ANA
Administration de la navigation aérienne

ANNUAL REPORT
2023

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CONTENT
ANNUAL REPORT 2023

01

KEY FIGURES

Key Figures

CDO application percentage
64.60%

VFR traffic
20 011

Local mouvements
17 020
Mouvements

Total air Traffic
92 862
Mouvements

International mouvements
75 842

Cargo freight
794 884
tons

Passengers
4 856 873

02

MESSAGE FROM THE DIRECTOR

Message from the director

I am delighted to present the foreword for 2023, highlighting a new chapter in the continuous growth and progress of our administration.

2023 has been marked by significant achievements and transformative projects that have strengthened our organization and positioned us for future success. One of the most notable highlights was assuming the chair of the FABEC CEO Board. This esteemed role was an honour and responsibility for setting up and implementing a new strategy and organisation the air navigation service providers within FABEC for the next future. This also underscores our commitment to excel as an ANSP in FABEC.

Our primary focus this year has been on digitalization and modernization of our network infrastructure. These initiatives are critical as we navigate the rapidly evolving technological landscape and strive to enhance our operational efficiency and service delivery and ensuring its resilience. By embracing cutting-edge technologies, we are laying the foundation for a more responsive and resilient organization.

In addition to our digital transformation efforts, we have embarked on the significant project of restructuring the former Safety Unit into a new Safety Department. This evolution highlights our unwavering commitment to the highest standards of safety, which have always been central to our operations. The transformation from a unit to a department underscores the increasing scope and strategic importance of safety within our organization. The renewed Safety Department will play a pivotal role in further enhancing our safety protocols, thereby safeguarding our operations, and strengthening its overall resilience.

These remarkable achievements would not have been possible without the exceptional dedication, professionalism, teamwork, and passion of every member of the ANA. Their relentless pursuit of excellence and the collaborative spirit were instrumental in realizing these milestones. It is through your efforts that we continue to achieve our goals.

As we look ahead, we remain committed to fostering a culture of innovation, collaboration, and continuous improvement. Our collective achievements are a testament to our shared vision and determination, which will undoubtedly propel us towards even greater success in the years to come. Together, we will continue to build on our strong foundation, driving forward with confidence and ambition.

I would like to thank our customers for their trust and ANA staff for their unwavering commitment and extraordinary contributions. Let us embrace the future with optimism and determination, as we continue to achieve excellence in all our endeavours.

Sincerely,

Claudio Clori

03

LEADING THE SKIES:
FABEC CHAIRMANSHIP 2023

FABEC Chairmanship 2023

In January 2023, ANA took over **the leadership of the FABEC ANSP Strategic Board** (ASB) from MUAC, marking a significant step forward for FABEC. In late 2022, FABEC ANSPs assessed the current situation considering multiple crises, changes, and the challenges posed by the forthcoming SES Reference Period 4 (RP4). They concluded that a new approach was necessary. During the inaugural meeting as the new ASB chair in December 2022, ANA's Director proposed developing a **new strategic direction** and revising the FABEC's working arrangements. This involved reassessing all activities and setting new objectives for FABEC's work during his 2023 tenure.

ANSPs and States welcomed and endorsed the proposal, recognizing its validity and necessity. They tasked a group of CEO Advisors, the 'Core Group,' with developing key strategic objectives and ambitions for a new FABEC ANSP structure. This included reassessing the current FABEC working arrangements and activities and creating a fresh setup and organization of FABEC's working arrangements and governance. This work had to align with the objectives of the FABEC Treaty and the overall aim to make FABEC 'fit for purpose' as an effective and goal-driven organization.

Throughout 2023, extensive development, communication efforts, and extra efforts were undertaken to align the interests of States and ANSPs and achieve the goal of a 'smarter, cheaper, and slimmer FABEC.' Effective communication and discussions with all stakeholders in various formats were key to gaining their support and endorsement.

The work concluded successfully, resulting in four main deliverables to transition towards a new FABEC organization in 2024:

1. **The new FABEC ANSP Strategy 2024+:** This leading document outlines FABEC's future strategic direction, providing the reasons, direction, and ambition for ensuring FABEC remains fit for purpose and adds value to all stakeholders.

2. **The FABEC ANSP Working Arrangements:** This describes the new top-down organization from the FABEC CEO Board (FCB) and the ANSP Advisory Group (AAG), supporting the FCB, to the Standing Committee 'Sustainable Airspace Operations' (SC ESO) as the core working arrangement. It also includes a revised FABEC ANSP Office (FAO) and a 'Pool of Experts' replacing the current Task Forces.

3. **High-level Objectives and Priorities for 2024:** These show the common will and commitment of FABEC ANSPs to deliver results in line with the new Strategy's strategic directions.

4. **A Workplan 2024 for 'bottom-up' projects and initiatives in the new working arrangements.**

These **key results**, achieved under the Presidency of the State of Belgium and the ANSP Chairmanship of ANA, will remain significant milestones for FABEC's future.

04

ANA MISSIONS & TASKS

ANA missions & tasks

Certification, safety, compliance,
quality, security, environment, health & safety

Administrative & financial
support services, IT & statistics

Meteorological
assistance & management of
meteorological equipment

Aeronautical
operations department

AIRPORT

Management of
communication, navigation
& surveillance
networks equipment

Air Traffic Control

Tower
control

Approach
control

Coordination
of winter
operations

Runway
inspections

Power & energy
supply services

Maintenance
of runway lighting

05

DRIVING GROWTH THROUGH TALENT:
HR STRATEGIES FOR A MODERN & AGILE WORKSPACE

Employee overview

[Personal Data]

EMPLOYE

General Overview

12.5 YEARS
Average Seniority
(Years in Service)
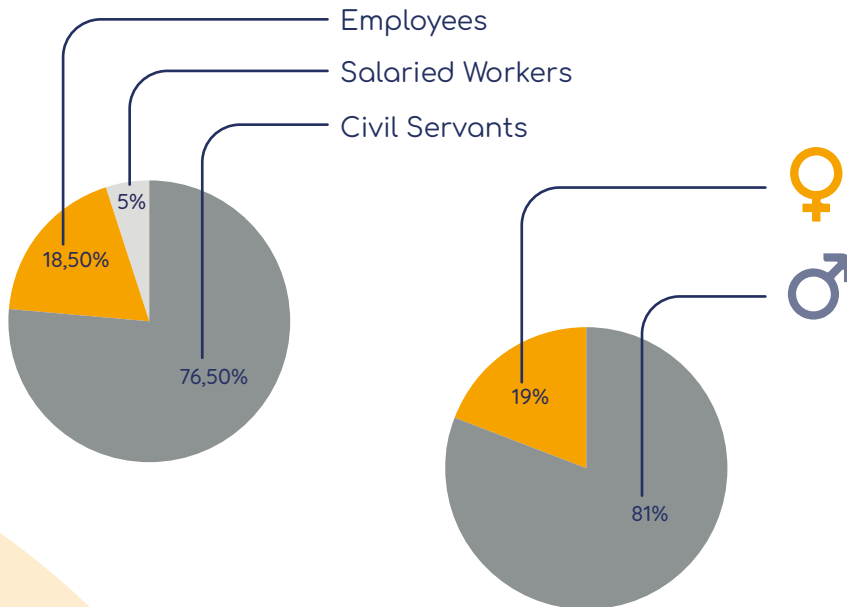
Total Headcount
200 EMPLOYEES
as of 31.12.2023

Average Age
41.1 years

19
NEW HIRES
in 2023

Full-Time Equivalents (FTE)
195.15 FTE
as of 31.12.2023

Employees
Salaried Workers
Civil Servants

5%
18,50%
76,50%

19%
81%

HR Transformation for a Modern & Efficient Administration

In 2023, ANA's HR department achieved key milestones in modernization and efficiency, focusing on recruitment, candidate engagement, streamlined processes, and digital transformation. These efforts are central to aligning HR with organizational goals and fostering long-term growth.

Stratetic Recruitment Optimization

Targeted Communication:
- Enhanced Candidate Experivence
- Onboarding and Training

Advancing Digital HR Processes:
- Paperless Transformation
- Automation of Routine

HR Policy:
Supporting Strategic Goals

ANA's HR policy underpins its commitment to **safe, efficient, and environmentally responsible air navigation services**. Guided by fairness, transparency, and equity, the policy ensures **effective recruitment, management, and continuous development of personnel**. It applies to all ANA staff, including trainees, civil servants, and consultants, aligning with both national law and European regulations. By **prioritizing professional growth and leadership**, ANA attracts and retains skilled, motivated employees, with policies regularly reviewed to meet evolving organizational needs.

