissions. It is worth noting that we are one of the leaders in Europe when it comes to the use of CDA technology.

Tab. 8. Figures concerning CDAs – “green approach” – implemented at major Polish airports in 2021

	EPWA	EPKK	EPGD	EPKT	EPWR	EPPO	EPRZ	EPSC	EPLB	Total
Number of landings	47,013	16,017	12,618	12,145	8,551	6,307	2,05	1,603	894	107,2
CDA operations	23,154	7,167	6,221	5,543	3,388	2,286	992	935	346	50,032
Share of CDA operation (%)	49.25%	44.75%	49.30%	45.64%	39.62%	36.25%	48.39%	58.33%	38.70%	46.67%
Fuel saved (tonnes)	1,066	330	286	255	156	105	46	43	16	2,303
Reduction of CO2 emissions (tonnes)	3,357	1,039	902	804	491	331	144	136	50	7,255

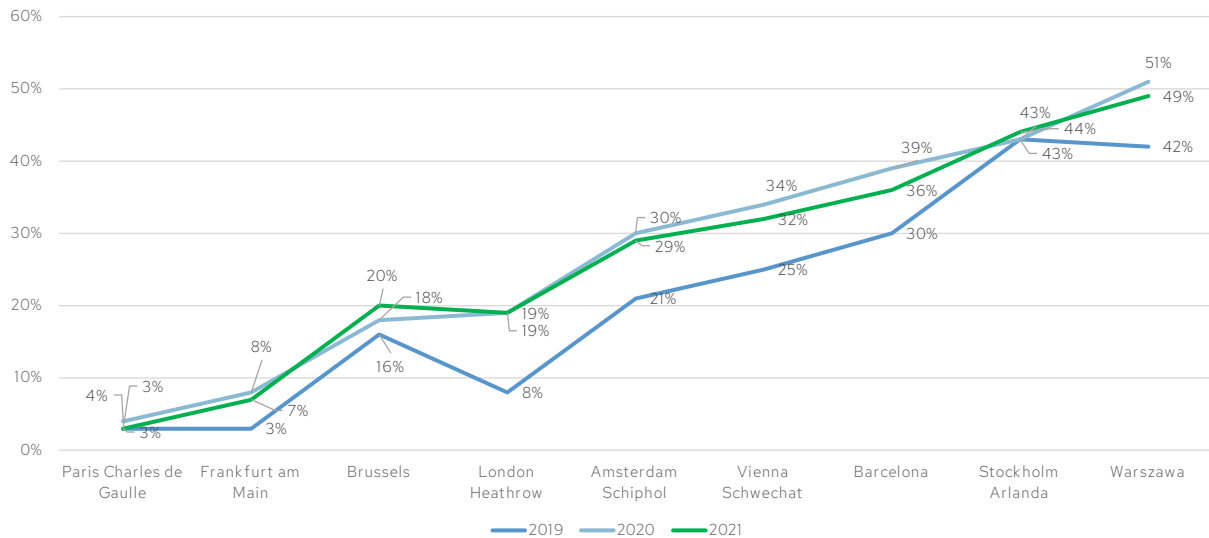
Source: Own elaboration on the basis of EUROCONTROL/PRU.

Fig. 10. Share of CDA operations implemented at major Polish airports in 2019-2021



Source: Own elaboration on the basis of EUROCONTROL/PRU.

Fig. 11. Share of CDA operations implemented at major European airports in 2019-2021



Source: Own elaboration on the basis of EUROCONTROL/PRU.

Our environmental activities have contributed to the introduction of technologies such as the **A-CDM (Airport Collaborative Decision Making)** system implemented operationally at Warsaw Chopin Airport. The system helps controllers to manage the movement of aircraft on the tarmac in a more effective manner and thus, among other things, to better determine the optimal moment for starting the engines. With A-CDM, the time that aircraft engines run on the ground has been reduced, resulting in lower fuel consumption, emissions and noise levels.

PANSA also cares for the environment by introducing new technologies and upgrading its infrastructure.

PANSA also achieves environmental savings in indirect aviation activities. Furthermore, PANSA provides environmental training for all employees and pays attention to correct segregation of waste. In this way, PANSA has already managed to separate 22.6 tonnes of paper, 2.6 tonnes of plastic and 1.1 tonnes of glass from municipal waste.

ATC TRAINING CENTRE

The Polish Air Navigation Services Agency is the only institution in Poland preparing civil air traffic controllers (ATC), staff and candidates for work in air traffic services (ATS) and training staff in the aviation sector.

The primary task of the ATS Personnel Training Centre "OSPA" of the Polish Air Navigation Services Agency is to conduct professional training for candidates for air traffic controllers and flight information officers, dedicated to work in air traffic services, as well as continuing professional development courses to maintain competence of both the above-mentioned professional groups. The objective of the aforesaid training is to ensure suitably qualified personnel required to provide air traffic control (ATC) and flight information services (FIS).

OSPA's simulators allow practical training that accurately reflects the operational environment, equipment and the Pegasus_21 ATM system. ATS Personnel Training Centre also has a state of the art simulator – an aerodrome control tower (TWR) with 360-degree imaging and four airport control towers with 120-degree imaging.

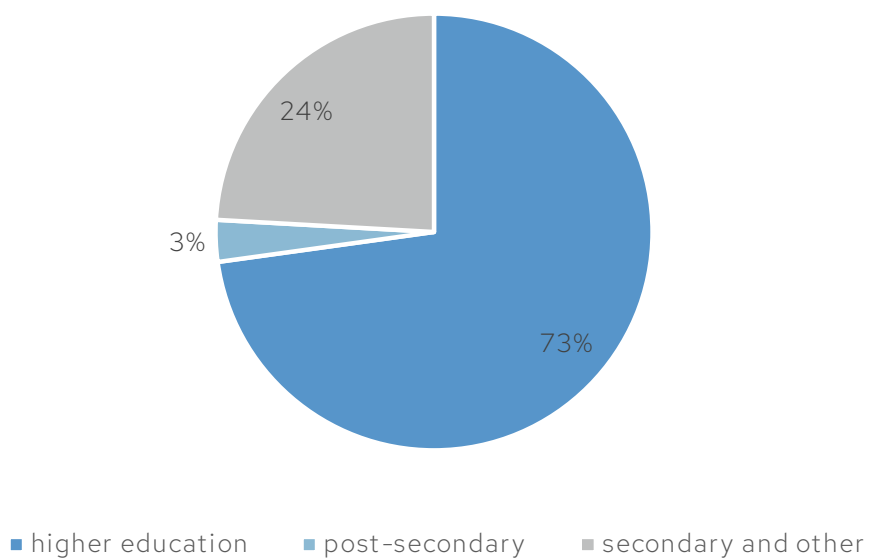
In 2021, PANSO, as well as the entire aviation sector, had to continue to deal with the crisis caused by the COVID-19 pandemic, which also affected the ATS Personnel Training Centre. Due to the pandemic restrictions and a significant drop in air traffic, apprentice training has been suspended or significantly limited. Priority training was set up and lower priority training was rescheduled. Both practical and theoretical refresher training took place according to the training plan despite the pandemic. The training process to obtain an ATC licence in 2021 has been extended due to the epidemic situation. Initial training at OSPA completed in 2021 lasted an average of 18 to 24 months.

With regard to the competences of those already holding an ATC licence or a certificate of competence, OSPA implemented, among other things, a refresher training programme and supplementary training for new qualifications. Four transitional training courses were also delivered, including three for APP authorities and one for TWR authorities, in-house training on the use of the electronic flight progress strips (EFES) system for TWR authorities and in-house training for FIS staff.

HUMAN RESOURCES

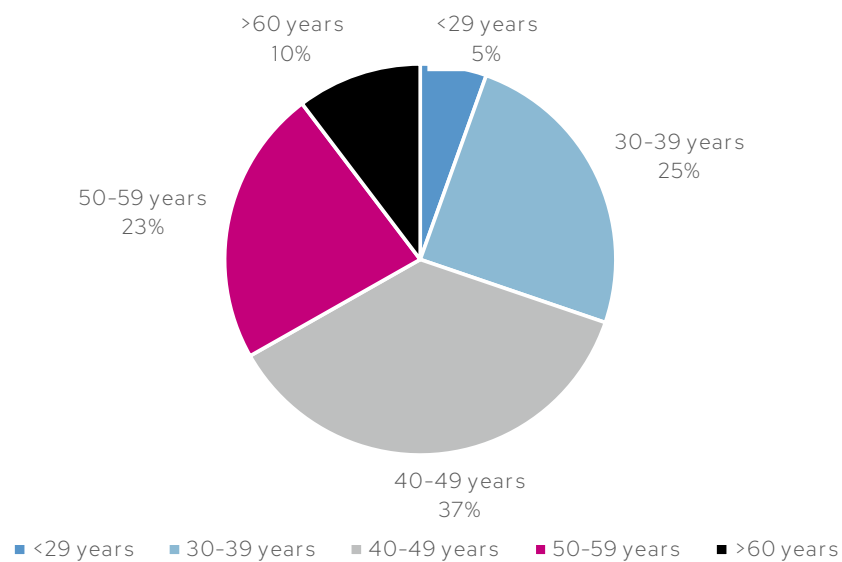
As at 31 December 2021, the Agency had 1,879 employees.

Fig. 12. Educational structure of PANSA employees (as at 31 December 2021)



Source: Own elaboration.

Fig. 13. Age structure of PANSA employees (as at 31 December 2021)



Source: Own elaboration.

Average age of PANSA employee – 45.3 years, average age of ATCO – 42.9 years.

Tab. 9. Employment in FTEs and persons as at 31 December 2021 compared to employment as at 31 December 2020

PRU Category		Employment in FTEs		Difference	Employment in persons		Difference
		31.12.2020	31.12.2021		31.12.2020	31.12.2021	
1	ATCO in OPC	587.71	582.46	-5.25	597.00	591.00	-6.00
2	ATCO on other duties	22.00	20.00	-2.00	22.00	20.00	-2.00
3	Ab Initio Trainee Controller	34.00	12.00	-22.00	34.00	12.00	-22.00
4	On-the-Job Training (OJT)	53.88	48.00	-5.88	54.00	48.00	-6.00
5	ATC assistants	46.25	43.50	-2.75	47.00	44.00	-3.00
6	OPS support non-ATCOs	369.55	339.55	-30.00	372.00	343.00	-29.00
7A	Technical support staff for operational CNS/ATM, monitoring and control systems	309.25	300.25	-9.00	311.00	304.00	-7.00
7B	Technical support staff for the development and implementation of CNS/ATM systems	39.33	68.25	28.92	41.00	69.00	28.00
8	Administrative staff	344.56	362.43	17.87	348.00	367.00	19.00
9	Support service staff	46.70	49.00	2.30	47.00	49.00	2.00
10	Other employees	38.25	31.50	-6.75	39.00	32.00	-7.00
Total		1,891.47	1,856.93	-34.54	1,912.00	1,879.00	-33.00

Source: Own elaboration.

