skeyes nice to guide you

Runway Performance Report **2024**

BRUSSELS SOUTH CHARLEROI AIRPORT

skeyes / tervuursesteenweg 303 / b-1820 Steenokkerzeel
T +32 2 206 21 11 / F +32 2 206 22 88
Member of FABEC

www.skeyes.be

Runway performance report

Brussels South Charleroi Airport

EXECUTIVE SUMMARY

The world-wide aviation sector continues its recovery and Brussels South Charleroi Airport continues increasing its traffic, reaching a 109% of 2019 traffic in 2024.

This report gives an overview of the Air Traffic Management (ATM) performance at Brussels South Charleroi Airport. ATM Performance is driven by four Key Performance Areas (KPAs): safety, capacity, environment, and cost-efficiency. This report focuses on skeyes' operations at Brussels South Charleroi Airport (International Civil Aviation Organization – ICAO code: EBCI). Its aim is to provide our main stakeholders with traffic figures for 2024 and relevant data on the performance of our operations at Brussels South Charleroi Airport, namely on three of the four KPA's: safety, capacity and punctuality and environment.

Traffic

Traffic in Brussels South Charleroi Airport surpassed 2019 levels in 2022 and traffic continued to increase in 2023 and 2024. skeyes controlled 91,681 movements at Brussels South Charleroi Airport in 2024, an increase of 4% compared to 2023. Especially January (+32%) and February (+29%) registered the highest increase compared to 2023.

The daily traffic pattern is showing similar trends in 2024 as in the previous year: less pronounced peaks and a more uniform distribution of traffic throughout the day. The busy periods of 07:00 and 22:00 (local time) are still there, but with a lower peak, followed/preceded by a more continuous and steady increase/decrease of traffic during the morning/evening. Similar to previous years, runway 24 is the most used runway. The typical north-east winds in April and May were less present, allowing higher use of runway (RWY) 24.

Looking at the market distribution, the main market segment operating in Brussels South Charleroi Airport is Low-Cost. More specifically Ryanair is the main airline operating in Charleroi Airport with 52,928 movements in 2024, 79% of all IFR traffic operating at Brussels South Charleroi Airport.

Safety

Safety is a crucial pillar in air traffic control. As such, safety occurrences and missed approaches are followed up by skeyes' safety unit who analyses the situations, trends and, when relevant, investigates.

The number of missed approaches, a procedure used when the approach cannot be continued for a safe landing, and particularly their cause can indicate which measures are to be taken to improve the safety of air navigation service provision. In 2024, there were 111 missed approaches, an increase of 39% compared to 2023, having an increase in the number of arrivals of 4%. Unstable approach and weather (thunderstorm – windshear) were the leading reasons, accounting for 66% of the missed approaches in 2024.

For safety occurrences, the report shows that there were nine runway incursions in Brussels South Charleroi Airport in 2024, one endorsed with severity 'C-Significant incident' and direct ATM contribution, four classified as a severity 'E – No safety effect' and four classifieds as having no ATM ground contribution. Five taxiway/apron events were reported in 2024. These occurrences are discussed within the Local Runway Safety Team (LRST) to ensure all stakeholders are informed and can collaboratively discuss possible actions.

Currently, there is a working group focused on reducing Runway Incursions. There has been an agreement to implement the use of the stop bars 24H. Also, The Advanced-Surface Movements Guidance and Control System (A-SMGCS) at Charleroi Airport became operational in 2022 and the operational validation for its safety nets started in 2023 and successfully ended in mid-December 2024.

Capacity and Punctuality

Brussels South Charleroi Airport has a declared capacity for the used runway configurations. This capacity is based on a theoretical throughput capacity following certain assumptions and rules. In this report, the declared IFR capacity is given together with a view on the effectively used capacity. In 2024, the declared capacity was exceeded on 14 days, during which times at least 66% of the traffic was VFR. For VFR traffic the IFR separation rules do not apply. Between May and September there were VFR restrictions in place to reduce the complexity due to IFR-VFR mix and allowing an increase of IFR traffic between +16% and +10% in that period compared to 2023.

Since 2015 skeyes is subject to an annual target regarding ATFM arrival delay, delay of a flight caused by a regulation attributable to the terminal and air navigation services of the destination airport. Brussels South Charleroi Airport is not considered as a contributor airport to this target. In 2024, Brussels South Charleroi Airport registered 611 minutes of ATFM arrival delay, due to 'G-Aerodrome Capacity' (RWY works) and 'O-Other' (hole on the RWY).