HR Audits &
Personnel Development

In 2023, ANA's Human Resources unit underwent comprehensive internal and external audits, ensuring compliance with regulations and identifying opportunities for enhancement.
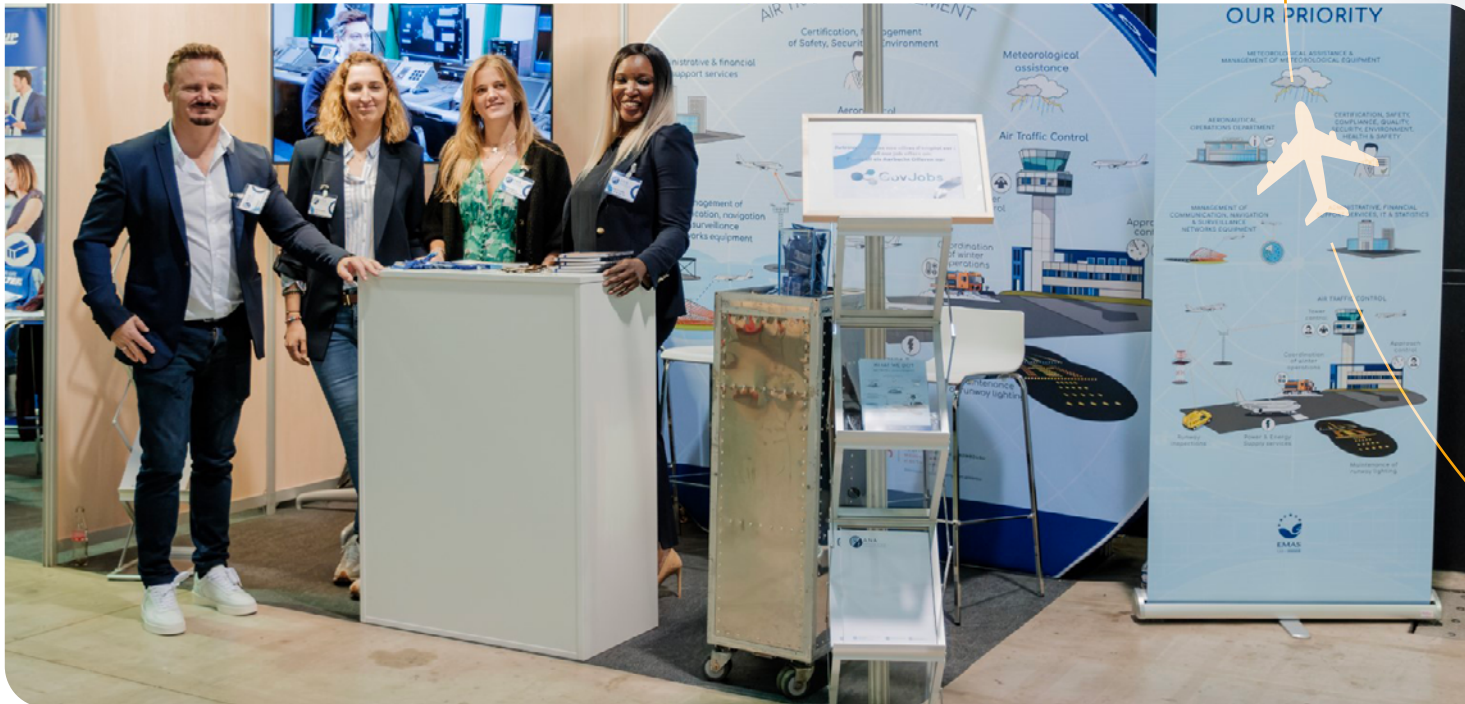
Key highlights include:

- **Training and Certification**

- **Global Alignment**
  By focusing on regular training and certification, ANA strengthens its operational capabilities and workforce readiness.

Recruitment & Workforce Mobility in 2023

ANA demonstrated adaptability and a focus on workforce development through:

- **Recruitment**
  Welcoming 19 new agents with targeted hiring strategies.

- **Internal Mobility**
  Facilitating role transitions for 8 employees, enhancing skill diversification and growth.

- **Career Advancement**
  Promoting 7 agents to civil servant status.

- **Work-Life Balance**
  Supporting parental leave for 5 employees.

These achievements reflect ANA's dedication to building a skilled, motivated team ready to meet future demands.

06

STRATEGIC INIATIVES & PERFORMANCE OVERVIEW

Introduction

In 2021, ANA launched an ambitious five-year Business Plan aimed at **enhancing operational efficiency, safety, and stakeholder engagement** across all aspects of its operations. As the aviation sector faces evolving challenges, assessing progress remains essential to ensure alignment with the dynamic demands of air traffic management and safety regulations.

This section highlights key advancements made over the past year in Air Navigation Services, operational technical infrastructure, and safety management. These achievements reflect ANA's **proactive approach** to addressing challenges and seizing opportunities for improvement. Through these efforts, we reaffirm our mission to provide safe, efficient, and environmentally responsible air navigation services at Luxembourg Airport.

Assessment
of 2023 Strategic Objectives

In 2023, ANA made significant progress in advancing the strategic objectives set out in its 2021–2025 Business Plan. This assessment provides a concise overview of key achievements and areas for further action:

Safety & Operational Excellence

Safety remained a top priority, with no Class A incidents (serious incidents that nearly lead to an accident) reported during the year. Improved reporting practices resulted in a rise in lower-category incidents, reflecting a proactive safety culture. ANA successfully achieved its 2023 target of zero critical Class A ATM System/Equipment (SE) incidents, a major safety milestone. Corrective measures were implemented to address the rise in runway incursions, ensuring safe ground operations. Efforts to address these challenges are ongoing, guided by insights from NSA audit findings incorporated into the Effectiveness of Safety Management (EoSM) evaluations.

Efficiency & Stakeholder Collaboration

ANA achieved a 64.6% utilization rate of Continuous Descent Operations (CDO), further reducing its carbon footprint. These results align with long-term environmental goals and demonstrate ANA's dedication to sustainable air navigation practices. Additionally, ANA collaborated on Luxembourg's updated Noise Action Plan, providing critical air traffic data to refine noise maps and improve community engagement regarding noise management.

Technological Advancements

ANA made significant investments in modernizing systems to enhance performance and safety. In 2023, it successfully upgraded its Airfield Lighting Control and Monitoring System (ALCMS) as part of the runway refurbishment project, improving reliability and safety. Moreover, ANA progressed its efforts toward Voice over IP (VoIP) implementation, aligning with ICAO and EUROCAE standards.

Strengthened Partnerships

ANA played a key role in the FABEC collaboration, assuming chairmanship of the FABEC CEO Board and driving initiatives to align air navigation services with shared European objectives. Additionally, ANA partnered with Belgian authorities to adjust the transition altitude from 4,500 to 5,000 feet in Luxembourg's Terminal Control Area, addressing vertical separation safety concerns.

Robust Security Measures

ANA updated its security protocols to align with evolving EU regulations, including NIS2 and CER standards. These updates resulted in improved response times and reinforced operational resilience. Additionally, regular vulnerability assessments and penetration tests confirmed that ANA's cybersecurity standards remain robust, further securing its operational environment.
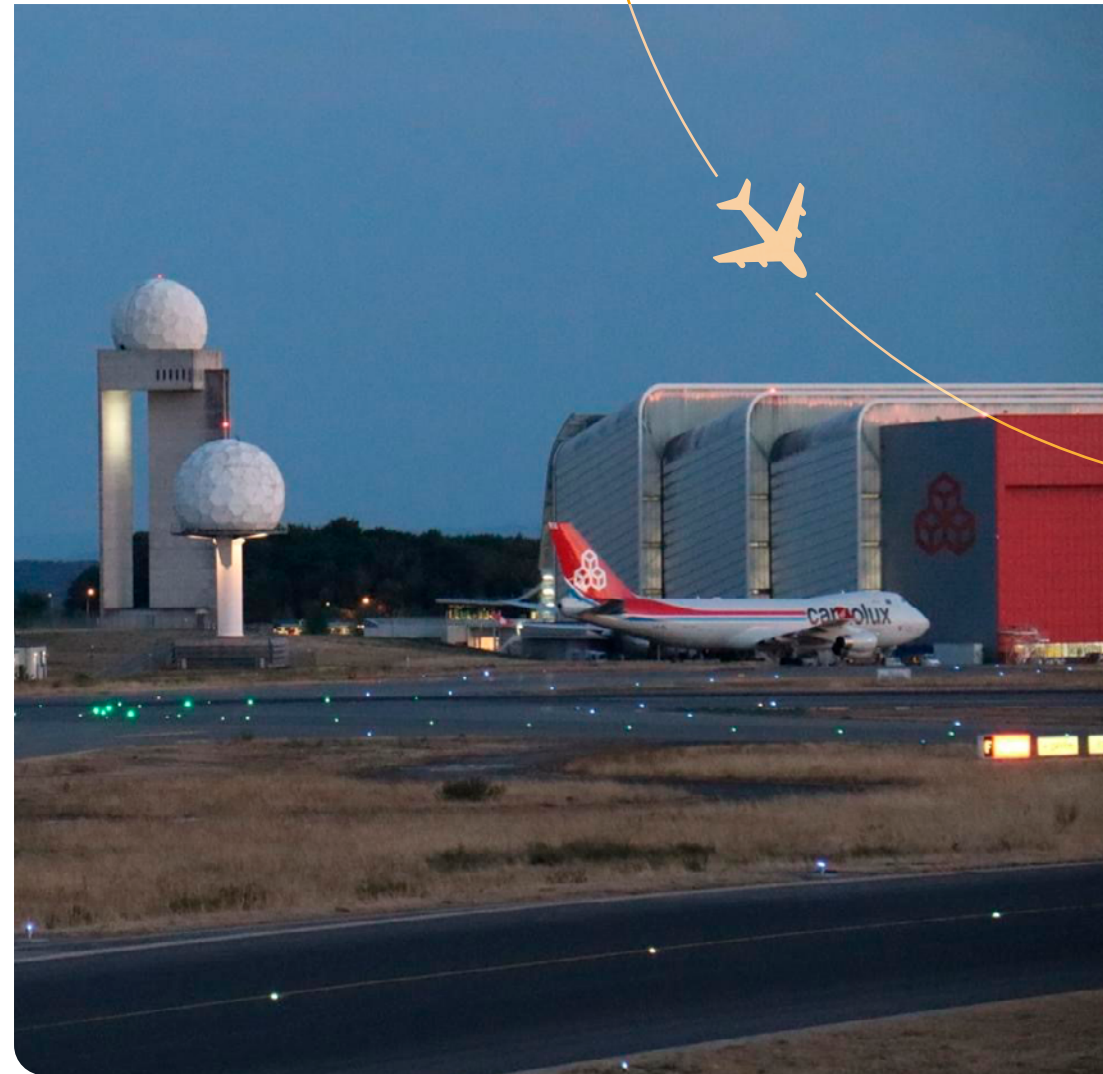
Projects:
Advancing Innovation & Operational Performance

In 2023, ANA undertook several **key projects** aimed at enhancing operational efficiency, safety, and sustainability. These initiatives reflect ANA's commitment to aligning with international standards and fostering innovation in air navigation services. Below is an overview of completed and ongoing projects that drive ANA's mission forward.