STRENGTHENING OF PANSO NATIONAL AND INTERNATIONAL POSITION

The international cooperation of the Polish Air Navigation Services Agency is diverse. Our partners are both analogous institutions of other countries within the framework of bilateral operational cooperation as well as global associations – CANSO, ICAO, NATO – and also European institutions: European Commission, EASA, EUROCONTROL, SESAR JU, SESAR DM and grassroots associations such as the prestigious A6 Alliance, the B4 Consortium, the GATE ONE Platform or iTEC cooperation.

RESEARCH AND DEVELOPMENT

PANSO strongly emphasises its presence in European research and development projects. The Agency entered the next phase of the works in the SESAR 2020 Programme as the so-called Active contributor.

In 2021, PANSO continued activities including, in particular:

- implementation of RIA tasks assigned to PANSO in the individual grant agreements of the H2020-SESAR-2015-2 and H2020-SESAR-2019-1 SJU competitions;
- continuing activities of in-house R&D projects implementing the objectives of the SESAR 2020 Solution;
- cooperation with PANSO's partners (national and foreign) in the SESAR 2020 Programme, on the basis of signed Cooperation Agreements, in terms of joint implementation of RIA tasks in individual SESAR 2020 Solutions;
- cooperation with project consortia partners based on established partnerships in individual SESAR 2020 projects;
- preparing to carry out commissioned research and development work, as part of its competence, for third parties;
- launching participation in wave 3 projects (SESAR 2020 Wave 3), i.e.:
 - participation in R&D projects under the SESAR 2020 programme to develop and validate CD&R (Conflict Detection & Resolution) tools, solutions to improve trajectory prediction, system solutions to increase the level of automation of ATM processes and solutions and services to support virtualisation: PJ.32-W3

Virtual Centre (WP#02: Operational Thread) and PJ.38-W3 ADS-C Enables and Supports Improved ATM Operations;

- participation in research and development projects to develop solutions to support the implementation of the U-Space concept: PJ.34-W3 ATM U-Space Interface and GOF2.0 Integrated Urban Airspace VLD (competition H2020-SESAR-2020-1).

All the works carried out by the Agency as part of the individual SESAR 2020 Solutions were in accordance with the formula of R&D projects, including:

- research (simulations, exercises, studies, analyses) and development activities (introducing changes and improvements to processes and products);
- production of R&D-specific deliverables in the form of documents/records/reports accompanying the documents;
- supporting the development of the strategic areas of the Agency by financing development tasks under PANS programmes using the Horizon 2020 instrument;
- extending the catalogue of the services rendered by the Agency by adding the subcontracted R&D activities.

PANS also performed tasks within the project roles assigned to the Agency within the framework of the individual SESAR 2020 Solutions.

In 2021, PANS also continued its function of chairing the B4 Strategy Team.

In 2021, the Agency launched the "SAMPLE" project (System for Automatic Monitoring of Aviation Obstacles and Records), implemented from the competition pool of the National Centre for Research and Development.

Following the end of Horizon 2020, it has been decided to terminate the mandate of the SESAR Joint Undertaking and end the SESAR 2020 Programme with its settlement, which will take place between 2022 and 2024.

In 2021, a new joint undertaking was established to develop a new generation European air traffic management system (Single European Sky ATM Research 3 Joint Undertaking - SESAR 3 JU). The founding members of the new SESAR 3 JU are the European Commission,

EUROCONTROL and more than 50 entities, including the Polish Air Navigation Services Agency. The SESAR 3 JU projects are scheduled to be implemented between 2023 and 2030.

SESAR DEPLOYMENT

In 2021, PANS continued its participation in the SESAR Deployment process, both as an Implementing Partner and as a founding Member of SESAR Deployment Alliance (SDA)¹.

As the Implementing Partner, PANS continued to implement the deployment projects launched in previous years using EU co-financing under the CEF Transport Calls for Proposals. As a member of the SDA, representatives of the Agency participated in the governing bodies of this institution: The General Meeting of Members (GMoM) and the Board of Directors of the SDA. By participating in the aforementioned governing bodies of the SDA, PANS representatives had a direct insight into the financial and organisational issues of the SDM, thus possessed and exerted real influence on the functioning of this institution.

In addition, PANS has dedicated a staff member to act as ANSPs Liaison Officer in 2021 to carry out the ongoing SDM tasks under Commission Implementing Regulation (EU) No 409/2013.

In a 2021, PANS participated in the Stakeholders Consultation Platform (SCP) under the aegis of SDM, taking part in the SESAR Deployment Programme consultation. Participating in the SCP, PANS represented the ANSPs of the Baltic FAB.

¹ In December 2014, on the basis of the Commission Implementing Regulation (EU) No 409/2013, the SESAR Deployment Alliance consortium was established. Since January 2018, the consortium has been transformed into a legal entity, i.e. SESAR Deployment Alliance (Association Internationale Sans But Lucratif (AISBL)).

Tab. 10. Projects associated with the implementation of the SESAR/PCP Program co-financed from EU funds under the CEF Transport Call for Proposals, in which PANSO participates as a leader or as a contributor

Project name	CEF	Planned project budget (in EUR)	Grant amount awarded (in EUR)
1 st part of the upgrade of the P_21 PEGASUS system to SESAR functionalities - Test and Validation Platform (project completed)	CEF201 4	6,600,000	3,300,000
LAN network upgrade (project completed)	CEF201 5	2,009,500	1,708,075
The ECG Communication System upgrade (project completed)	CEF201 5	1,567,500	1,332,375
ATM System Upgrade towards Free Route Airspace (project completed)	CEF201 6	5,880,000	2,528,400
iTEC Tests, Validation and Planning	CEF201 6	1,716,360	738,035
Implementation of Data Link Service for the ATM in FIR Warsaw (project completed)	CEF201 6	5,247,102	2,256,254
Deploy SWIM Governance (project completed)	CEF201 6	90,400	38,872
New PENS Stakeholders contribution for the procurement and deployment of New PENS (project completed)	CEF201 6	145,900	62,737
DLS Implementation Project - Path 2 (project completed)	CEF201 6	148,805	63,986
General Call - DLS Implementation Project - Path 1 "Ground" stakeholders (project completed)	CEF201 6	142,501	61,275
European Deployment Roadmap for Flight Object Interoperability (project completed)	CEF201 6	25,000	10,750
Local traffic complexity management (project completed)	CEF201 7	1,694,000	847,000
SWIM Common PKI and policies & procedures for establishing a trust framework	CEF201 7	101,515	50,758
IP1 DLS European Target Solution assessment (project completed)	CEF201 7	139,600	69,800
TOTAL		25,508,183	13,068,316

Source: Own elaboration.

A6 Alliance

In 2021, the Agency continued to participate in all three activities of the A6 Alliance, which brings together Europe's largest air navigation service providers (from, among other countries, Germany, the UK, France, Spain, Italy, Switzerland):

- coordination between ANSPs in the SESAR Joint Undertaking;
- coordination between ANSPs of the works within SESAR Deployment Manager;
- joint actions in the field of European aviation policy/changes European ATM system.

In 2021, PANSO was the leader of two consortia – coordinated them both internally and on the A6 Strategy Board:

- PHRC (with HungaroControl and ROMATSA) for the SESAR Deployment Manager;
- B4 (with ANS Czech Republic, Slovak LPS and Lithuanian Oro Navigacija) for the SESAR Joint Undertaking.

In 2021, PANSO actively participated in the work of the A6 Steering Board and the A6 Strategy Board, developing common A6 alliance positions and representing the A6 Group at high-level meetings. This has provided PANSO with the opportunity to directly influence the decisions related to the development of the air traffic management industry in Europe, including participation in the works on the new Single European Sky legislative package. The areas in which PANSO was particularly involved included the future of SESAR Deployment Manager, participation of A6 members in the new integrated ATM partnership – SESAR 3, digital communications – SDB (SES Digital Backbone), virtualisation and ADSP.

Baltic FAB

PANSO actively participated in information exchange and ongoing activities within the Baltic FAB (Baltic Functional Airspace Block), which Poland forms with Lithuania, and on the InterFAB forum, which is a platform for the exchange of experience between all European functional airspace blocks.

GATE ONE

In 2021, PANSO continued to be active within the GATE ONE platform, which aims to exchange opinions and coordinate issues of strategic importance at a regional level as well as to represent common positions on relevant European forums.

The actions of GATE ONE focused, among other things, on developing common positions complementary to those of CANSO.

CANSO

In 2021, PANSO continued its cooperation with other ANSPs within the CANSO structures, carrying out tasks imposed on individual working groups and task forces, aimed at developing and presenting a common position of ANSPs towards the most important topics and challenges that were presented to the ATM environment in 2021, among other things, due to the outbreak of the COVID-19 pandemic. PANSO representatives also participated in meetings organised as part of the cooperation between CANSO and other organisations and institutions, including within the framework of the works on the Single European Sky package (SES II+), which is a flagship European initiative to reform the European air traffic control system to meet future capacity and safety needs.

CANSO Europe's work has focused on issues such as:

- exploring the possibility of having an influence on shaping the future role of the Network Manager and EUROCONTROL as part of the CANSO positions being developed for the Single European Sky package (SES II+) and the Deloitte report²,
- PANSO representatives' participation in the 'ICB Workshop - Facilitation of Industrialisation' discussions and workshops on the future ATM Data Service Provision (ADSP) format,
- participation in the development of the Human Dimension Roadmap³, which, among other things, analysed the requirements for the licensing of air traffic controllers

² The Deloitte report is an in-depth analysis of Eurocontrol's role with recommendations for Eurocontrol that provide a roadmap for the future of the organisation.

³ A document being developed with trade unions by CANSO to serve as a guide for the EC and institutions at national level to facilitate the introduction of SES initiatives by 2035.

(ATCOs), developed an appropriate crisis management framework and identified good practices in ANSP in the area of human resources,

- participation in discussions to evaluate the framework of the performance plan of agencies such as PANSO in relation to the SES II+ and RP4/Long Term vision reform,
- participation in analysing the role of Agencies such as PANSO in UTM/U-Space and actively assisting CANSO in developing a common 'High-Level CANSO position on the EASA Opinion 01-2020 on U-Space'.

PANSO has actively used the CANSO forum to formulate and present its own opinions on draft civil aviation legislation.

iTEC Consortium

In 2021, PANSO continued to operate within the iTEC Collaboration (Interoperability Through European Collaboration) industry consortium on the basis of the ATM system co-development partnership agreements concluded with DFS, NATS, ENAIRE, LVNL, Avinor and Oro Navigacija in 2017. As part of the iTEC Co-operation, air navigation agencies from seven European countries are working with technology partner Indra Sistemas to achieve smoother and more efficient air traffic management through the harmonisation and development of an advanced, state-of-the-art iTEC ATM system, supporting the implementation of the Single European Sky.