Environment

A preferential runway system (PRS) is in place at Brussels South Charleroi Airport and defines runway 24 as the preferred runway to use, when the necessary conditions are met. The PRS was followed for 88% of the time, showing an increase in use of RWY 24 due to less north-east winds in 2024. A view is given on the wind direction and speed, the main factor that influences the selection of the runway in use.

The chapter continues with statistics on the continuous descent operations (CDO). The rate of CDO Fuel (flying a CDO from FL100) and CDO Noise (flying a CDO from FL60) is steady in the last years. The 'average level-off time below certain altitude' (10,000 ft, 6,000 ft and 3,000 ft) shows that the average level—off time increased during the months with more north-east winds.

In addition, skeyes keeps on promoting the increased use of performance-based navigation (PBN) procedures and is currently working on the optimisation of the PBN environment at Brussels South Charleroi Airport. Such approach procedures fit in the on-going transition towards a PBN Environment (EU regulation), and greatly improve predictability for the flight crews such that CDO performance can be improved. As a result of skeyes efforts towards a more sustainable aviation, skeyes renewed the GreenATM level 3 accreditation in 2024.

Brussels South Charleroi Airport normally operates from 06:30 to 23:00 local time. Due to late arrivals, the airport had to extend the opening hours on 347 days. Despite the increase on traffic, the night traffic in 2024 decreased by two movements compared to 2023 and by 26% compared to 2022.

SYNOPSIS

Le secteur de l'aviation connaît dans le monde entier une reprise rapide et il en va de même à l'aéroport de Charleroi Bruxelles-Sud, qui a atteint en 2023 107% du trafic de 2019. Ce rapport donne un récapitulatif des performances de la gestion du trafic aérien (Air Traffic Management (ATM) Performance) à l'aéroport de Charleroi. Les performances ATM reposent sur quatre domaines de performance clés (KPA, Key Performance Areas) : la sécurité, la capacité, l'environnement et l'efficacité économique. Ce rapport se focalise sur les opérations de skeyes à l'aéroport de Charleroi (code de l'Organisation de l'Aviation civile internationale (OACI) : EBCI). Son objectif est de fournir aux principaux stakeholders les chiffres du trafic pour 2023 et des données pertinentes sur la performance des opérations à l'aéroport de Charleroi, à savoir pour trois des quatre KPA : la sécurité, la capacité et l'environnement.

Trafic

Le trafic à l'aéroport de Charleroi Bruxelles-Sud a dépassé les niveaux de 2019 en 2022 et le trafic a continué à augmenter en 2023 et 2024. skeyes a contrôlé 91.681 mouvements à l'aéroport de Charleroi en 2024, soit une augmentation de 4% comparé à 2023 Ce sont surtout les mois de janvier (+32%) et février (+29%) qui ont enregistré la plus forte augmentation par rapport à 2023.

Les modèles du trafic quotidiens sont en 2024 similaires à ceux de l'année précédente : des pics moins prononcés et une répartition plus uniforme du trafic tout au long de la journée. Les périodes chargées de 7h et de 22h (heures locales) existent toujours, mais avec un pic plus bas, suivi/précédé d'une augmentation/diminution plus continue et régulière du trafic durant la matinée/soirée. Comme les années précédentes, la piste 24 est la plus utilisée. Les vents du nord-est typiques d'avril et de mai étaient moins présents, permettant une plus grande utilisation de la piste 24.

En analysant la répartition du marché, le segment de marché principal opérant à l'aéroport de Charleroi est le low-cost. Plus précisément, Ryanair est la principale compagnie aérienne opérant à Charleroi Airport avec 52.928 mouvements en 2024, soit 79% de l'ensemble du trafic IFR opérant à l'aéroport de Charleroi.

Sécurité

La sécurité est un pilier essentiel du contrôle aérien. C'est pourquoi les événements de sécurité et les approches interrompues font l'objet d'un suivi par la Safety Unit de skeyes, qui analyse les situations, les tendances et, le cas échéant, mène des enquêtes.