Completed Projects

Modernizing Aeronautical Information Services

ANA successfully modernized Aeronautical Information Management (AIM) by launching a local AIM database in partnership with lux-Airport and ArcGIS Enterprise. This initiative ensures the provision of **high-quality, real-time data** critical for flight safety and operational efficiency, aligning with EU Regulation and ICAO standards and recommanded practices. By integrating System Wide Information Management (SWIM) capabilities, ANA has facilitated seamless data exchange across European airspace, improving decision-making and stakeholder coordination.

Airfield Lighting Control and Monitoring System (ALCMS) Upgrade

ANA completed a comprehensive upgrade of its Airfield Lighting Control and Monitoring System (ALCMS) as part of the runway refurbishment project. This involved implementing a new Human-Machine Interface (HMI), advanced software, and a robust fiber optic network. The improvements have significantly **enhanced the reliability and efficiency of airfield operations**, met the highest international safety standards while minimizing disruptions during installation. The system's modular design also supports future automation opportunities, reinforcing ANA's commitment to innovation in airport infrastructure.

Performance-Based Navigation (PBN)

Implementation

In December 2023, ANA updated standard arrival and departure routes at Luxembourg Airport (ELLX) as part of its transition to Performance-Based Navigation (PBN), in compliance with the PBN Implementing Regulation (IR) 2018/1048. These updates were supported by a detailed transition plan and extensive consultations with civil and military stakeholders, including aircraft operators.

All routes are now published in the AIP as both Area Navigation (RNAV) and conventional options, with transition waypoints enabling Continuous Descent Operations (CDO) and Continuous Climb Operations (CCO). These changes **enhance efficiency, reduce environmental impact, and align with ANA's sustainability goals.**

Mode-S Enhanced Surveillance (EHS)

Completed in October 2022, the Mode-S Enhanced Surveillance (EHS) upgrade significantly improved air traffic controllers' situational awareness and enhanced surveillance data integrity. The upgrade supports compliance with EU regulations, reduces radio communication workload, and **reinforces safety nets**, including the Short-Term Conflict Alert (STCA) system.

Dedicated Clearance Delivery Position

On June 1, 2023, ANA introduced a dedicated Clearance Delivery position in the Air Traffic Control Tower (TWR). This initiative **optimized workload distribution during peak periods**, enhancing operational efficiency and safety. Post-implementation reviews have demonstrated improvements in service quality and controller workload management.

Transition Altitude Adjustment

In collaboration with our Belgian partner Skeyes, ANA raised the transition altitude from 4,500 to 5,000 feet in Luxembourg's Terminal Control Area. This adjustment addressed vertical separation safety concerns, ensured compliance with airspace regulations, and **enhanced operational efficiency**. This achievement demonstrates ANA's commitment to continuous improvement and alignment with European safety standards.

Ongoing Projects

Surveillance Chain Upgrade

This project will integrate additional sensors and emerging surveillance technologies to **modernize Luxembourg's air traffic management infrastructure.**

Advanced Surface Movement Guidance & Control System (A-SMGCS)

This project aims to ensure **safe separation of aircraft and vehicles** under all visibility conditions.

Continuous Descent/Climb Operations (CDO/CCO)

While Continuous Descent Operations (CDO) were fully implemented in 2017, ANA is working on further enhancements to **optimize environmental benefits** and improve fuel efficiency in coordination with stakeholders.

Voice over IP (VoIP) Implementation

ANA is transitioning its communication systems to Voice over IP (VoIP) **to meet ICAO and EUROCAE standards.**

NewPENS Implementation

As part of the European network modernization, ANA is implementing the New Pan-European Network Service (NewPENS) to **facilitate secure and efficient information exchange.**

Ultrasonic Wind System Upgrade

ANA is upgrading the Ultrasonic Wind System with new sensors to **improve wind measurement accuracy.** Installation has already been completed, though final tests are still due.
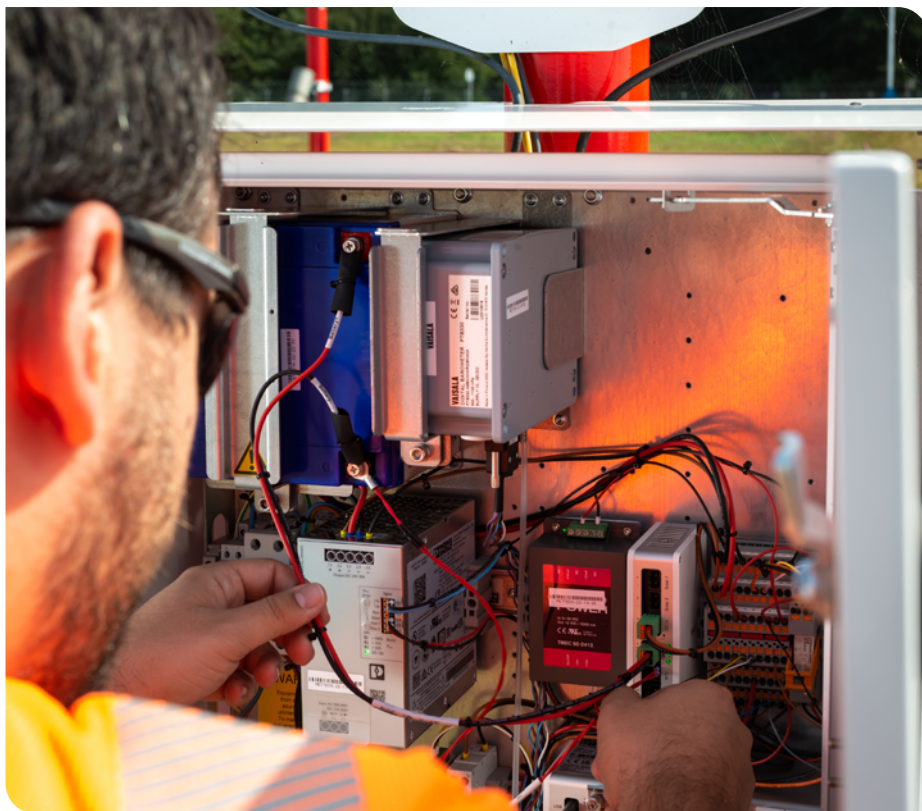
LED Approach Lights for RWY 06-24

This project involves replacing and upgrading LED approach lights to **reduce power consumption** and maintenance requirements.

Aeronautical Data Quality (ADQ)

ANA is advancing its infrastructure and procedures to ensure compliance with EU Regulation 73/2010. This ongoing project aims to **enhance the accuracy, integrity, and security of aeronautical data.**

Enhanced AMHS Upgrade

ANA is upgrading its Aeronautical Message Handling System (AMHS) to ensure compliance with EU Interoperabillity Regulations (IOR) and EUROCONTROL specifications and **improve safety and security in data transmission.**

AWOS System Upgrade

The Automated Weather Observation System (AWOS) is undergoing an upgrade to ensure reliable and future-proof weather observations. This initiative ensures the **continuation of provision of high-quality data** critical for flight safety and operational efficiency, aligning with EU Regulation and ICAO standards directives and integrating System Wide Information Management (SWIM) capabilities.

ADD with integrated D-ATIS System Upgrade

The project aim is to modernize and integrate the Aerodrome Data Display (ADD) system and implement a Digital Automatic Terminal Information Service (D-ATIS) system to **ensure operational compatibility with the future deployed Automated Weather Observing System** (AWOS).

07

FACTS & FIGURES

Movements, Passengers, Freight & Service Units

The Table below illustrates the activities in Luxembourg terminal airspace and Luxembourg Airport during Reference Period 2 (RP2) and the first four years of Reference Period 3 (RP3).

During RP2 (2015–2019), air traffic at Luxembourg Airport steadily increased, with both the number of flights and the number of terminal Traffic Service Units (TSUs) surpassing the projections in the Statistical Forecast (STATFOR) for the Luxembourg Performance Plan (PP). The pandemic brought this growth to a halt. Passenger traffic declined during 2020 whilst cargo transport flights could hold and even slightly increased during the pandemic.

In 2022, traffic showed a **significant recovery**, particularly in comparison to other European regions. Total movements reached 93,341 in 2022, slightly decreasing by 0.5% to 92,862 in 2023, marking a 2.2% decrease compared to 2019. International and commercial movements increased by 1.9% and 2.8% respectively from 2022 to 2023, but still reflected a decrease of 5.9% and 5.2% respectively compared to 2019 levels.

Passenger numbers saw a **robust recovery**, with an 18.1% increase from 2022 to 2023, resulting in a 10% increase compared to 2019. Cargo movements, however, decreased by 11.4% from 2022 to 2023 and by 10% compared to 2019. Freight tonnage saw a significant decline of 18% from 2022 to 2023 and a 6.9% decrease compared to 2019.

While the outlook for the coming years remains uncertain due to various influencing factors, the situation in 2023 demonstrated signs of improvement. However, the sector remains vulnerable to other crises. ANA continues to adapt its operations accordingly.