PANSO PROPRIETARY SOLUTIONS

PansaUTM System and U-Space Programme

PansaUTM is a concept of digital coordination of flights of unmanned aerial vehicles and management of applications and approvals for flights in Polish airspace. PansaUTM consists of proprietary operational solutions of PANSO and system part integrated with the most popular mobile application among drone operators in Poland – Droneradar.

Among other things, the system allows fast, digital, non-verbal communication between air traffic controllers and drone operators. With the PansaUTM system, drone operators may

quickly check flight opportunities in a given area, digitally file a flight plan and obtain permission to fly when it does not compromise the safety of manned traffic. PansaUTM provides air traffic controllers with the information about the unmanned flights planned near airports, enabling them to give permissions to flights, similarly as in the case of manned aviation.

The PansaUTM system has successfully passed the accreditation process conducted by PANSO and supervised by the Polish Civil Aviation Authority, which ultimately enabled its operational implementation in the controlled zones of airports in Bydgoszcz, Gdansk, Katowice, Krakow, Lublin, Lodz, Modlin, Olsztyn, Poznan, Rzeszow, Szczecin, Wroclaw and Zielona Gora, as well as in the FIS sectors of Gdansk, Krakow, Olsztyn, Poznan and Warsaw. It means that the whole of Poland is within reach of PansaUTM services.

In 2021, version 1.2 of the PansaUTM system was implemented operationally, automating the process of issuing pre-tactical and tactical approvals for airspace users with SuperPilot status. Thanks to the implementation of version 1.2 of the PansaUTM system and the further automation of UAV flight approvals introduced, there has been a significant reduction in the workload of air traffic controllers at their operational position and a further boost to the number of UAV flights in Polish airspace. It is worth noting that currently all flight conditions for UAVs issued by the Polish Air Navigation Agency are granted digitally, using the PansaUTM system.

In addition, procedures related to the coordination of large-scale UAV flights, including out-of-sight and automated flights in non-segregated areas, were being developed in 2021. In 2021, there were a number of out-of-sight flights carried out in coordination with PANSO through the PansaUTM system. The development of tracking infrastructure has also enabled piloted medical out-of-sight flights to combat COVID-19. Assumptions have also been made for long-range UAV flights at distances of 60-100 km, which will take place in 2022.

In 2021, 536,440 unmanned aerial vehicle flights were registered in the PansaUTM system in Polish airspace, an increase by nearly 80 per cent year-on-year. It is worth noting that in the same time period in the area of General Aviation, the number of operations handled by the Flight Information Service (FIS) was 268,500.

In 2021, 20,269 permissions were issued for UAV flights within the Visual Line of Sight (VLOS) and Beyond Visual Line of Sight (BVLOS) in controlled traffic region (CTR), compared to

14,500 permissions issued in 2020 (up by nearly 40%), maintaining procedures for handling such flights (also H24 (24h/day) for operational flights).

System Common Airspace Tool (CAT)

The CAT system makes it possible to accept and verify reservations of airspace structures as well as to streamline the process of creating and publishing the Airspace Use Plan (AUP) – one of the key aviation documents used by the Polish sky users. The CAT system allows efficient management of structures in accordance with the reservations of airspace structures (AFUA) concept, at pre-tactical level and in real time – their activation, deactivation or change of altitude parameters. The CAT system works closely with Network Manager, the European air traffic management system, and through a B2B Web Services connection, automatically exchanges all information on the activity of the structures included in the AUP.

The CAT system is a major convenience for airspace managers and users. Thanks to a modern, freely accessible web interface, i.e. Collaboration Human Machine Interface, anyone using services offered by PANSO may see – in the form of a map – all current and planned, even in the long term, structures and obtain information thereof. It is a secure, complete, flexible, coherent and open solution for data exchange with other systems, operationally used by air traffic services.

In 2021, system evaluation activities continued, including the implementation of operational radar data visualisation functionalities and the commencement of work on CAT-iTEC data exchange (work will continue in 2022); in terms of the Web Service, activities related to the completion of work to make the web service available to third parties for airspace ordering were carried out. November 2021 saw the operational implementation of the new version of the CAT system – i.e. version CAT3.0.

TRAFFIC System

The TRAFFIC system is a tool used to validate and verify the operational data contained in flight plans before sending them to ATM systems. The aforesaid process is carried out in both the pre-tactical and tactical phases of the flight plan processing.

The TRAFFIC system is a solution that has allowed PANSO to face the challenges generated by growing air traffic in a smooth and user-friendly manner.

In 2021, the TRAFFIC system was evaluated and upgraded. The modification implemented relates to trajectories with active airspace elements, validation of flight plans in the FRA environment and cross-border FRA operations, introduction of changes in flight plan verification related to both formal and operational requirements.

A-CDM TERMINUS System

The system has been developed in collaboration with Warsaw Chopin Airport. A-CDM TERMINUS is the Advanced/Airport-Collaborative Decision Making (CDM) system developed by PANSO. The A-CDM TERMINUS system allows to plan and manage the traffic situation at the airport well in advance. A-CDM as a concept and TERMINUS as the Target Startup Approval Time Generator (TSAT) allow the prediction and flow of information regarding aircraft handling in the aerodrome area (landing, completion of ground handling, take-off). Close collaboration of all partners using such information contributes to the streamlining of the entire process and thus translates into operational, financial and environmental gains.

The A-CDM system has a positive impact on the reduction of delays, noise and fuel consumption, translating into tangible benefits for airspace managers, airports, carriers and their operators.

In 2021, the A-CDM Terminus EPWA code was partially refactored, allowing it to be used in other locations.

Aeronautical inspection

PANSO is responsible for the proper operation of about 150 ground-based air traffic safety devices and the validation of instrumental aeronautical procedures in Poland. Operating since 1963, the Polish Air Navigation Services Agency (PANSO) carries out control and measurement flights.

PANSO Flight Inspection performs implementation, periodic, ad hoc and category inspections and measurements of CNS infrastructure: instrument landing systems (ILS CAT 1, 2, 3), VHF Omnidirectional Radio Range (VOR and DVOR) and non-directional radio beacons (NDB), distance measuring equipment (DME), navigation light systems (approach light systems ALS and runway light systems) and precision approach path indicator (PAPI).

PANSO Flight Inspection is the only unit in Poland to check new and existing instrumental flight procedures – conventional and area navigation (RNAV) based on DME-DME and Global Navigation Satellite Systems (GNSS). Due to the progressive implementation of the Ground Based Augmentation Systems (GBAS) in Europe, which are used for precision landing of aircraft based on satellite technology, aerial inspection services of such systems and validation of the associated flight procedures will also be provided.

In 2021, PANSO Flight Inspection also carried out foreign orders for calibration flights for two European air navigation service providers, i.e. airport manager and ILS system contractor. The first order consisted in the measurements at the NATO base in Lithuania, at Šiauliai EYSA. Another order was executed for Cyprus DCA – validation of approach procedures at Larnaca LCLK and Paphos LCPH airports, and for Moldova MoldATSA, where periodic aerial checks of Chisinau's two ILS/DMEs and DVOR/DMEs were carried out as well as checks of visual aids to navigation (including four PAPIs) on both runways of Chisinau International Airport LUKK. The latest order referred to survey flights for Oro Navigacija under a newly signed contract following a successful tender.

Aviation publications

One of organisational units of PANSO is the Aeronautical Information Services (AIS). AIS Poland is responsible for providing aeronautical data and information necessary to ensure the safety, regularity and efficiency of air navigation in FIR Warsaw. For this purpose, AIS Poland prepares aeronautical information products, which include:

- Aeronautical Information Publication (AIP), including AIP Amendments and Supplements;
- Aeronautical Information Circular (AIC);
- Aeronautical maps;
- NOTAMs;
- Digital datasets.

In 2021, PANSO sold aviation publications (AIPs and maps) and digital datasets – changing the distribution model for aviation information products (AIS) from DVDs to digital products

available online. In 2021, the product catalogue was expanded to include digital datasets such as aerial obstacle data.

Consultancy services

Consultancy services offered by PANS are tailored to customers' needs and performed by experienced specialists with many years of experience working for PANS and other aviation institutions. The catalogue of consulting services is constantly growing to allow PANS effectively carry out the tasks and achieve the objectives set by clients. PANS currently offers consultancy services in such areas, as:

- airspace design;
- design, validation and operational maintenance of instrument flight procedures;
- integration and management of unmanned aerial vehicles (UAVs).

The provision and development of training services continued in 2021.

FINANCIAL RESULTS

General information

Basis of preparation of the financial statements

The Agency, in accordance with the Act of 8 December 2006 on the Polish Air Navigation Services Agency (Journal of Laws of 2021, item 260 as amended hereinafter referred to as "PANS Act"), prepares financial statements for statutory purposes in accordance with IFRS as approved by the EU.

Measurement currency and financial statement currency

The measurement currency of the Agency and the reporting currency is the Polish zloty (PLN), and all values, unless otherwise indicated, are presented in thousands of Polish zlotys ('000 PLN).

Principles of financial management

The Agency, in accordance with the PANSO Act, conducts independent financial management, taking into account EU law, international agreements and EUROCONTROL provisions regarding the air navigation charges system, including the principles of establishing and collecting charges and issuing invoices by CRCO.

By virtue of the PANSO Act, the net loss of the Polish Air Navigation Services Agency for the financial year is covered from the reserve fund. If the net loss is higher than the reserve fund, the part of the loss not covered by the reserve fund will be covered by the initial fund. Whereas the Agency's net profit for the financial year is allocated to the reserve fund or other funds created on the basis of separate provisions.

Operating expenses are covered by the generated revenues. The sources of revenues are: revenues from services provided, interest on bank deposits, grants and donations from the state budget, other revenues including funds obtained as non-returnable aid.

The main source of the revenue generated from sales constitutes the revenue from navigation activities, which includes charges levied for the provision of air navigation services (Commission Implementing Regulation (EU) 2019/317 of 11 February 2019 laying down a performance and charging scheme in the single European sky and repealing Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013). The amount of the revenue generated due to the provision of navigation services (en-route and terminal services) depends, among other things, on the level of unit rates for charges for navigation services established annually.