Le nombre d'approches interrompues, une procédure utilisée lorsque l'approche ne peut être poursuivie pour effectuer un atterrissage en toute sécurité, et en particulier leur cause, peuvent indiquer les mesures à prendre pour améliorer la sécurité de la fourniture des services de navigation aérienne. En 2024, il y a eu 111 approches interrompues, une augmentation de 39% par rapport à 2023, avec une augmentation du nombre d'arrivées de 4%. Une approche instable et les conditions météorologiques (des orages – des cisaillements de vent) en ont été les raisons principales, soit pour 66% des approches interrompues en 2024.

Pour ce qui a trait aux événements liés à la sécurité, le rapport indique qu'il y a eu neuf incursions de piste à l'aéroport de Charleroi en 2024, une portant la gravité 'C-Significant incident' et avec une implication directe de l'ATM, quatre classées dans la gravité 'E-No safty effect' et quatre classées comme n'étant pas imputables à l'ATM au sol. Cinq incursions sur une voie de circulation /aire de trafic ont été signalées en 2024. Ces événements font l'objet d'une discussion au sein de la Local Runway Safety Team (LRST) dans le but de sensibiliser tous les stakeholders et de discuter des actions possibles.

Actuellement, un groupe de travail tente de réduire le nombre d'incursions de piste. Un accord a été conclu afin d'implémenter l'utilisation des barres d'arrêt 24h/24. Aussi, l'Advanced-Surface Movements Guidance and Control System (A-SMGCS) à l'aéroport de Charleroi est opérationnel depuis 2022 et la validation opérationnelle de ses filets de sécurité a débuté en 2023 et s'est achevée avec succès mi-décembre 2024.

Capacité et ponctualité

L'aéroport de Charleroi Bruxelles-Sud dispose d'une capacité déclarée pour les configurations de pistes utilisées. Cette capacité repose sur une capacité de débit théorique suivant certaines hypothèses et règles. Le présent rapport comporte la capacité IFR déclarée ainsi qu'un aperçu de la capacité effectivement utilisée. En 2024, la capacité déclarée a été dépassée pendant 14 jours, au cours desquels au moins 66% du trafic était de type VFR. Pour le trafic de type VFR, les règles de séparation du trafic IFR ne s'appliquent pas. Entre mai et septembre, des restrictions VFR ont été mises en place afin de réduire la complexité entraînée par la combinaison IFR-VFR et permettant ainsi une augmentation du trafic IFR entre +16% et +10% au cours de cette période par rapport à 2023.

Depuis 2015, skeyes est soumise à un objectif annuel concernant le retard ATFM à l'arrivée, c'est-à-dire le retard d'un vol causé par une régulation imputable aux services terminaux et de navigation aérienne de l'aéroport de destination. L'aéroport de Charleroi n'est pas considéré comme un aéroport contributeur pour cet objectif. En 2024, l'aéroport de Charleroi a enregistré 611 minutes de retard ATFM à l'arrivée, en raison d'une mesure G 'Aerodrome Capacity' (travaux sur la piste) et 'O-Other' (trou sur la piste).

Environnement

Un système de pistes préférentielles (PRS, Preferential Runway System) est en place à l'aéroport de Charleroi et définit la piste 24 comme préférentielle, lorsque les conditions requises sont réunies. Le PRS a été suivi pendant 88% du temps, soit une augmentation de l'utilisation de la piste 24 parce qu'il y a eu moins de vent du nord-est en 2024. Un aperçu est présenté sur la direction et la vitesse du vent, le facteur principal qui influence la piste sélectionnée.

Le chapitre se poursuit par des statistiques sur les Continuous Descent Operations (CDO). Le taux de CDO Fuel (vols CDO à partir du niveau de vol 100) et de CDO Noise (vols CDO à partir du niveau de vol 60) est resté stable ces dernières années. Le 'temps moyen de mise en palier en dessous d'une certaine altitude' (10.000 pieds, 6.000 pieds et 3.000 pieds) indique qu'un temps moyen de mise en palier supérieur a été constaté lors des mois où il y avait plus de vents du nord-est.

En outre, skeyes continue d'encourager l'utilisation accrue des procédures PBN (Performance Based Navigation) et travaille actuellement sur l'optimisation de l'environnement PBN à l'aéroport de Charleroi. Ces procédures d'approche s'inscrivent dans la transition en cours vers un environnement PBN (réglementation de l'UE) et améliorent considérablement la prévisibilité pour les équipages, ce qui permet d'améliorer la performance des CDO. Grâce aux efforts de skeyes en faveur d'une aviation plus durable, skeyes a renouvelé l'accréditation GreenATM de niveau 3 en 2024.