Table 1 - Traffic movement, passengers, freight & service units over RP2 (2019), RP3 (2020-2023) and 2022-2023 /2019-2023 in comparison

	2019	2020	2021	2022	2023	Change 2022-23	Change 2019-23
Reporting Period	RP2	RP3					
Total movements	94.985	64.705	74.516	93.341	92.862	-0,5%	-2,2%
International Movements	80.557	43.639	51.789	74.422	75.842	+1,9%	-5,9%
Commercial Movements	73.801	38.629	45.691	68.000	69.935	+2,8%	-5,2%
Passengers (Mio)	4,416	1,446	2,039	4,114	4,857	+18,1%	+10%
Cargo Movements	13.367	13.307	14.931	13.582	12.033	-11,4%	-10%
Freight (t)	853.354	905.223	1.088.441	969.962	794.884	-18%	-6,9%
Actual terminal Traffic Service Units (in .000)	56,0	40,0	46,0	54	53.4	-1%	-4.6%

Figure 1 -Terminal TSU forecast and actual values

Legend: ■ Terminal TSU forecast in Performance Plan   ■ Actual terminal TSU
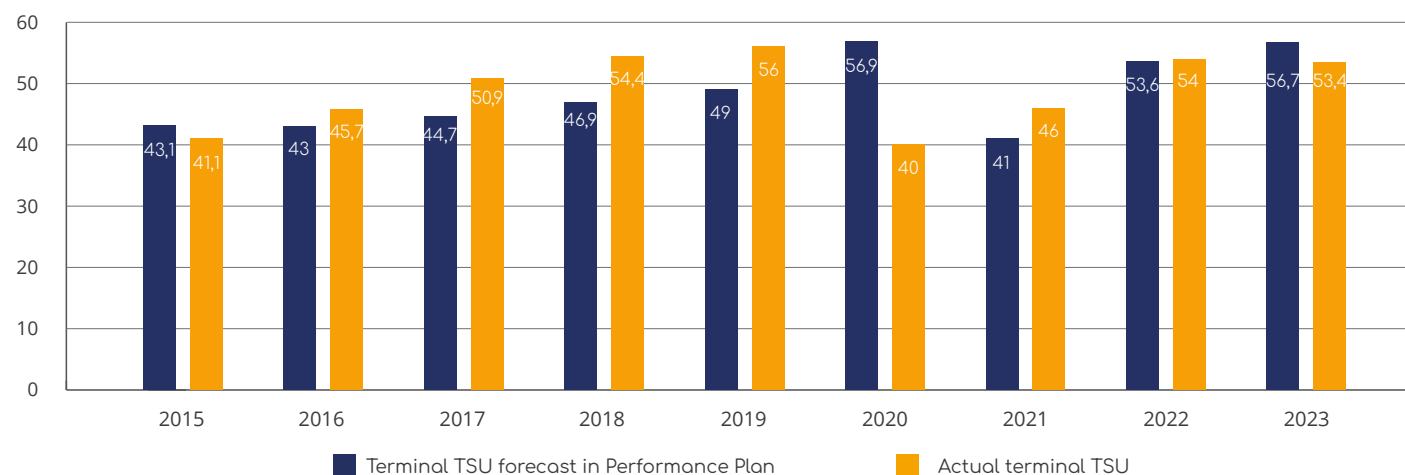
08

KEY PERFORMANCE AREAS

Key Performance Areas (KPA)

ANA is in a transition phase in its process to modernise and respond to the evolving ATM environment as described in the foregoing chapters. This is also evident in the mixed KPA results. It was a tough year for ANA and the results reflect this. More work is needed in 2024 to complete this transformation to achieve better results.

Performance Overview:
Achievements & Challenges in
Key Performance Areas (KPAs) for 2023

Safety

Safety is the cornerstone of our operations, and 2023 was marked by both significant achievements and notable challenges in **maintaining and enhancing our safety standards**. Key performance indicators (KPIs) such as the Effectiveness of Safety Management (EoSM), ATM System/Equipment (SE) incidents, Separation Minima Infringements (SMIs), runway incursions, and airspace infringements were monitored closely to ensure the safety of operations within Luxembourg's airspace and at the airport.

While we successfully met the goal of zero critical Class A ATM incidents and saw continued reductions in airspace infringements, areas such as runway incursions and EoSM scores require further attention. The incorporation of NSA audit findings into EoSM evaluations and the impact of increased reporting rates demonstrate a proactive approach to addressing safety concerns. This section provides an in-depth analysis of our performance, showcasing both progress and areas for **targeted improvement** as we move forward.

The Effectiveness of Safety Management (EoSM):

The EoSM scale, updated for 2023, evaluates safety across five critical Safety Management Objectives: Safety Culture, Safety Policy and Objectives, Safety Risk Management, Safety Assurance, and Safety Promotion. Results for 2023 reflect a temporary decline due to the inclusion of findings from NSA audits for the first time. These audits applied stricter evaluation criteria and highlighted new focus areas, such as enhanced documentation and process standardization, which had not been fully implemented by the time of scoring. While these findings impacted the results, they provide a **clear roadmap for improvement**. Corrective action plans are actively being implemented to address these gaps, ensuring alignment with targets set for the end of RP3.

Tabel 2 - Effectiveness of Safety Management (EoSM)

EoSM Component	Target 2023	2023 Result
Safety Culture	C	2B, 1C
Safety Policy and Objectives	C	1B, 6C, 2D
Safety Risk Management	D	3B
Safety Assurance	C	3B, 3C, 2D
Safety Promotion	C	1C

ATM System/Equipment Incidents:

ANA met its 2023 target of zero critical Class A ATM System/Equipment (SE) incidents, a major safety achievement. However, a higher number of Class B and non-safety-impacting Class C and E incidents were reported. This increase is linked to a proactive reporting culture and environmental factors, such as interference in ILS signals caused by tall cranes near the airport.

Figure 2 - Maximum tolerable ATM SE incidents

ATM SE Events

	Class A	Class B	Class C	Class D	Class E
2019	0	4	55	86	28
2020	0	0	15	134	18
2021	0	4	16	80	1
2022	0	1	22	145	4
2023	0	6	80	271	8
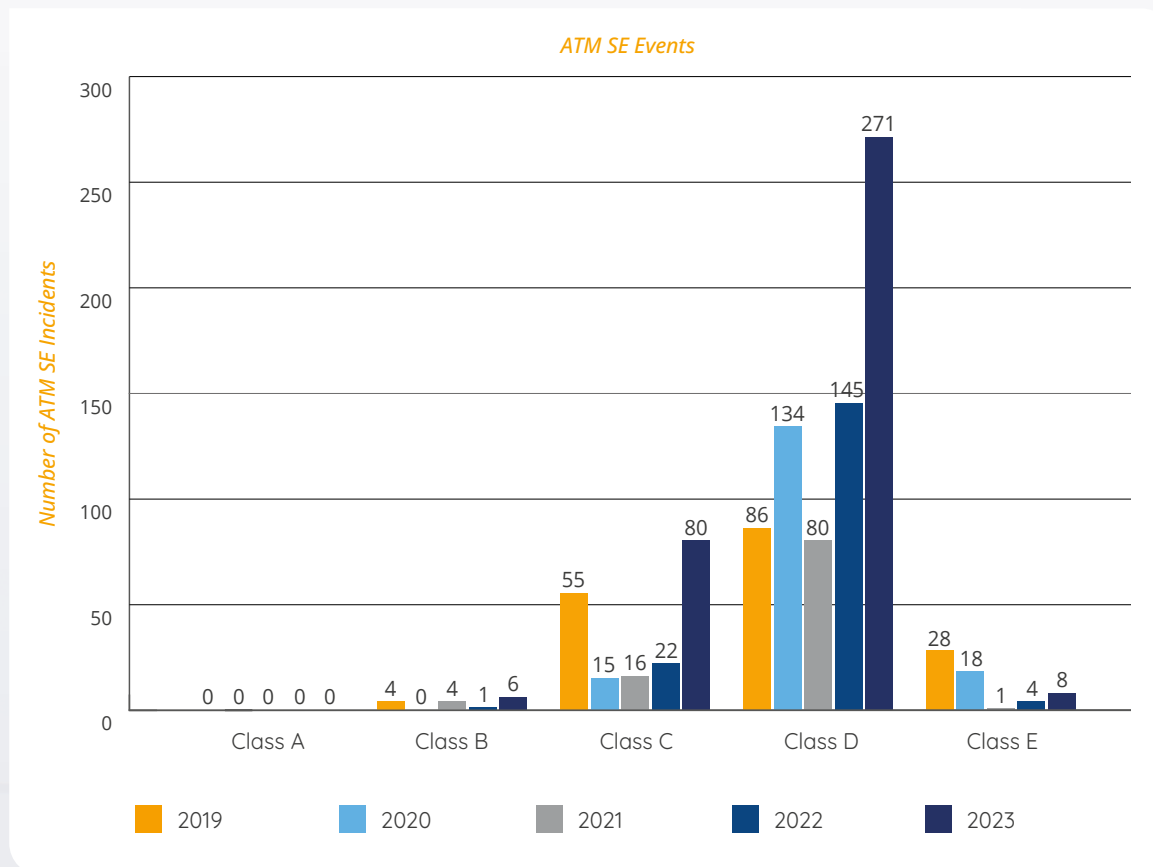
Separation Minima Infringements (SMIs):

While total flight hours **increased** from 17,665 in 2022 to 19,112 in 2023, the **SMI rate decreased** from 0.00023 to 0.00016. This improvement is due to a reduction in the number of reported SMIs, from four in 2022 to three in 2023.

Continuous efforts in air traffic management aim to address safety risks effectively, ensuring that the increase in flight activity is accompanied by enhanced safety measures.

Table 3 - Number of SMI's at Luxembourg Airport (2022-2023)

Year	Controlled Flight Hours	Number of SMIs	SMI Rate
2022	17,665	4	0.00023
2023	19,112	3	0.00016

Runway Incursions:

Runway incursions increased from one per year between 2020 and 2022 to four in 2023, raising the rate to 0.00004 per movement. Corrective measures and recommendations have been implemented to mitigate this trend and ensure safe ground operations.

Table 4 - Number of Runway incursions on Luxembourg Airport (2020-2023)

Year	Runway Incursions	IFR and VFR Movements	Incursion Rate (per movement)
2020	1	64705	0.00002
2021	1	74516	0.00001
2022	1	93341	0.00001
2023	4	92862	0.00004

Airborne Collision Avoidance System (ACAS) Alerts:

Most ACAS Resolution Alerts (RAs) in 2023 were triggered by interactions between VFR and IFR aircraft. Importantly, **no TCAS RAs occurred near the airport**, reflecting the success of implemented safety measures. The only notable incident involved an airspace infringement by a VFR aircraft.