The calculation of revenue from the sale of navigation services provided by the Agency is based on:

- actual number of service units:

- for en-route services (SU), which derive from the weight of the aircraft, number of movements and the length of the route of the flight over the territory of Poland,
 - for terminal services (SU-L), which derive from the weight of the aircraft and the number of take-offs and landings at 'controlled' Polish airports,

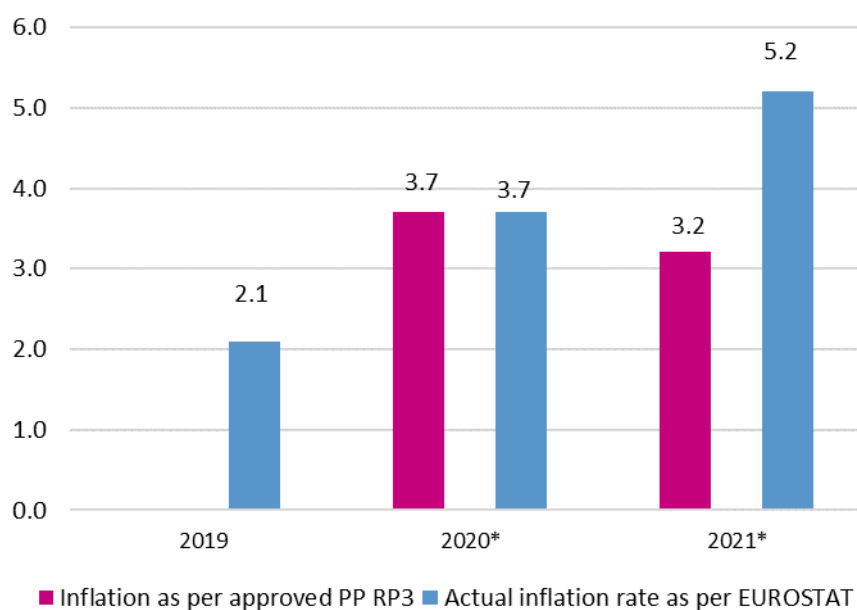
- unit rates of en-route and terminal charges,
- estimated value of adjustments reflected in the calculation of the unit rates under applicable law.

Inflation

Average annual inflation in 2021, according to EUROSTAT data from March 2022, was 5.2% (the inflation observed in 2020 was 3.7%).

This indicator has been steadily increasing since 2018 and is the highest in a decade. Compared with other countries of the Central and Eastern European region, Poland is a country with the highest inflation rate in 2021. The increase in inflation in 2021 primarily arose from the COVID-19 pandemic.

Fig. 14. Planned vs Actual inflation rates



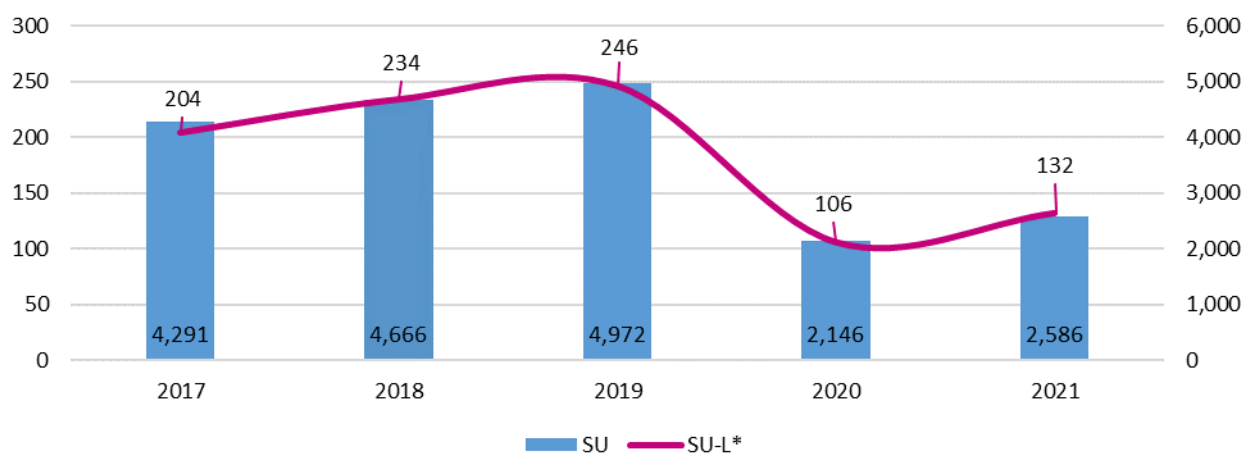
* according to the PP RP3 adopted in 05/2022

Source: Own elaboration.

Service units

In 2021, the situation in the aviation industry was still affected by the COVID-19 pandemic, which resulted in restrictions and traffic constraints to selected countries. The lower travel demand resulted from passengers' concerns of virus infection, uncertainty about flight cancelation and the need of being quarantined. The passenger traffic improved in the second half of 2021, but the emergence of the Omicron variant at the end of the year and introduction of Omicron travel restrictions slowed the recovery in international demand for travel in Europe.

Fig. 15. Service units by service ('000)



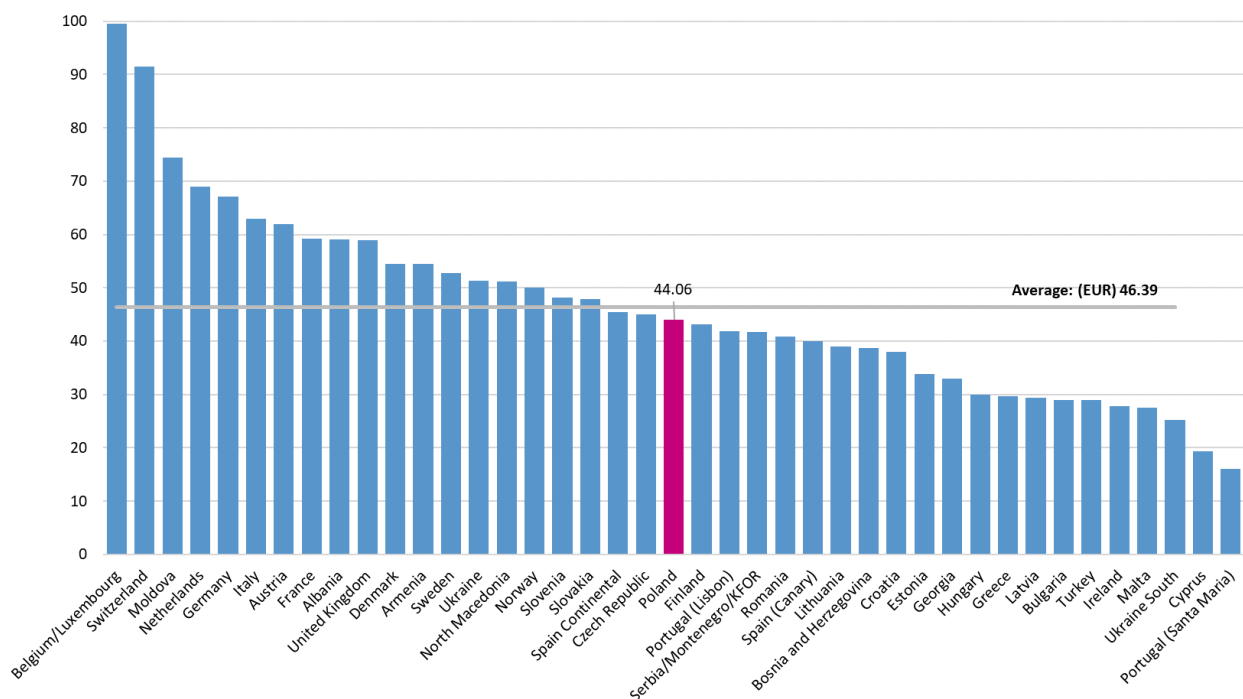
*Data on terminal service units include traffic handled by PANSA

Source: Own elaboration.

Unit rates for air navigation services

The average value of the en-route unit rate in 2021 in EUROCONTROL member states was EUR 46.39. The Polish unit rate for en-route navigation services was EUR 44.06.

Fig. 16. En-route unit rate in EUROCONTROL Member States in EUR*



* administrative charge of EUR 0.29 included

** Unit rates expressed in EUR are recalculated on a monthly basis using average of the "closing cross rate" calculated by Reuters on the basis of the daily BID rate, for the preceding month.

Source: PANSA's own analysis based on: EUROCONTROL Route Charges System.

Report on PANSO's financial activities

Tab. 11. Statement of comprehensive income

Statement of comprehensive income ('000 PLN)	For the year ended 31.12.2021	For the year ended 31.12.2020
Sales revenues	1,196,051	771,342
Operating expenses	623,351	885,614
Profit (loss) on sales	572,701	-114,272
Other operating revenues	41,151	32,473
<i>including: EU grants and donations from the state budget</i>	<i>33,989</i>	<i>29,056</i>
Other operating expenses	33,878	13,582
Operating profit (loss)	579,974	-95,381
Financial revenues	1,245	15,089
Financial expenses	79,337	20,736
Gross profit (loss)	501,882	-101,029
Income tax expense	96,854	-14,863
Net profit (loss)	405,028	-86,166
Items of other comprehensive income	13,104	2,365
Total comprehensive income	418,132	-83,800

Source: Own elaboration.

Sales revenues

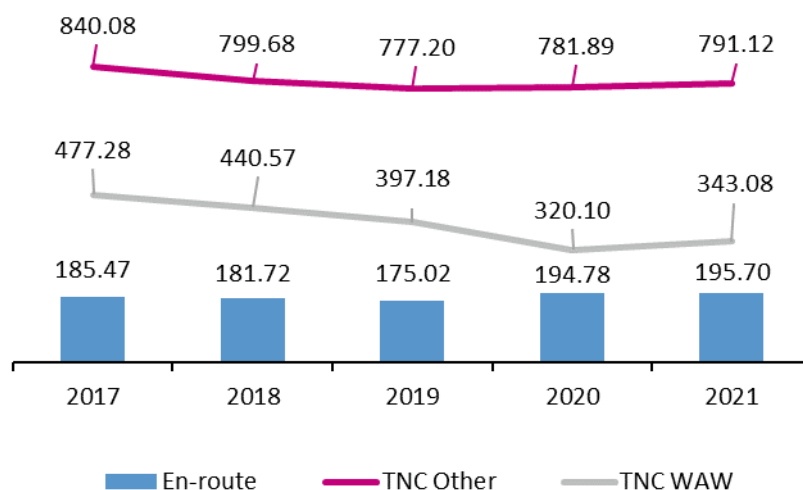
The en-route unit rate is used to calculate revenue from transit flights and revenue from navigation for take-offs and landings (arrivals). The unit rate of the en-route charge was approved at PLN 195.70 and was valid from 1 January to 31 December 2021.

The terminal unit rate is used to calculate terminal navigation revenue.

In 2021, there were two terminal charging zones:

- zone 1 (TNC WAW) - Warsaw (PLN 343.08),
- zone 2 (TNC Other) - the remaining 14 airports (PLN 791.12).

Fig. 17. Air navigation charges unit rates (PLN)



Source: Own elaboration.