L'aéroport de Charleroi est normalement ouvert de 6h30 à 23h, heures locales. En raison d'arrivées tardives, l'aéroport a dû prolonger ses heures d'ouverture pendant 347 jours. Malgré l'augmentation du trafic, le trafic de nuit en 2024 a diminué de deux mouvements par rapport à 2023 et de 26% par rapport à 2022.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

GLOSSARY

AIP:	Aeronautical Information Publication
AMC:	Acceptable Means of Compliance
AMS:	Airport Movement System
ANSP:	Air Navigation Service Provider
A-SMGCS:	Advanced-Surface Movement Guidance and Control System
ATC:	Air Traffic Control
ATCO:	Air Traffic Control Officer
ATFM:	Air Traffic Flow Management
ATM:	Air Traffic Management
BCAA:	Belgian Civil Aviation Authority
BVLOS	Beyond Visual Line of Sight
CAA:	Civil Aviation Authority
CANSO	Civil Air Navigation Services Organisation
CCO:	Continuous Climb Operations
CDO:	Continuous Descent Operations
CISP:	Common Information Service Provider
COVID-19:	Coronavirus Disease 2019
CRSTMP:	C-Capacity, R-Routeing, S-Staffing, T-Equipment, M-Airspace Management, P-Special Event
CTR:	Control Zone
DEP:	Departure
DSA:	Drone Service Application
EASA:	European Union Safety Agency
EBCI:	Brussels South Charleroi ICAO Code
FABEC:	Functional Airspace Block Europe Central
ICAO:	International Civil Aviation Organization
IFR:	Instrument Flight Rules
ILS:	Instrument Landing System
LRST:	Local Runway Safety Team
NM:	Network Manager
PBN:	Performance Based Navigation
RAT:	Risk Analysis Tool
RNP:	Required Navigation Performance
RWY:	Runway
RYR	Ryanair
PRS:	Preferential Runway System
UAS:	Unmanned Aircraft System
VLOS	Visual Line of Sight
VFR:	Visual Flight Rules
WMT	Wizz Air Malta
Wx:	Weather
WZZ	Wizz Air

1 TRAFFIC

- **Traffic Overview**
- **Traffic Patterns**
- **Runway Use**
- **Market Contributions**
- **Drone Activities**

In this chapter, traffic at Brussels South Charleroi Airport (International Civil Aviation Organization (ICAO) code: EBCI) is presented as recorded by the Airport Movement System (AMS). The AMS is an in-house developed tower air traffic control (ATC) system and records the movements at an aerodrome and within its Control Zone (CTR). The movements are defined as an aircraft either crossing the CTR, landing or taking off at the aerodrome.

The figures presented throughout the report consider a movement as a take-off or landing of all traffic (flights under Visual Flight Rules (VFR) and Instrumental Flight Rules (IFR), helicopters and airplanes, commercial, military or general aviation). As this report considers runway performance, movements such as crossings of CTRs are not considered. As per BCAA's (Belgian Civil Aviation Authority) aerodrome movement definition:

- **one take-off = one movement**
- **one landing = one movement**
- **one touch-and-go = two movements**