Airspace Infringements:

Airspace infringements have begun to decline, reflecting the effectiveness of the information campaign targeted at the pilots involved. A statement is requested from the pilot for each incident, and efforts are made to engage pilots from non-local flying clubs. This initiative has continued into 2024.

Figure 3 - Number of ACAS Resolution Alerts (RAs) in Luxembourg Airspace (2019-2023)
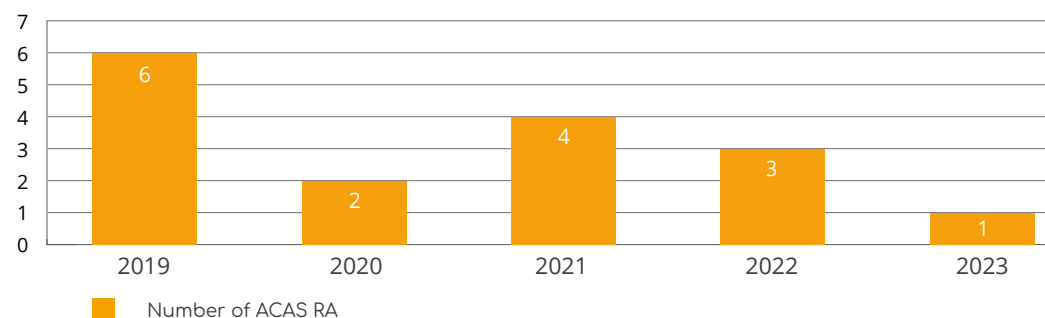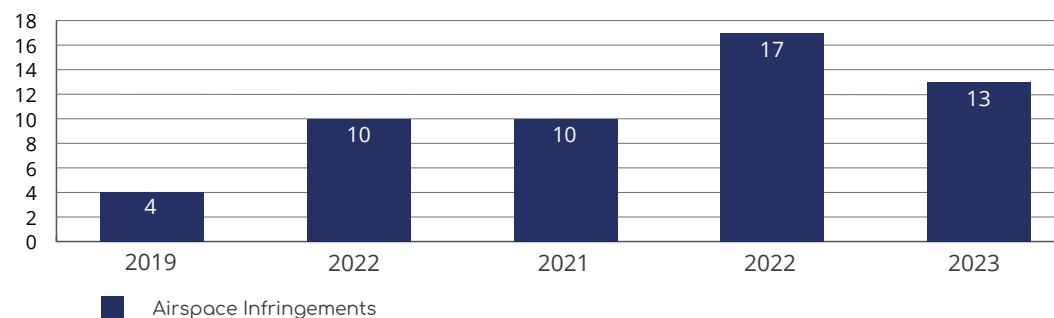

Figure 4 - Airspace Infringements

Capacity

The performance of ANA's Air Traffic Control (ATC) department from 2020 to 2023 was assessed using four Key Performance Indicators (KPIs): Arrival ATFM Delay, ATC Departure Delay, ATFM Slot Adherence, and Additional Taxi Out Time. The results are summarized in *Table 5*.

Table 5 – Air Traffic Control Capacity KPI Results 2020 – 2023

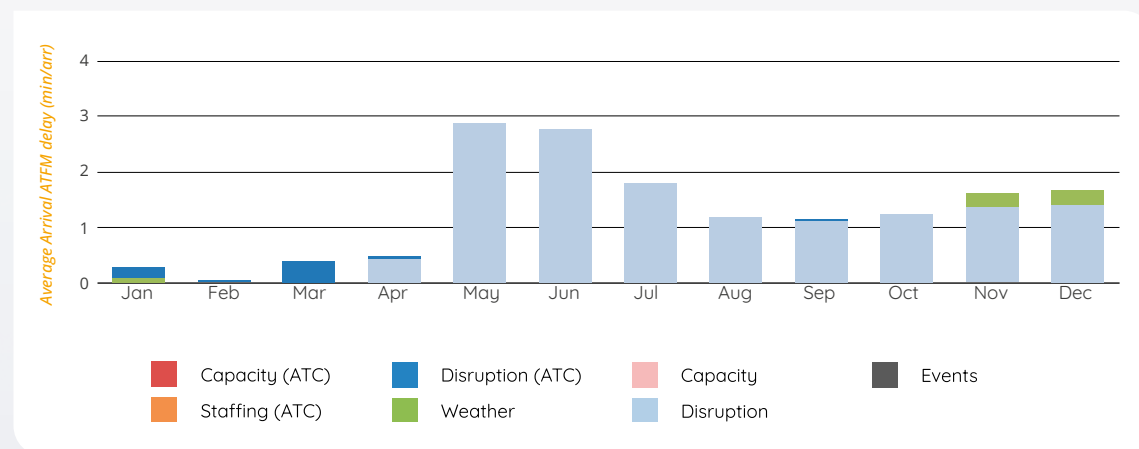| KPI Metic	2020	2021	2022	2023	Target	Analysis
Arrival ATFM Delay (min/arr)	0.06	0.14	0.10	1.36	0,05 + 50%	Significant increase in 2023 due to operational event (no ATC), weather, operational restrictions.
ATC Departure Delay (min/dep)	0.02	0.04	0.04	0.09	N/A	A slight upward trend, with delays remaining low compared to arrival delays.
ATFM Slot Adherence (%)	90.2	93.4	94.12	94.95	> 80%	Steady improvement, achieving nearly 95% adherence in 2023.
Additional Taxi Out Time (min/dep)	3.32	1.57	1.95	2.99	N/A	Increased in 2023 due to traffic recovery and more precise reporting methods.

Key Highlights

1. Arrival ATFM Delay

In 2023, Arrival ATFM Delay increased significantly to 1.36 minutes per arrival, far exceeding the target of 0.05 minutes + 50%. This sharp rise, compared to 0.1 minutes in 2022, was largely due to weather-related restrictions, operational events (no ATC) and operational restrictions. Addressing this challenge will be a priority moving forward.

Figure 5 – ATFM delay/month in 2023

Legend:
- Capacity (ATC)
- Staffing (ATC)
- Disruption (ATC)
- Weather
- Capacity
- Disruption
- Events

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ATFM Delay Trends: *Figure 5* highlights the monthly distribution of ATFM delays in 2023, emphasizing seasonal impacts and operational challenges.

2. ATC Departure Delay (min/dep)

Departure delays showed a slight upward trend over the years, but the delays remain relatively low compared to arrival delays. This increase could be attributed to **rising traffic volumes**, which place added demand on ATC resources—such as runway access, taxiway space, and departure slots.

3. ATFM Slot Adherence (%)

Slot adherence improved consistently, reaching 94.95% in 2023, well above the target of 80%. This reflects the effectiveness of ANA's operational procedures and planning.

4. Additional Taxi Out Time (min/dep)

Taxi-out times increased to 2.99 minutes per departure in 2023, missing the target of 2.5 minutes. This was due to traffic recovery post-COVID-19 and the adoption of more precise reporting methods, providing better insights into delays.

Reducing Environmental Impact

Luxembourg's Updated Noise Action Plan:

Collaboration for a Quieter Environment

Luxembourg's updated Noise Action Plan, developed under the European Environmental Noise Directive (Directive 2002/49/EC), includes **enhanced strategic noise maps** and increased collaboration with national and municipal entities to address noise pollution. ANA played a key role by providing detailed data on air traffic patterns, flight movements, and aircraft noise levels. This data was critical in refining the noise maps, ensuring an accurate representation of noise exposure around Luxembourg Airport.

https://map.geoportail.lu/theme/emwelt

Continuous Descent Operations (CDO) at Luxembourg Airport:
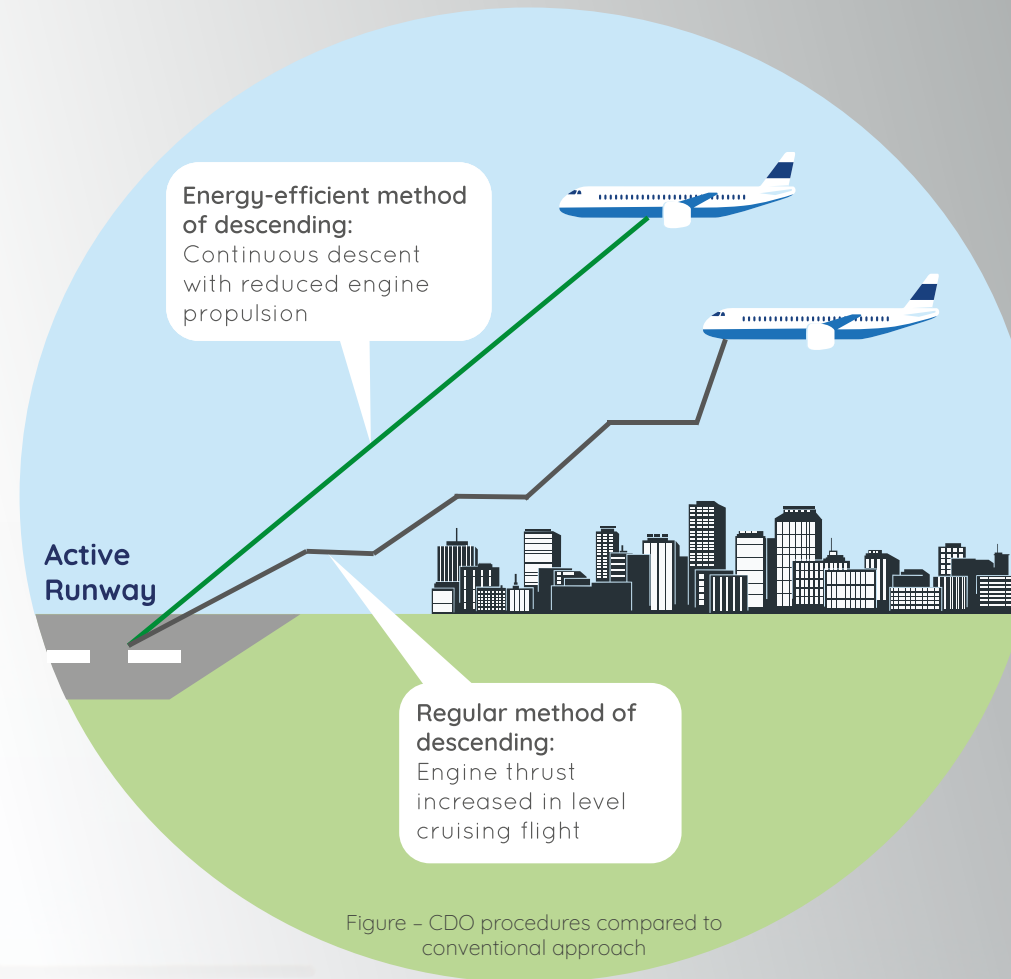## Efficiency and Impact

Continuous Descent Operations (CDO) optimize landing approaches by minimizing thrust usage from the Top of Descent (ToD) to 1800ft, reducing noise, fuel consumption, and emissions.