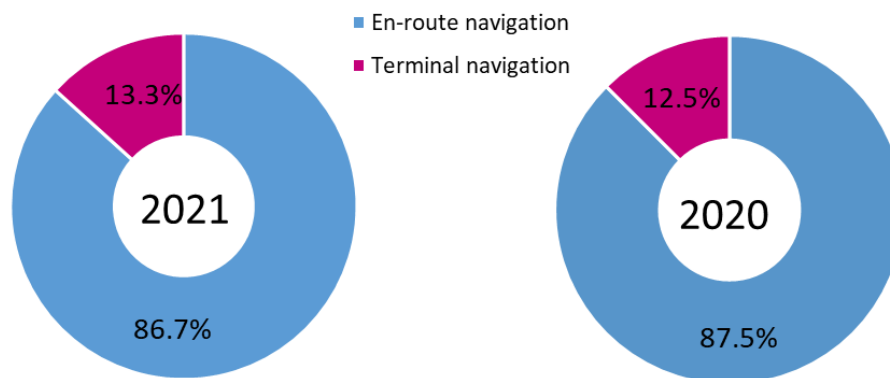
The en-route charges for flights in the Polish airspace are calculated, invoiced and collected in Euro on behalf of PANSA by CRCO, the organisational unit of EUROCONTROL. The terminal charges for flights served in Polish airspace are charged in PLN and invoiced and collected by PANSA.

Tab. 12. Sales revenues

Sales revenues ('000 PLN)	For the year ended 31.12.2021	For the year ended 31.12.2020
Navigation services, including:	1,187,637	762,070
En-route navigation, including:	963,586	625,258
Balance of adjustments for carry-overs	460,178	207,384
Terminal navigation, including	208,773	122,385
Balance of adjustments for carry-overs	131,579	62,781
Grant for exempted flights	15,278	14,427
Non-navigation services, including:	8,378	9,220
Measurement of meteorological parameters	1,771	1,771
Radar data	2,844	2,844
Sales of materials	36	52
Total	1,196,051	771,342

Source: Own elaboration.

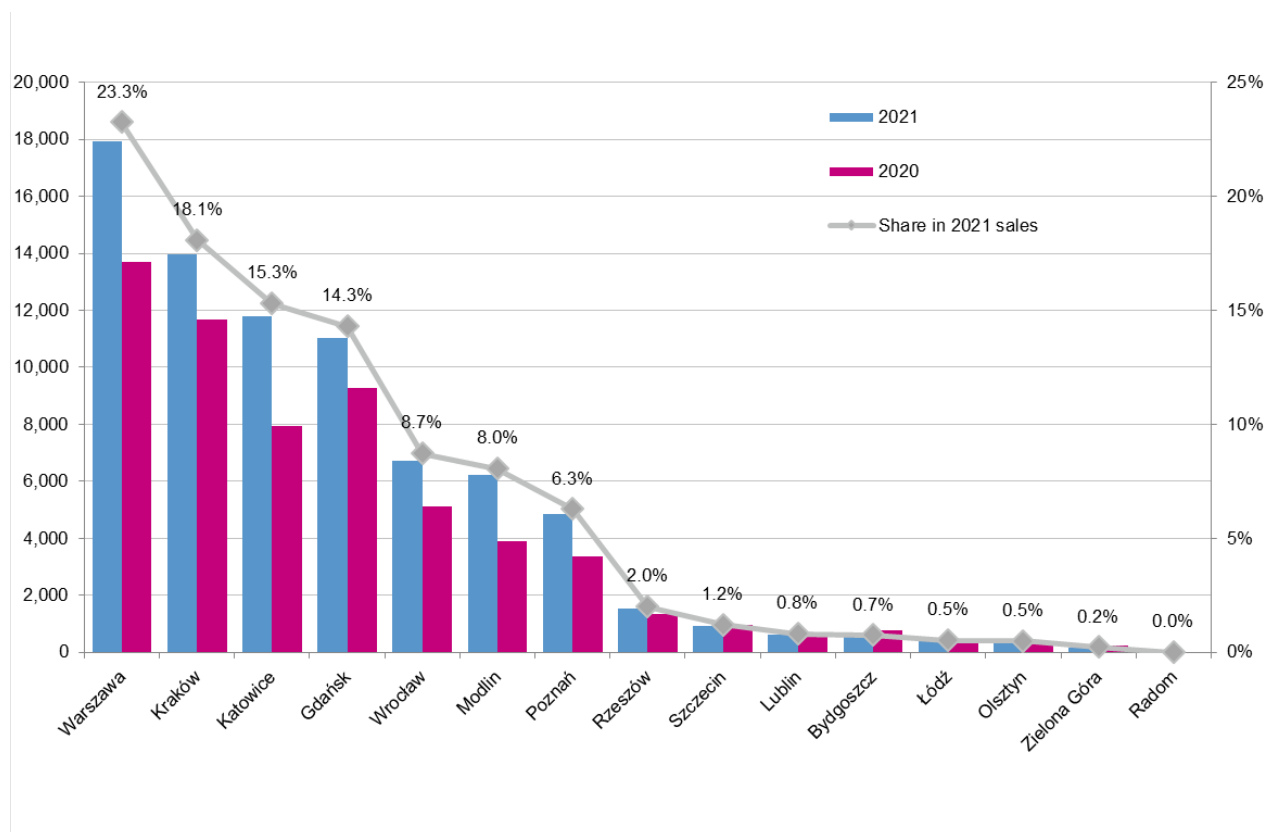
Fig. 18. Invoiced sales revenues by services



Source: Own elaboration.

The analysis of the PANSA's revenue structure shows that the dominant share in total revenues was sales revenues, which in 2021 amounted to kPLN 1,196,051. The revenue generated at this level was primarily derived from navigation services provided by the Agency, including en route and terminal services. It should be emphasised that in 2021 the balance of adjustments for carry-overs, including the estimated and recognised value of the lost revenue mechanism in the total amount of kPLN 591,757 had a significant impact on the recognised revenue of the Agency. The value of the estimated adjustments of the lost revenue in 2021, shall be subject to settlement with the airspace users in subsequent years. In 2021, the share of sales revenue of navigation services accounted for 96% of the total revenue reported by the Agency.

Fig. 19. TNC invoiced sales by airport



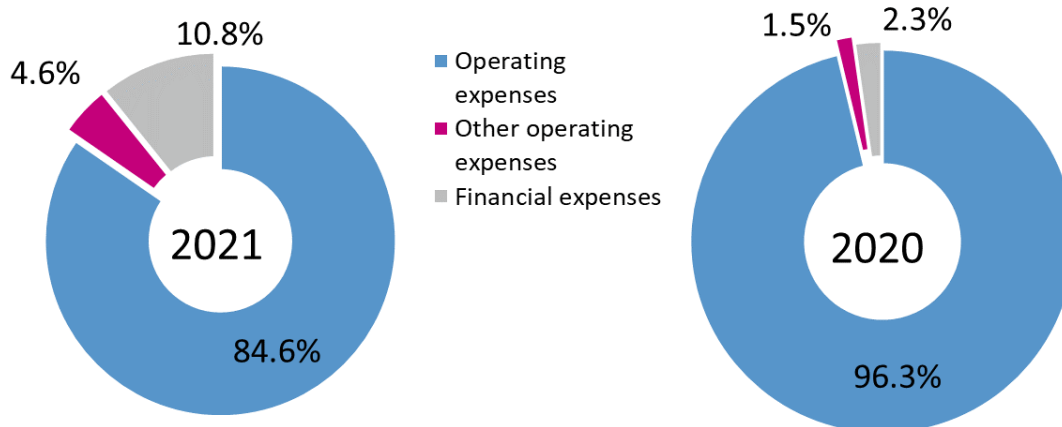
Source: Own elaboration.

Total costs

The total costs incurred by PANSA within the twelve months of 2021 amounted to kPLN 736,566.

The analysis of PANSA costs structure shows that the major share in total costs corresponds to the operating expenses, which in 2021 amounted to kPLN 623,351.

Fig. 20. Total costs



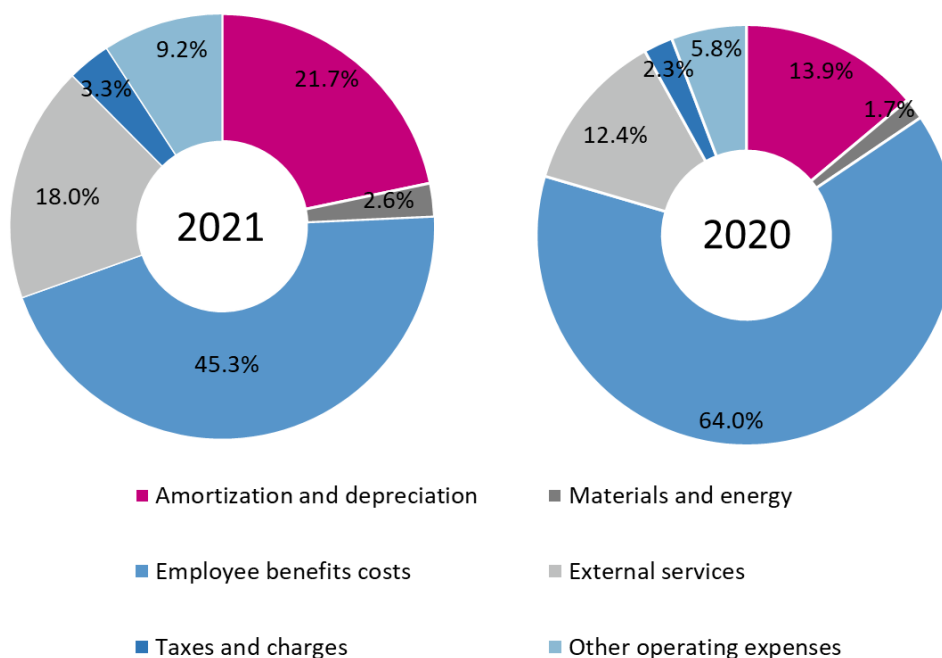
Source: Own elaboration.

Operating expenses by type

Due to the exceptional scale of the crisis in aviation industry caused by the COVID-19 pandemic and the restrictions implemented in air traffic, the Agency continued the strategy of cost management implemented in 2020 in order to survive this difficult period for the sector. The above activities were aimed at maintaining liquidity and optimizing costs in the face of uncertain business environment and low traffic.