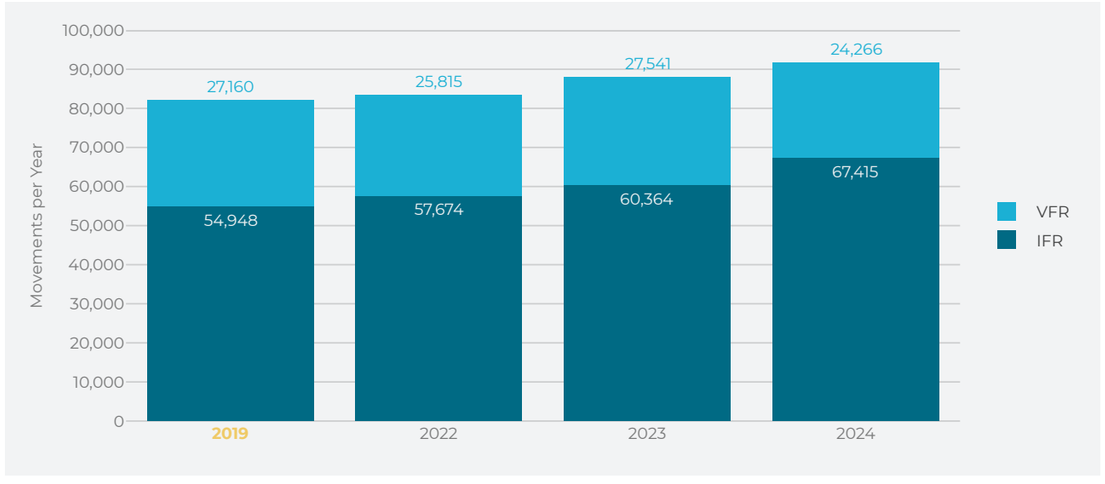
Traffic Overview

Traffic at Brussels South Charleroi Airport already surpassed 2019 traffic numbers in 2022 (increase of 2%), in 2023 the trend continued, reaching 7% more traffic than in 2019. In 2024 traffic has continued growing, reaching an increase of 9% compared to 2019 traffic. The number of aircraft movements for 2019 and the last three years are as follows:

2019:	**82,108 movements**	(54,948 IFR, 27,160 VFR)
2022:	**83,489 movements**	(57,674 IFR; 25,815 VFR)
2023:	**87,905 movements**	(60,364 IFR; 27,541 VFR)
2024:	**91,681 movements**	(67,415 IFR; 24,266 VFR)

Figure 1.1 shows the traffic at Brussels South Charleroi Airport on 2019 and during the last three years. Over these years, COVID-19 has been the event with the biggest impact on traffic, from which Charleroi Airport has already recovered. The forecast by the network manager EUROCONTROL foresees traffic in Europe return to pre-pandemic levels in 2025 but with notable local variation. This reflects the 2024 outturn, an improved economic outlook and optimistic airline schedules for winter 2024-2025.[1]

Figure 1.1: *Historical traffic overview*



1. EUROCONTROL forecast update 2024-2030
www.eurocontrol.int/sites/default/files/2024-10/eurocontrol-seven-year-forecast-2024-2030-october-2024.pdf
(URL retrieved on 24/01/2025)