Key Benefits of CDO

Fuel Efficiency: Reduced fuel usage and carbon emissions

Noise Reduction: Quieter descents without level-offs.

Operational Effectiveness: Simplifies tasks for pilots and air traffic controllers.

Energy-efficient method of descending:
Continuous descent with reduced engine propulsion

Active Runway

Regular method of descending:
Engine thrust increased in level cruising flight

Figure – CDO procedures compared to conventional approach

Implementation at Luxembourg Airport

CDO application rates have consistently improved from 2020 to 2023:

*2020:* 61.1% of inbound flights (12,131 out of 19,851)
2023: 64.6% (23,057 out of 35,717 flights)

CDO effectiveness is measured from ToD to 1,800 feet (Fuel CDO) and from FL075 to 1,800 feet (Noise CDO), achieving significant noise and fuel reductions.

The graph in *Figure 6* shows the application of CDOs at Luxembourg Airport 2020 - 2023. **Key insights include:**
These statistics, provided by EUROCONTROL, demonstrate a consistent adoption of CDOs in Luxembourg airspace, contributing to improved efficiency and reduced environmental impact.

Figure 6 – Number / rate of CDO application in Luxembourg airspace 2020-2023
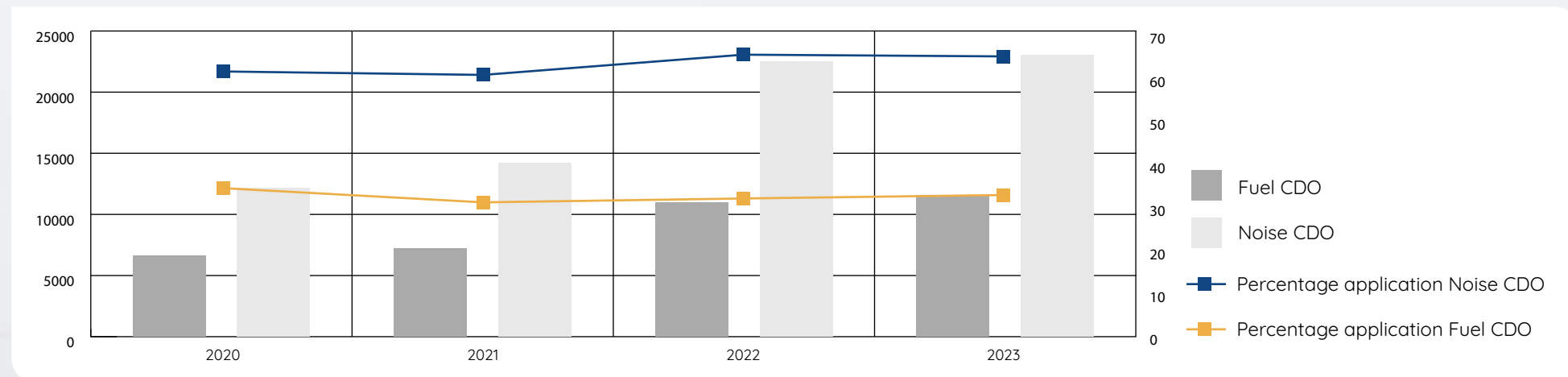
Night Flights & Restrictions at Luxembourg Airport

Luxembourg Airport enforces a night curfew from 23:00 to 06:00, with exemptions for essential operations such as government, medical, and humanitarian flights. Flexibility is provided for delayed and unscheduled flights.

Night Flight charter: Cargolux & Luxair

ANA has had a night flight charter in place with Cargolux for several years to reduce noise and minimize the environmental impact during night operations. Discussions are ongoing with Luxair to implement a similar agreement for passenger flights, addressing noise concerns and enhancing operation efficiency while balancing community interests.

Link to ENV Statement

Sustainable Aviation Practices:
Enhancing Community Engagement & Reducing Environmental Impact

Luxembourg Airport remains **committed to sustainability** and fostering strong community relations. Since adopting Performance-Based Navigation (PBN) in 2019, ANA has actively adjusted the GTQ departure route to minimize noise impacts on surrounding communities while maintaining operational efficiency.

GTQ Departure Route:
Key Features und Updates

The GTQ departure route, a Standard Instrument Departure (SID) procedure, guides aircraft departing southward from Luxembourg Airport (ELLX). This route ensures safe integration into the en-route air traffic system while prioritizing noise reduction and community well-being.

Community Consultations:
ANA collaborated with local communities and aviation stakeholders to adjust the GTQ route, balancing operational efficiency with noise mitigation.

Noise Reduction Measures:
In response to community feedback:

- The **minimum turning altitude** was raised to **2,200 feet** in 2020 and further increased to **2,700** feet in 2023, reducing noise levels for affected areas.

Ongoing Commitment to Sustainability

The adjustments to the GTQ departure route reflect ANA's dedication to **sustainable aviation practices** and proactive community engagement. Moving forward, ANA remains focused on integrating advanced navigation procedures and exploring innovative solutions to further reduce noise pollution and enhance environmental sustainability.

Security Management:
Enhancing Protection and Resilience

ANA's Security Management System is dedicated to safeguarding personnel, facilities, and data through **continuous improvement of physical and cybersecurity measures**. The primary objective is to ensure uninterrupted operations and protect staff, addressing both physical and cyber-based security concerns in an evolving threat landscape.

Key Components of the Security Management System

The system incorporates a comprehensive approach to risk management, including:

Risk Analysis:
Identifying and assessing potential threats.

Audits and Inspections:
Regular evaluations of security controls.

Technology Monitoring:
Staying ahead of emerging trends and vulnerabilities.

Threat Tracking & Incident Analysis:
Proactive identification and mitigation of risks.

Regulatory Compliance:
Adhering to evolving standards, including NIS2, CER and Part IS regulations.

2023 Achievements

1. Physical Security

- Stricter standards for access control systems were successfully implemented across all land sites, enhancing the overall security level.

- Continuous improvements ensure robust protection against unauthorized access.

2. Cybersecurity

- Regular **vulnerability assessments** and **penetration tests** (internal and external) were conducted, confirming cybersecurity is at a strong standard level.

- Ongoing refinements to address identified improvement areas are in progress

3. Regulatory Compliance

- ANA proactively advanced regulations concerning NIS2, CER, and Part IS, strengthening its compliance framework to meet evolving security standards.

Future Outlook

*Security management is an ongoing process that requires **constant innovation**. While no significant incidents impacted ANA's assets in 2023, the administration's proactive approach—through observation, analysis, and innovation—ensures **continuous improvement**. Strengthened standards and strategic initiatives will remain essential in addressing future challenges in both physical and cybersecurity.*

Risk Management System Overview

ANA's risk management system focuses on seven principal risks: aviation safety, business continuity, security, occupational health, reputation, and finance.

System Maturity & Performance

ANA measures its risk management system's maturity using a KPI aligned with ISO 31000-2018 standards.In 2023, the system achieved an 83% maturity level, reflecting significant progress.

2023 Key Initiatives

1. **Security Risk Assessment**

   Strengthened evaluation of physical and information security risks in compliance with the NIS directive.

2. **SERIMA Tool Adoption**

   Leveraged the SERIMA tool from the Institut Luxembourgeois de la Régulation to assess information security risks, enhancing ANA's security framework.

Program Management:
Maximizing Benefits through Strategic Coordination

ANA's program management framework ensures the effective coordination of related projects to optimize resource utilization, minimize conflicts, and improve organizational performance. Project performance is monitored regularly by management and the Strategic Management Team (SMT), focusing on three key areas:

- **Project Scope Compliance**
- **Resource**
- **Adherence to Deadlines**

Future Focus

To address underperformance in project completion, ANA will **enhance resource allocation and streamline project management processes** *in 2024. Strengthened coordination and additional support for complex projects will be key to improving performance.*

PROJECT 5
PROJECT 4
PROJECT 3
PROJECT 2
PROJECT 1

JAN   FEB   MAR   APR   M

Cost-Efficiency

In 2023, ANA successfully met its financial reporting obligations and finalized the revised Performance Plan for RP3 in December. This section provides an overview of En-route and Terminal costs and revenues, highlighting ANA's contributions to cost efficiency.

En-route costs & revenues

Skeyes, our Belgian partner organization, is the primary ANSP responsible for En-route services within the common charging zone for En-route services of the Brussels Flight Information Region (FIR), covering both Luxembourg and Belgium. While EUROCONTROL MUAC manages Luxembourg's upper airspace (above Flight Level (FL) 245), ANA controls the lower airspace (below FL 145/165). Each of the three ANSPs provides a **transparent breakdown of their respective costs** in separate cost tables. Additionally, MUAC costs are divided between MUAC Luxembourg and MUAC Belgium. This report will primarily focus on ANA's contribution to the costs within this common En-route charging zone.