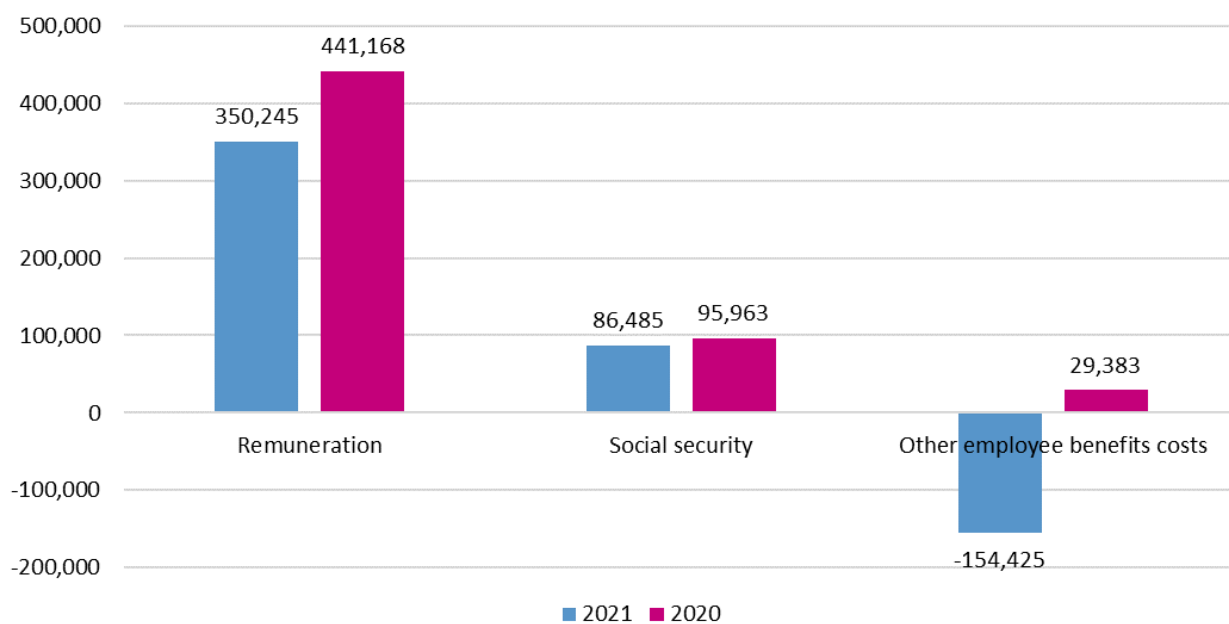
Thanks to the efforts of the Agency, in 2021 the operating expenses were lower than in the preceeding year. The difference amounts to kPLN 262,264 includes also one-off impact of changed internal remuneration scheme on staff costs.

Fig. 21. Operating expenses by type



Source: Own elaboration.

Fig. 22. Employee benefits costs



Source: Own elaboration.

Operating expenses by service

In compliance with the Commission Implementing Regulation (EU) 2019/317 of 11 February 2019 laying down a performance and charging scheme in the single European sky and repealing Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013, the costs of providing air navigation services are broken down into: staff, other operating costs, depreciation, cost of capital (off-balance sheet item) and exceptional items.

The employee benefits costs (excluding training costs) are included in the staff costs. Other operating costs include the following categories of costs: consumption of materials and energy, external services, taxes and charges, other expenses, training in employee costs, other operating expenses and eligible financial costs. Lease payments resulting from the application of IFRS16 are also presented in other operating expenses.

The portion of depreciation resulting from the application of IFRS16 is not presented under depreciation. The cost of capital is not calculated on assets recognised due to the application of IFRS16.

Tab. 13. Operating expense by service

Specification according to the Regulation 2019/317	Constituent items	En-route navigation	Terminal navigation
Staff	Total, including:	337,727	80,218
	Operating expenses	334,747	79,527
	Other operating expenses	2,980	692
Other operating costs	Total, including:	69,423	15,825
	Operating expenses	72,613	16,450
	Other operating and financial expenses	2,459	460
	Other operating and financial revenues	-5,649	-1,085
Depreciation	Operating expenses	104,551	18,860
Cost of capital		29,578	4,995
Exceptional items		0	0
Total costs		541,278	119,898

Source: Own elaboration.

Statement of financial position

Tab. 14. PANSÁ's balance sheet total as at 31 December 2021

Statement of financial position as at	31.12.2021	31.12.2020
Non-current assets	1,994,427	1,585,962
Intangible fixed assets	250,314	243,843
Property, plant and equipment	929,264	988,886
Right-of-use assets IFRS 16	47,209	47,091
Long-term receivables	135	135
Deferred tax assets	0	82,953
Long-term assets due to adjustments for carry-overs	759,750	221,832
Other accruals	7,755	1,222
Current assets	355,675	387,567
Inventories	135	241
Trade and other receivables	144,064	150,516
Income tax receivables	0	9,632
Short-term assets due to adjustments for carry-overs	0	7,353
Short-term accruals	5,778	3,256
Cash and cash equivalents	202,511	214,147
Assets available-for-sale	3,188	2,421
Total Assets	2,350,102	1,973,529

Statement of financial position as at	31.12.2021	31.12.2020
Equity, including:	1,355,760	937,628
Statutory Fund	475,022	475,022
Reserve Fund	464,620	550,786
Retained earnings	0	0
Accumulated other comprehensive income	11,090	-2,014
Profit (loss) for the financial year	405,028	-86,166
Long-term liabilities	688,586	709,672
Long-term provisions	135,168	306,189
Deferred tax liability	16,975	0
Other long-term accruals	252,492	266,507
Long-term liabilities due to adjustments for carry-overs	81,666	27,840
Liabilities due to IFRS 16	43,925	43,798
Liabilities due to loan	157,482	64,501
Other long-term liabilities	879	836
Short-term liabilities	305,756	326,229
Short-term provisions	7,859	10,767
Trade and other liabilities	90,303	117,150
Short-term liabilities due to adjustments for carry-overs	62,101	103,687
Liabilities due to IFRS 16	5,583	5,005
Liabilities due to loan	16,000	0
Other short-term accruals	123,911	89,621
Total Liabilities	2,350,102	1,973,529

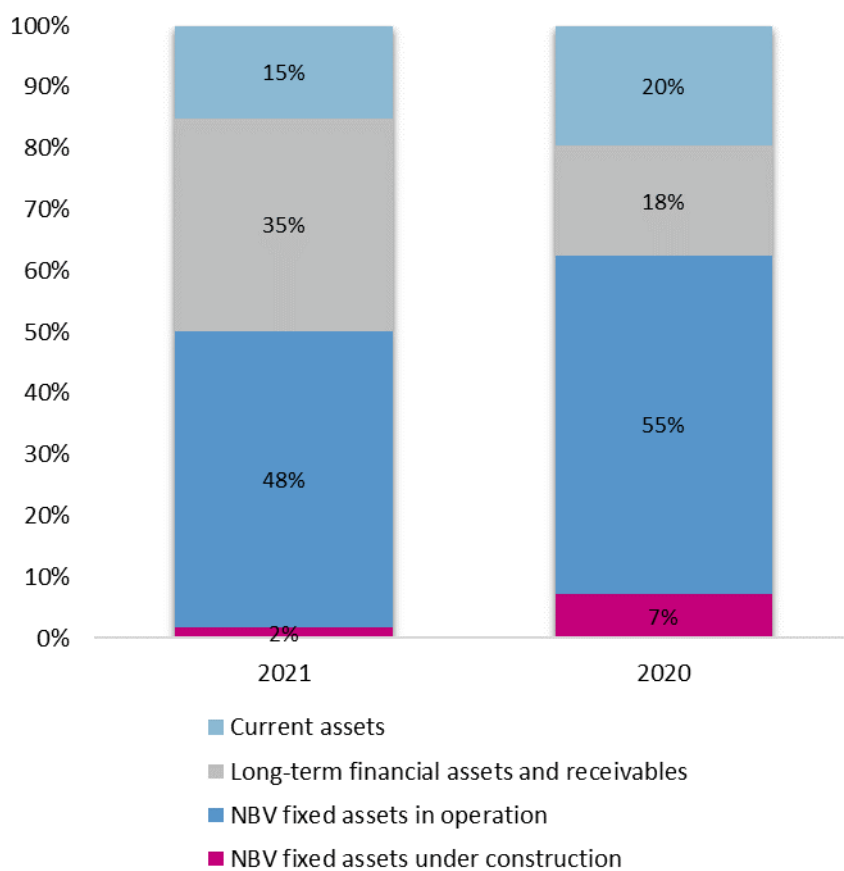
Source: Own elaboration.

At the end of 2021, the total value of assets/liabilities amounted to kPLN 2,350,102 which is higher than at the end of 2020 (kPLN 1,973,529). This increase is mainly due to larger amounts of long-term assets due to adjustments for carry-overs (on the assets side) and more equity (on the liabilities side).

The below graph presents the changes in PANSO balance sheet structure in years 2021 and 2020.

On the assets side, the shares of NBV of fixed assets in operations and under construction fell by 7 p.p. and 5 p.p. respectively. Also the share of current assets decrease by 5 p.p. At the same time, the share of long-term financial assets and receivables rose by 17 p.p. mainly due to adjustments for carry-overs to be recovered in future years.

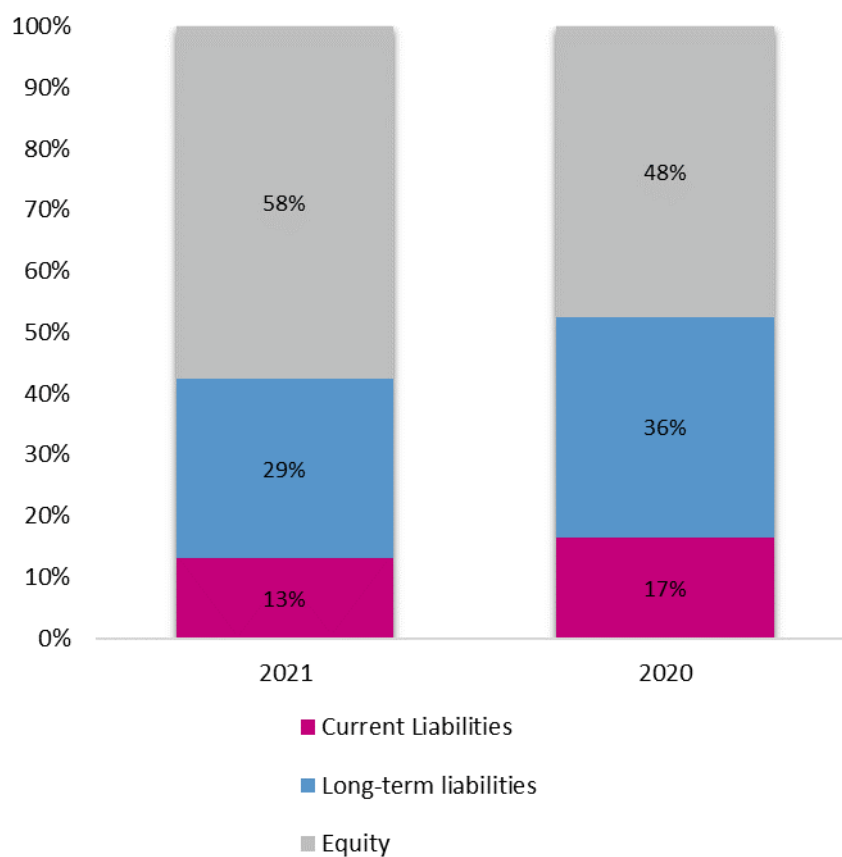
Fig. 23. Assets



Source: Own elaboration.