Table 6 - Total determined costs & unit rate calculation for En-Route services 2019 (RP2) & 2020-2024 (RP3) (only ANSP ANA) & 2025 (as presented during the latest user consultation)

(in k€)	2019	2020	2021	2022	2023	2024	2025
Total determined costs	6.560	7.340	7.634	7.312	7.568	7.407	9.460
Carry-forward adjustments	57	125	211	76	226	1182	798
Other revenues	-585	-880	-974	-2.969	-1.217	-1.198	-1.296
Remaining (chargeable costs)	6.033	6.585	6.871	4.419	6.577	7.391	8.962
Unit rate (in €/SU)	2,22	2,39	2,44	2,10	2,74	2,89	3,37

Notably, the Luxembourg State does not pass on the costs of capital or the depreciation of investments to users through En-route and Terminal Navigation Charges (TNC). Instead, these costs are covered under the "Other Revenues" section. After accounting for over-recoveries and carry-forwards from previous years, En-route users were charged a unit rate of 2.74 euros per service unit on behalf of ANA in 2023. With the recovery of traffic post-pandemic, the total amount recovered through the EUROCONTROL route charges system for Luxembourg increased significantly from 8 million euros in 2022 to 11.2 million euros in 2023.

In 2023, ANA's actual total nominal costs for En-route services amounted to 8.165 million euros, compared to 7.522 million euros in 2022, representing an 8.6% increase.

Table 6 gives the calculation of the ANA related unit rates for En-route services for the last year of RP2 (2019) and the whole period of RP3 (2020-2024), after adjustments related to inflation and traffic and other revenues.

In real terms, actual costs were 6 % higher than in 2022, and 9,3 % above the DC for 2023. The unit cost attributed to ANA in real terms per service unit for the common charging zone was 3.08 euros in 2022, which decreased to 2.8 euros in 2023. The **actual unit cost** in real terms was **9,1 % lower** in 2023 than in 2022 and **7,3 % above** the determined unit cost mainly due to the traffic recovery following the COVID-19 crisis.

Table 7 - Total costs and unit costs for En-Route services in real terms at 2017 price level (only ANSP ANA)

	2022 Actuals	2023 Determined (as planned in the approved Performance Plan (PP) for RP3)	2023 Actuals
Total costs (real terms; Inflation index - Base 100 in 2017) for terminal services (.000€)	6.456	6.263	**6.843**
Service Units (in .000)	2.096,18	2.404,00	**2.446,5**
Unit costs in real terms (in €/SU)	3,08	2,61	**2,80**

Table 7 gives the total costs, actuals and Determined Costs (DC) in real terms at 2017 price level, the actual and forecasted SU's and the actual and Determined Unit Cost (DUC) in real terms.

ANSP Terminal Costs (TNC)

As the ANSP for Luxembourg, ANA delivers approach (APP) and aerodrome control (TWR) services within Luxembourg's airspace and at the airport.

Since 2015, ANA has operated a departure charging scheme from Luxembourg airport, which adjusts charges based on the Maximum Take-off Weight (MTOW) as stipulated by EU Regulation 391/2013 Article 16 (repealed by EU Regulation 2019/317 Article 32 for RP3). This scheme incentivizes airlines to use quieter aircraft by modulating charges according to the noise certificate of the aircraft across four noise categories (factor E). Additionally, charges are lower for flights departing during daytime compared to those departing late at night or after midnight, categorized into three time-based factors (factor D).

ANA's charging and billing office calculates and issues charges and bills. After the billing year concludes, traffic and modulation effects are calculated. Any excess amount above the Determined Cost (DC) is used to reduce user charges in the second subsequent year (n+2).

Table 8 – Total determined costs and unit rate calculation for terminal services 2019 (RP2) & 2020-2024 (RP3) (only ANSP ANA) and 2025 (as presented during the latest user consultation)

(in k€)	2019	2020	2021	2022	2023	2024	2025
Total determined costs	12.487	14.933	15.456	16.030	15.289	15.809	19.241,1
Carry-forward adjustments	-1.765	-1.874	-1.562	-557	-830	1.590	1.286
Other revenues	-1.568	-2.482	-2.818	-3.671	-1.663	-1.773	-2.329
Remaining (chargeable costs)	9.154	10.577	11.077	11.802	12.797	15.626	18.199
Unit rate (in €/SU)	186,63	185,83	190,85	216,87	225,74	259,80	324,98

Table 8 gives the unit rates for terminal services for the last year of RP2 (2019) and the whole period of RP3 (2020-2024), after adjustments related to inflation, traffic, other revenues and modulation.

After accounting for costs covered by the State of Luxembourg and various carry-forward adjustments related to traffic and modulation, the unit rate charged in 2023 was set at 223,97 Euros per service unit, significantly higher than the 216,76 Euros unit rate in 2022.

Due to the increased unit rate in 2023 and relatively stable traffic levels, the total TNC charges recovered, rose slightly to 11,6 million Euros, compared to 11,1 million Euros in 2022.

In 2023, the actual nominal costs for terminal air navigation services (ANS) amounted to 16,6 million euros, reflecting a 10% increase from 2022's costs of 15,06 million euros. Compared to the determined costs of 15,3 million euros, the actual costs were approximately 8% higher. In real terms, actual costs were 6,9 % higher than in 2022 and 7,3 % above the DC for 2023. The ANSP unit cost per terminal service unit rose to 263,82 euros in 2023, up from 243,87 euros in 2022. The **actual unit cost** in real terms is **8,2% higher** in 2023 than in 2022 and stays **13,9 % above** the Determined Unit Cost.

Table 9 - Total costs and unit costs for terminal services in real terms at 2017 price level (only ANSP ANA)

	2022 Actuals	2023 Determined Costs (as planned in the approved Performance Plan (PP) for RP3)	2023 Actuals
Total costs (real terms; Inflation index - Base 100 in 2017) for terminal services (.000€)	13.184	13.136	14.092
Service Units (in .000)	54,1	56,7	53,4
DUC in real terms (in €/TSU)	243,9	231,7	263,8

The *previous Table 9* gives the total costs, actuals, and Determined Costs (DC) in real terms at 2017 price level, the actual and forecasted SU s and the actual and Determined Unit Cost (DUC) in real terms.

Investments
– ATM/ANS & Aerodrome Services

In 2023, ANA continued to **prioritize investments** aimed at enhancing the provision of Air Traffic Management (ATM) and Air Navigation Services (ANS), as well as Aerodrome Infrastructure services at Luxembourg Airport. These investments targeted key areas such as Communication, Navigation, and Surveillance (CNS), Aeronautical Information, Meteorological Services, and critical aerodrome infrastructure upgrades.

However, the total amount of investments in 2023 (Capital Expenditure - CAPEX) for the entire ANA (ANSP, Aerodrome and non-aeronautical services) showed a significant reduction and was far lower than the amount foreseen in the revised Performance Plan. This was due to the urgent reorganization of the CNS unit and the procedural changes of the procurement process related to the transition of ANA to a traditional administration under the Luxembourg State rule.

Total Investments (k€) 2023 (2022)   **1.047** (3.033)

Table 10 - ATM/ANS and Aerodrome Investments in 2023

Department/Service - Project Title	Expense 2023 (€)
CNS - AMHS Upgrade	178.785
IT – Licences IP Fabric, Red Hat, Tenable	101.562
ELE - Implementation of the ILCMS	89.000
ELE – UPS System	69.178
CNS - EDST300 Tester/Analyzer	51.768
ELE – Cabling work	47.326
Sub-total project related expenses	**537.619**
Sub-total non-project related expenses	**503.689**
Grand Total	**1.041.308**

Table 10 provides an overview of the project-specific and non-project-related expenses incurred in 2023, reflecting ANA's commitment to modernization and operational excellence.

Table 11 - Annual & cumulative investment costs in the scope of the performance plan

	2022 Actuals	2023 Actuals
	RP3-Yaer 3 of 5	RP3-Yaer 4 of 5
Total ANSP investments (k€) actuals vs planned (for the year)	996 / 2.528	599/ 4.960
Total ANSP investments (k€) cumulated actuals vs planned (for the total 5 years of the RP)	5.813 / 14.340	6.412 / 14.340
% of CAPEX target achievement for the RP	41%	45%

The *previous Table 11* presents the CAPEX in the scope of the performance plan (ANSP part only), meaning that they can, according to the cost allocation principles in place, be allocated either to ER or to TNC.

09

REGULATORY & COMPLIANCE UPDATE 2023

Regulatory & Compliance Update 2023

In 2023, new European Union regulations and frameworks significantly impacted Air Navigation Service Providers (ANSPs), aiming to enhance safety, capacity, and environmental performance. ANA proactively adapted its strategies accordingly to ensure compliance and alignment with these developments.

RP4 Performance Targets

The European Commission's Decision (EU) 2023/2481 sets performance targets for 2025-2029 in safety, environment, capacity, and cost-efficiency.

Single European Sky (SES) Interoperability

New SES rules adopted in 2023 emphasize interoperability and digitalized data exchange between airborne and ground systems.

U-Space Regulation for Drones

The U-space regulation establishes a framework for drone operations in designated airspace.

Operational and Financial Adjustments

To meet regulatory requirements, ANA realigned its priorities:

1. **Technical Upgrades:**
   Improved radar coverage, weather systems, and communication tools.

2. **Safety & Compliance:**
   Adopted new safety management tools and bolstered cybersecurity.

3. **Environmental Goals:**
   Progressing toward net-zero emissions by 2050 through innovation and efficiency.

SES ATM/ANS Interoperability Framework

New SES regulations outline certification and operational requirements for ATM/ANS systems:

Looking Ahead

These updates will guide ANA's strategic priorities, with investments in compliance and innovation ensuring its continued role as a regional leader in air navigation services.

10

GOVERNANCE & COMPLIANCE:

Governance and Compliance:
Strengthening Oversight & Standards in ANSP Operations

Oversight and Audits

In 2023, ANA resolved key non-conformities identified during external audits, particularly in aviation safety and contingency planning. The collaboration with the Directorate of Civil Aviation (DAC) led to enhanced compliance, introducing effective supervision of subcontracted activities and strengthening change management practices to improve operational resilience.

Internal Audits & Continuous Improvement

Comprehensive internal audits targeted critical operations, fostering continuous improvement, quality enhancement, and regulatory compliance. These audits ensure corrective actions are effectively implemented, preparing ANA for evolving regulatory demands and reinforcing safety and operational excellence.

Supplier Oversight

The introduction of a new subcontractor supervision process ensures alignment with ANA's rigorous safety and quality standards, improving oversight of external operations.

ISO and EMAS Certifications

In 2023, ANA renewed its ISO 9001, ISO 14001, and EMAS certifications, reaffirming commitments to quality, environmental management, and sustainability. These achievements highlight ANA's dedication to operational excellence and alignment with global standards and stakeholder expectations.

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11

COSTUMER SATISFACTION
& STAKEHOLDER ENGAGEMENT

Customer Satisfaction & Stakeholder Engagement

FABEC User Consultation and Stakeholder Engagement 2023

In 2023, ANA continued its commitment to **engaging with key stakeholders and understanding user needs to enhance service delivery**. A significant aspect of this effort was the **FABEC User Consultation,** which gathered **feedback from 29 airlines** representing various carrier types, including major, low-cost, cargo, and business aviation. Airlines were contacted through multiple channels, such as IATA, CM AOG, VFE WS, NM AOG, and direct outreach, resulting in a 42% response rate. The survey aimed to assess user satisfaction and identify areas for improvement across four main topics: **general satisfaction, information flow, improved flight planning, and long-term priorities**.
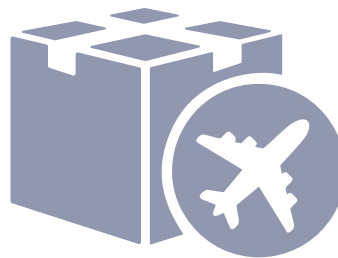
Key Findings from the FABEC User Consultation

The survey findings provided valuable insights into areas of strength and opportunities for improvement:

- **Safety** was a standout area, with 80% of airlines indicating they were either very satisfied or satisfied. This reflects the high priority placed on safety by ANA and the broader FABEC community.

- **Capacity** emerged as a challenge, with 40% of respondents expressing dissatisfaction. This feedback underscores the need to address capacity constraints and enhance operational flexibility.

- **Communication** received favorable feedback, with 65% of participants satisfied with the flow of information. This demonstrates ANA's efforts to maintain open lines of communication and transparency with its users.

- **Cost Effectiveness** elicited mixed responses: 41% of airlines were neutral, 28% satisfied, and 24% dissatisfied. These results highlight the ongoing need for a balanced approach in managing costs while delivering safe services with high quality.

- **Efficiency** showed room for improvement, as only 28% of respondents were satisfied, while 31% remained neutral. The findings suggest a focus on optimizing procedures and flight planning to better serve airline needs wherever possible.

Stakeholder Engagement in 2023 & Proactive Coordination

In 2023, ANA prioritized **proactive collaboration with its national and international stakeholders**, ensuring alignment with strategic objectives and regulatory requirements. By fostering strong partnerships and maintaining open communication, ANA reinforced its commitment to transparency and operational excellence.

National Coordination

ANA worked closely with the Ministry of Transport to align its strategic initiatives, operational changes, and financial planning with national policy goals. Regular consultations ensured that decisions were well-informed and reflected shared priorities.

Collaboration with airlines and lux-Airport remained central to ANA's stakeholder strategy. The Annual Airport User Committee (AUC) served as a key platform for transparent discussions on financial performance and Terminal Navigation Charges (TNC). During the 2023 AUC, ANA presented the 2022 financial outcomes and provided insights into the cost structure and unit rate calculations for 2023.

International Representation

ANA actively engaged in major international aviation forums, including:

- **Functional Airspace Block Europe Central (FABEC)**
- **EUROCONTROL**
- **Civil Air Navigation Services Organization (CANSO)**
- **International Civil Aviation Organization (ICAO)**
- **Maastricht Upper Area Control Centre (MUAC)**

Through participation in working groups, committees, and workshops, ANA contributed to advancing air navigation services and supporting Luxembourg's regulatory objectives. Virtual meetings allowed ANA to expand its presence and enhance its influence across these international initiatives.

Commitment to Transparency

ANA's stakeholder engagement approach emphasized **clear communication and collaboration**. By integrating stakeholder input into its operational strategies, ANA demonstrated its commitment to addressing shared challenges and advancing common goals.

This comprehensive engagement strategy highlights ANA's role as a proactive partner in air navigation, ensuring alignment with both national and international priorities.

12

FINANCIAL RESULTS

Financial Results

In 2023, ANA transitioned from being a separately managed administration service to **a traditional administrative structure**. This change significantly impacted ANA's processes, controls, and decision-making procedures. Previously, ANA received an annual lump sum from the State and maintained its own liquidity, allowing for more flexible spending as needs arose. Independent audits were conducted biannually in retrospect.

With the new structure in 2023, ANA's budget is now assigned to specific State budget accounts, meaning funds are strictly categorized and can only be used for the designated types of expenses. Additionally, every transaction must now be submitted to the financial controller for prior approval. As a result, ANA has faced a notable decrease in operational flexibility and a longer procurement process since this transition.

Financial Evolution & Support

The Luxembourg State continued to cover the costs associated with ATM investments, ensuring that depreciation expenses for these investments were not passed on to airspace users. This resulted in savings of approximately 1.7 million euros in terminal costs and around 1.2 million euros in En-route ANS provision in 2023.

The year 2023 saw a continued increase in revenues as the recovery from the COVID pandemic progressed. En-route service units grew by more than 16.7%, while terminal activity experienced a slight decline of 1.2%. Despite the decrease in terminal activity, the higher terminal unit rate led to an overall increase in total fees charged for both En-route and Terminal Navigation Charges (TNC), rising from 19.1 million euros in 2022 to 22.9 million euros in 2023.

2023
Results

The 2023 accounts provide a consolidated overview of ANA's financial position. Currently under audit, these accounts have presented some complex questions due to ANA's transition from a separately managed administrative service to a traditional administrative structure. Once approved, the finalized accounts will be available on the ANA website under the 'Publications' section.

Abbreviation	Meaning
A-SMGCS	Advanced Surface Movement Guidance and Control System – Ground radar system to manage and control airport surface traffic, enhancing safety and efficiency.
ACAS RA	Airborne Collision Avoidance System - Resolution Advisory – A system providing pilots with alerts to prevent mid-air collisions
ACC	Area Control Centre – Facility that manages en-route air traffic within a defined area.
AIM	Aeronautical Information Management – The management and distribution of aeronautical data essential for safe flight operations.
AIP	Aeronautical Information Publication – Official publication providing comprehensive information on aviation facilities, services, and regulations.
ALCMS	Airport Lighting, Controlling, and Monitoring System – System used to control and monitor airfield ground lighting.
ANSP	Air Navigation Service Provider – An organization responsible for providing air navigation services to manage air traffic.
ATC	Air Traffic Control – A service provided to manage the safe and efficient flow of aircraft within controlled airspace and at airports.
ATFM	Air Traffic Flow Management – A process to optimize air traffic flow and avoid congestion.
ATM	Air Traffic Management – The system for ensuring safe, efficient, and environmentally responsible air traffic operations.
ATM/ANS	Air Traffic Management / Air Navigation Services – Essential services ensuring the safe and efficient flow of air traffic.
CAPEX	Capital Expenditure – Funds used by organizations to acquire or upgrade physical assets like infrastructure.
CDO	Continuous Descent Operations – A procedure to reduce fuel consumption and noise by allowing aircraft to descend continuously at a more efficient rate.
CNS	Communication Navigation Surveillance – Essential services for air traffic control, enabling communication with and tracking of aircraft.
EOSM	Effectiveness of Safety Management – A metric assessing the maturity and effectiveness of safety management systems in organizations.
EUROCONTROL	European Organization for the Safety of Air Navigation – An intergovernmental organization that manages and coordinates air traffic across European airspace.
FABEC	Functional Airspace Block Europe Central – A collaboration among ANSPs in central Europe to optimize airspace usage.
IATA	International Air Transport Association – A global trade association representing airlines worldwide.

Abbreviation	Meaning
KPA	Key Performance Area – High-level performance categories such as safety, capacity, and environmental impact, used in evaluating air navigation services.
KPI	Key Performance Indicator – A measurable value indicating how effectively an organization achieves key objectives.
MUAC	Maastricht Upper Area Control – A Eurocontrol-managed air traffic control center covering high-level airspace for Belgium, Luxembourg, the Netherlands, and northwest Germany.
NewPENS	New Pan-European Network Service – An ultra-resilient, IP-based infrastructure spearheaded by EUROCONTROL, designed to securely and efficiently exchange critical aeronautical information among aviation stakeholders across Europe.
NFZ	No-Fly Zone – Designated airspace where aircraft operations are prohibited, often for security or safety reasons.
RP3	Reference Period 3 – A performance planning period under the EU's Single European Sky initiative, focusing on targets related to safety, capacity, and cost-efficiency.
SES	Single European Sky – An initiative to streamline European air traffic management and improve the overall efficiency of air navigation services.
SESAR	Single European Sky ATM Research – A research initiative to modernize and integrate European ATM infrastructure.
SMI	Separation Minima Infringement – A breach of the minimum safe distance between aircraft, potentially compromising safety.
SWIM	System Wide Information Management – A framework for seamless information sharing across ATM systems, a foundational requirement for SESAR implementation.
TMA	Terminal Area – Airspace surrounding an airport, where arriving and departing flights are managed.
TNC	Terminal Navigation Charges – Fees charged to cover air navigation services provided in terminal areas.

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