On the liabilities side, the share of current and long-term liabilities fell by 4 p.p. and 7 p.p., respectively, due to decreased long-term provisions and accruals. The share of equity rose by 10% mainly due to recording of profit in 2021.

Fig. 24. Liabilities

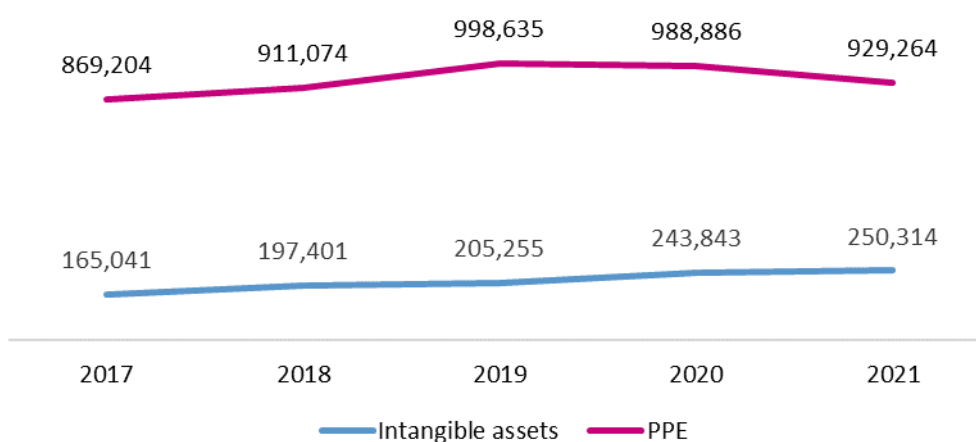


Source: Own elaboration.

Non-current assets

Assets held by the Polish Air Navigation Services Agency in 2021 show that the Agency had at its disposal tangible fixed assets (PPE) in the total amount of kPLN 929,264, which consisted mainly of technical equipment and machinery, buildings and structures, land (including rights of perpetual usufruct of land) and tangible fixed assets under construction.

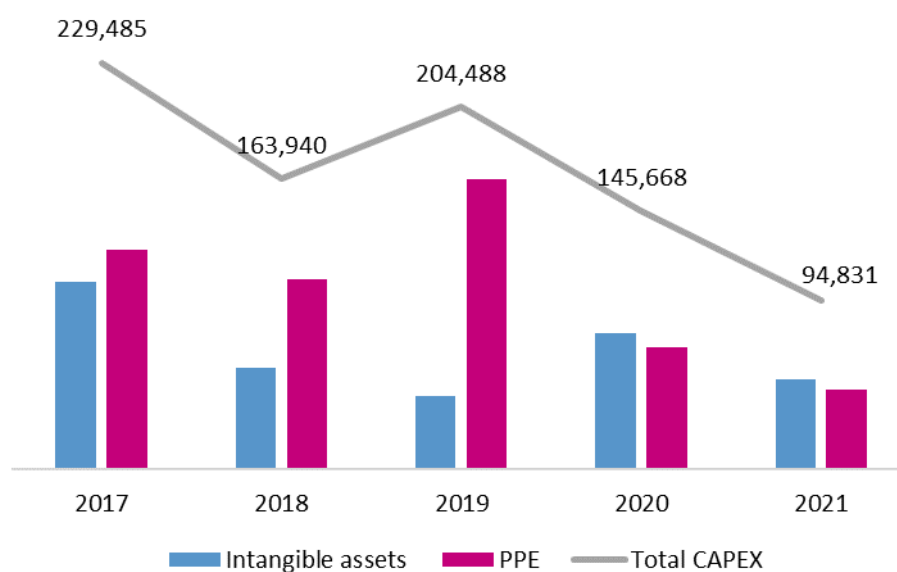
Fig. 25. PPE & Intangible assets



Source: Own elaboration.

Expenditures on modernisation and construction of modern CNS/ATM infrastructure and facility incurred by PANSA in 2021 amounted to kPLN 94.831. The highest expenditures were on tasks performed in the Capacity area, which primarily concerned the implementation of investments in air traffic management systems.

Fig. 26. CAPEX



Source: Own elaboration.

Due to the long-time horizon of the ongoing investment tasks, a decrease in fixed assets under construction is visible.

Tab. 15. Property, plant and equipment

Property, plant and equipment	Net value as at 31.12.2021	Net value as at 31.12.2020
Land & Perpetual usufruct of land	142,020	160,196
Buildings and structures	323,955	275,491
Machinery and equipment	382,551	368,394
Fixed assets under constructions	41,629	143,297
Vehicles, other non-current assets	39,109	41,509
Total	929,264	988,886

Source: Own elaboration.

Current assets

Cash and Cash Equivalents were the most significant current asset item in 2021. The balance of cash and cash equivalents recorded as for 31 December 2021 amounted to kPLN 202,511 and was lower by kPLN 11,636 than at year-end 2020. The decrease was caused by the COVID-19 pandemic, which significantly reduced the ability of the Agency to generate revenue.

Trade and other receivables

In accordance with the accounting policy in force, the Agency makes a write-off for uncollectible receivables.

Tab. 16. Trade and other receivables

Trade and other receivables	31.12.2021	31.12.2020
Trade receivables (gross)	147,134	152,569
Receivables impairment allowances	-21,213	-25,320
Trade receivables (net), including:	125,921	127,249
<i>Due within 12 months</i>	<i>125,921</i>	<i>127,249</i>
Receivables from other taxes, subsidies, customs duties, social security and other benefits	14,998	21,947
Other receivables	1,441	488
Receivables from the Social Security Benefit Fund	1,704	832
Other receivables	18,143	23,267
Trade and other receivables	144,064	150,516

Source: Own elaboration.

Equity and liabilities

The analysis of the asset financing sources shows that the Agency's own funds (equity) amounting to kPLN 1,355,760 represent 57.7% of total liabilities, while the remaining 42.3% are long-term liabilities and short-term liabilities in the total amount of kPLN 994,342.

Tab. 17. Statement of changes in equity

Statement of changes in equity	Statutory fund	Reserve fund	Retained earnings	Profit (loss) for the financial year	Accumulated other comprehensive income	Total
As for 31 December 2020	475,022	550,786	0	-86,166	-2,014	937,628
Distribution of prior year profit		-86,166		86,166		0
Profit (loss) for the financial year				405,028		405,028
Retained earnings						0
Actuarial profit (loss)					13,104	13,104
As for 31 December 2021	475,022	464,620	0	405,028	11,090	1,355,760

Source: Own elaboration.

Statement of cash flows

The net cash flow from PANSO's operating activities for 2021 was negative and amounted to kPLN -59,429.

Cash flow from operating activities refers to cash flows from the core, statutory activities of PANSO, directly related to the services provided. The positive operating cash flow balance demonstrates the ability of the Agency to generate cash from its core operating activities. In 2021, the ability of the Agency to generate cash from its core activities has been significantly affected by the sharp decline in traffic associated with the COVID-19 pandemic.

Operating cash flows should provide the Agency with the cash necessary to make investments. In order to ensure the financing of the investments, the Agency acquired an investment loan in total amount of PLN 550 million and operating credit facility in amount of PLN 250 mln. The funds obtained from the investment loan may be used in tranches until December 31st, 2023, and the loan should be fully repaid by December 31st, 2033. At the end of 2021 total balance under operating credit facility and investment loan was PLN 173 mln.

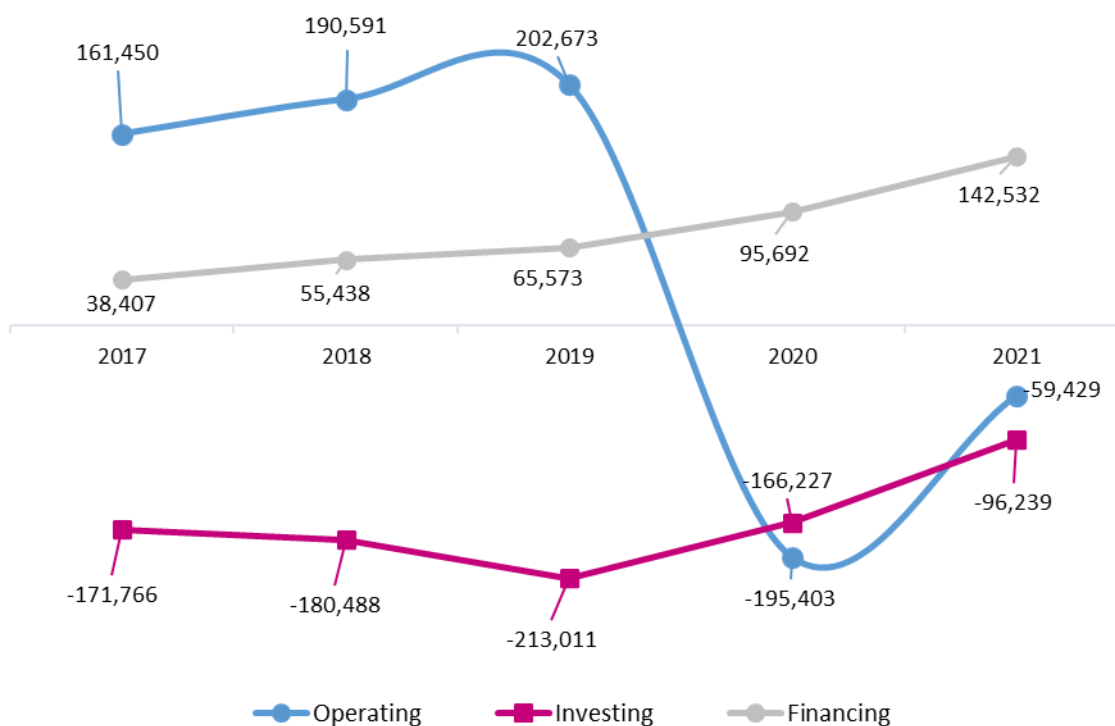
In connection with the investment processes carried out in 2021, net cash flows for the acquisition of intangible assets and fixed assets amounted to kPLN -96,239. The negative cash flows in this area prove that the PANSO continued its activities aimed at modernising the Agency through digitisation as well as development in the area of new technologies.

Net cash flow from financing activities in the analyzed period was positive and amounted to kPLN 142,532, which to a large extent resulted from launched loan tranches in the amount of kPLN 234,182 and the impact of grants and donations amounting to kPLN 42,723.

In order to cover the negative operating cash flow and be able to pay its liabilities, the Agency used the operating credit facility and own funds accumulated in previous years. Thanks to the measures taken by the Agency, the level of liquidity was maintained and allowed uninterrupted fulfilment of commitments in 2021. As foreseen in the ANS charging scheme, the majority of losses in revenue due to traffic are expected to be recovered from airspace users in the coming years. These carry-overs in accordance with the provisions of the Commission Implementing Regulations (EU) 2019/317 and 2020/1627, will be subject to recovery by the Agency, starting from 2023, by including them in the unit rates of air navigation charges. The above will have a

significant positive impact on the liquidity position of the Agency and should allow for uninterrupted fulfilment of obligations in the following years.

Fig. 27. Cash flows



Source: Own elaboration.

Tab. 18. Statement of cash flows

Statement of cash flows	For the year ended 31.12.2021	For the year ended 31.12.2020
Cash flow from operating activities		
Profit (loss) before tax	501,882	-101,029
Total adjustments	-561,312	-94,374
Depreciation	135,430	123,090
Foreign exchange profit (loss)	-1,501	-2,373
Interest	2,881	-3,397
Profit (loss) on investments	18,596	-313
Change in provisions	-170,855	-7,649
Change in inventories	106	-100
Change in receivables	6,452	42,777
Change in liabilities	-25,367	10,240
Change in accruals	2,486	28,031
Change in adjustments for carry-overs	-518,325	-251,812
Income tax (paid)	9,632	-3,812
Other adjustments	-20,849	-29,056
Net cash flows from operating activities	-59,429	-195,403
Cash flows from investing activities		
Disposal of tangible and intangible assets	30	450
Acquisition of tangible and intangible assets	-91,298	-165,629
Development works	-4,971	-1,048
Net cash flows from investments	-96,239	-166,227
Cash flows from financing activities		
Credits and loans	234,182	64,501
Interest received	1,244	5,759
Proceeds from grants	42,723	32,846
Repayment of credits and loans	-125,201	0
Interest paid	-4,234	-2,362
Change in liabilities due to IFRS 16	-6,182	-5,052
Net cash from financing activities	142,532	95,692
Net decreases in cash and cash equivalents	-13,136	-265,938
Change in cash due to exchange rates changes	1,501	2,373
Balance sheet change in cash and cash equivalents	-11,636	-263,565
Operating balance of cash and cash equivalents	214,147	477,712
Closing balance of cash and cash equivalents, including:	202,511	214,147
restricted cash	29,570	15,003

Source: Own elaboration.

Auditor's report

passion

teamwork

quality

clarity



Independent Auditor's report

on the annual
financial statements of Polish Air Navigation Services Agency
with its registered office in Warsaw
for the financial year
from January 1st, 2021 to December 31st, 2021



This document is a free translation of the independent auditors' report issued in Polish in electronic format. Terminology current in Anglo-Saxon countries has been used where practicable for the purposes of this translation to enhance understanding. The binding Polish original should be referred to in matters of interpretation.

INDEPENDENT AUDITOR'S REPORT ON THE ANNUAL FINANCIAL STATEMENTS

For Minister of Infrastructure

Report on the audit of the financial statements

Qualified opinion on the financial statements

We have audited the accompanying annual financial statements of Polish Air Navigation Services Agency with its registered office in Warsaw at Wieżowa 8 Street, hereinafter referred to as the "Agency", for the financial year from January 1st, 2021 to December 31st, 2021, which comprise the statement of comprehensive income for the year ended December 31st, 2021, the statement of financial position as of December 31st, 2021, the statement of changes in equity and the statement of cash flows for the financial year then ended and related notes including significant accounting principles (policies) and other explanatory information.

The financial statements have been prepared in an electronic format as a file entitled *Sprawozdanie finansowe PAŻP 2021.pdf*, and have been signed with an electronic signature by the President of the Agency on May 30th, 2022.

The annual financial statements have been prepared in accordance with applicable financial reporting framework of International Accounting Standards, International Financial Reporting Standards and related interpretations published as a Commission Regulation, hereinafter referred to as "IFRS EU".

In our opinion, except for effects of the matter described in the Basis for Qualified Opinion section of our report, the accompanying annual financial statements of Polish Air Navigation Services Agency:

- give true and fair view of the financial position of the Agency as of December 31st, 2021, and of its financial performance and its cash flows for the financial year then ended in accordance with IFRS EU and applied accounting principles (policies),
- comply, in all material respects, as to the form and content, with the regulations relevant to the Agency as well as with provisions of the Agency's articles of association,
- have been prepared, in all material respects, based on the properly kept accounting records in accordance with the provisions of Chapter 2 of the Accounting Act.

Basis for Qualified Opinion

Due to the great decline in air traffic in Europe as a result of the COVID-19 pandemic, the Commission Implementing Regulation (EU) no 2020/1627 dated November 3rd, 2020 regarding exemptions for the calculation and setting of unit rates and related adjustments, the rate setting and settlement mechanism for en-route and terminal services has been modified for year 2020. It included the introduction of a mechanism for settling lost revenues from year 2020 in future periods, with the assumption that years 2020 and 2021 are being defined as one reporting period for these purposes.

As presented in note no 9 „Sales revenues” the Agency estimated the value of revenues loss for year 2020, which will be able to settle in the en-route and terminal unit rates of future periods in total amount of PLN 237 258 thousand. The mechanisms estimated in this way increased, respectively, revenues from the sale of en-route and terminal services in year 2020 and are subject to settlement with airspace users during a minimum period of 5 years, starting from year 2023. After the end of year 2021 the Agency estimated the value of lost en-route and terminal revenues in the 2020-2021 period in the total amount of PLN 837 622 thousand. This amount, reduced by the mechanism value included in year 2020, is included in the statement of comprehensive income for the year 2021 as revenue increase.

For estimation the value of lost en-route and terminal revenues for the year 2020, the Agency applied the prudence principle of valuation. Additional expert assumptions were used to reduce the value of revenues loss.

We have not been presented with a justification for these expert assumptions which was reducing the estimated lost revenues in year 2020. For this reason, we were unable to obtain sufficient and appropriate audit evidence regarding the treatment of this matter in the 2020 financial statements. As a result, we were unable to conclude that the years' 2020 and 2021 financial statements are free from material misstatement in relation to this matter.

We conducted our audit of the financial statements in accordance with the National Standards on Auditing being International Standards on Auditing as adopted in Poland by the National Chamber of Statutory Auditors, hereinafter referred to as "National Standards on Auditing", adapted by the Act dated May 11th, 2017



on Statutory Auditors, Audit Firms and Public Oversight, hereinafter referred to as “statutory auditors act”, applicable to audit of financial statements prepared for the periods ended on December 31st, 2021.

Our responsibilities under those standards are further described in the “Statutory Auditor’s Responsibilities for the Audit of the Financial Statements” section of our report.

We are independent of the Agency in accordance with the International Code of Ethics of Professional Accountants (including the International Independence Standards, hereinafter referred to as the “IFAC Code”, adopted by a resolution of the National Chamber of Statutory Auditors and the requirements of independence specified in the Act on Statutory Auditors.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of the President of the Agency for the financial statements

The President of the Agency is responsible for the preparation of the annual financial statements that give true and fair view in accordance with IFRS EU, their compliance with applicable laws and regulations and the Agency’s articles of association, as well as for keeping the accounting records in accordance with the Accounting Act.

The President of the Agency is also responsible for such internal control as management deems necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing financial statements, the President of the Agency is responsible for assessing the Agency’s ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management intends to liquidate the Agency or to cease operations, or has no realistic alternative but to do so.

Under the Accounting Act, the President of the Agency is obliged to ensure that the annual financial statements meet the requirements of the Accounting Act.

Statutory Auditor’s Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance as to whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an independent auditor’s report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the above mentioned standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

While carrying out the audit, in compliance with the National Standards on Auditing:

- we exercise professional judgment and maintain professional skepticism and
- identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud or other irregularities is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control and may relate to any area of law and regulations, not only the one that directly impacts the financial statements.
- obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Agency’s internal control;
- evaluate the appropriateness of accounting principles (policies) used and the reasonableness of accounting estimates and related disclosures made by the Agency’s President;
- conclude on the appropriateness of use by the Agency’s President of the Agency of the going concern basis while applying the adopted accounting principles (policies) and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Agency’s ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our audit report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion about the financial statements. Our conclusions are based on the audit evidence obtained up to the date of our audit report. However, future events or conditions may cause the Agency to cease to continue as a going concern.
- evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events accurately.

Our audit does not involve any assurance on the future viability of the Agency nor the efficiency nor effectiveness with which the President of the Agency has conducted or will conduct the affairs of the Agency.

Under the Act on Statutory Auditors, we are also required to express in the audit report an opinion on whether financial statements comply, as to their form and content, with applicable laws as well as the Agency’s articles of association and whether they have been prepared based on the properly kept accounting records. We report on these matters based on the work undertaken in the course of the audit.



Report on Other Legal and Regulatory Requirements

Other information included in the annual report

Other information comprises the financial and non-financial information, other than the financial statements or out report. Other information comprises of the management report for the year ended on December 31st, 2021.

The management report has been prepared in electronic format as a file titled Sprawozdanie z działalności PAŻP 2021.pdf and has been signed with qualified electronic signatures by the President of Polish Air Navigation Services Agency on May 30th, 2022.

Our opinion on financial statements does not cover the other information and, except to the extent otherwise explicitly stated in Report on Other Legal and Regulatory Requirements below, we do not express any form of assurance conclusion thereon. Furthermore, scope of our work related to the other information conducted in the course of our audit and related assurance conclusion is only as we describe below.

Responsibilities of President of the Agency

The President of the Agency is responsible for preparation of the management report in compliance with the law. The President of the Agency is required to ensure that the management report complies with the Accounting Act.

Responsibilities of the Statutory Auditor

Under the Act on Statutory Auditors and the Regulation on Current and Periodic Information, we are required to express an opinion

on whether the management report has been prepared in accordance with the Accounting Act and whether it is consistent with the information included in the annual financial statements.

Furthermore, we are also required to state, whether, in the light of the knowledge of the Agency and its environment obtained during the course of the audit, we have not identified material misstatements in the management report, and report on these misstatements if noted.

We have read the management report. We considered whether it discloses the information required by these laws and whether the information included therein is consistent with the information included in the financial statements. Reading the management report we also considered whether, in the light of our knowledge and understanding of the Agency and its environment, it does not include material misstatements.

Opinion on the management report

In our opinion, based on the work undertaken in the course of the audit of the annual financial statements, the accompanying management report of Polish Air Navigation Services Agency for the financial year ended on December 31st, 2021:

- has been prepared in accordance with Article 49 of the Accounting Act,
- the information presented therein is consistent with the information in the audited financial statements.

In the light of the knowledge of the Agency and its environment obtained during the course of the audit, with the exception of matters described in the "Basis for Qualified Opinion" we have not identified material misstatements in the management report.

Qualified electronic signature on the Polish original

Cezary Bąkiewicz
Statutory auditor no.12 232

Key Statutory Auditor conducting the audit
on behalf of PKF Consult Spółka z ograniczoną odpowiedzialnością Sp. k.
the audit firm number 477

ul. Orzycka 6 lok. 1B
02-695 Warszawa

Warsaw, May 30th 2022





PANSA