Figure 1.2: *Monthly total movements per year*

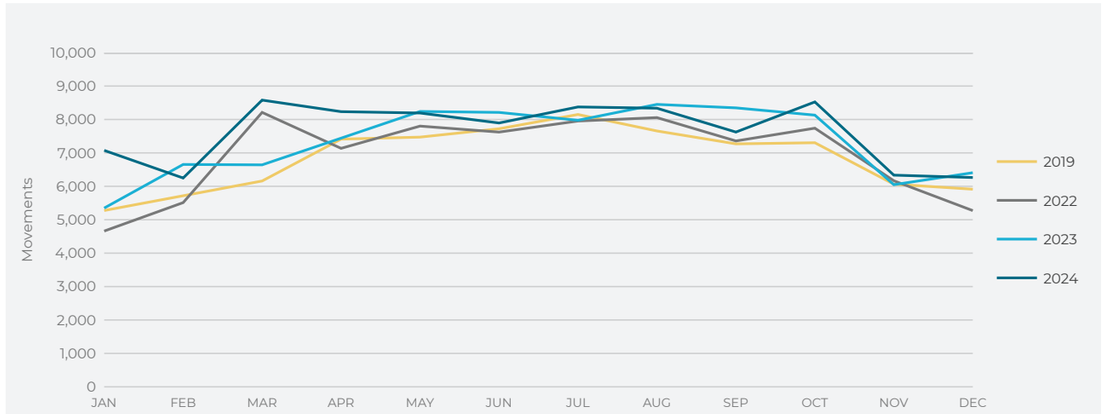


Figure 1.3: *Monthly IFR and VFR movements per year*

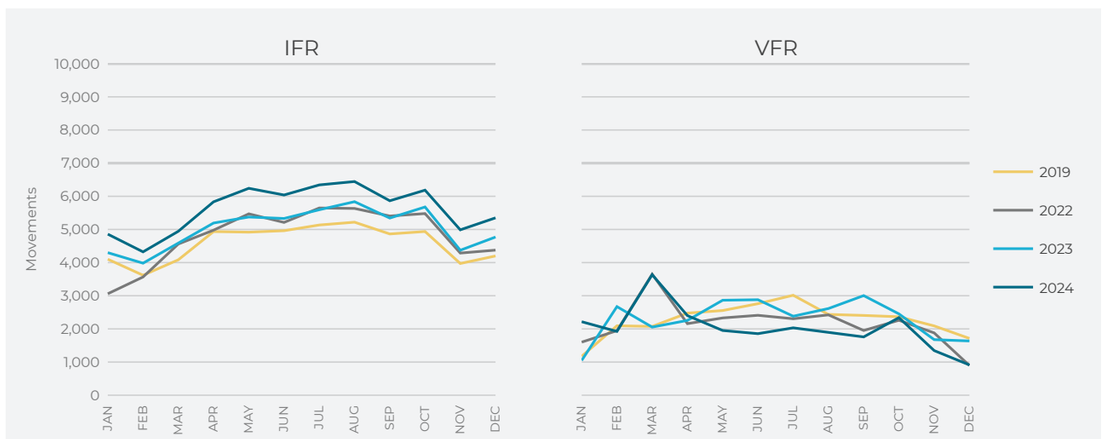


Figure 1.2 provides information about the monthly evolution of the traffic (total movements) at Brussels South Charleroi Airport for 2019, 2022, 2023 and 2024. ***Figure 1.3*** shows the movements split between Instrumental Flight Rules (IFR) traffic and Visual Flight Rules (VFR) traffic.

In March 2022, by decision of the Belgian authorities, all restrictions related to Covid-19 were lifted starting the end of the emergency epidemic situation, also generating the highest peak of VFR traffic that year. The subsequent reopening of the borders had a significant impact on Charleroi airport, which experienced a high volume of flights from countries such as Morocco. These factors generated the highest peak of traffic in 2022 on March, with 8,212 movements.

In 2023, the traffic continued to grow resulting in the highest number of IFR (60,364) and total movements (87,905) for Charleroi airport in the last years. According to Charleroi Airport's Chairman of the board of directors and the CEO, this recovery was explained by the profile of the main airlines operating at Charleroi airport: Companies such as Ryanair, Wizz Air, Pegasus and Volotea had captured new market shares from traditional airlines.[2]

2024 ended with the highest levels of traffic of the years studied. The monthly IFR movements were between 18% and 27% higher compared to the same months in 2019 and between 8% and 16% compared to 2023. This resulted in the highest number of IFR (67,415) and total movements (91,681) for Charleroi airport in the last years. ***Table 1.1*** shows traffic figures per month and flight rule for 2019 and from 2022 to 2024, along with a comparison of 2024 versus 2023 and 2019.

The highest amount of monthly traffic in 2024 was recorded in March with 8,579 movements, being the month with the highest increase compared to 2023 (+29%) and 2019 (+39%). Previous years, the busiest months were allocated during the summer period: August in 2023 with 8,451 movements or July in 2019 with 8,149. This change is due to the restrictions imposed to limit VFR traffic between May and September, to reduce the traffic complexity and allow the IFR traffic demand during that period. The highest amount of IFR was recorded in August with 6,445 movements. On the other hand, comparing 2024 traffic with the previous year, January registered the biggest increase (+32%).

2. Brussels South Charleroi Airport 2022 Activity Report
https://www.brussels-charleroi-airport.com/sites/default/files/inline-files/BSCA_RA_DESIGN2022_EN-FINAL_0.pdf
(URL retrieved on 11/02/2024)

Table 1.1: *Monthly movements per flight rule per year*

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
IFR	**2019**	4,102	3,618	4,084	4,936	4,918	4,962	5,134	5,219	4,864	4,938	3,973	4,200	**54,948**
	2022	3,060	3,566	4,560	4,978	5,471	5,212	5,647	5,633	5,405	5,479	4,287	4,376	**57,674**
	2023	4,300	3,982	4,588	5,193	5,375	5,331	5,594	5,837	5,343	5,677	4,373	4,771	**60,364**
	2024	4,858	4,324	4,944	5,833	6,241	6,039	6,343	6,445	5,865	6,185	4,988	5,350	**67,415**
	2024 *vs* 2019	+18%	+20%	+21%	+18%	+27%	+22%	+24%	+23%	+21%	+25%	+26%	+27%	+23%
	2024 *vs* 2023	+13%	+9%	+8%	+12%	+16%	+13%	+13%	+10%	+10%	+9%	+14%	+12%	+12%
VFR	**2019**	1,174	2,094	2,075	2,476	2,554	2,760	3,015	2,437	2,406	2,366	2,090	1,713	**27,160**
	2022	1,601	1,946	3,652	2,158	2,331	2,410	2,306	2,423	1,952	2,260	1,879	897	**25,815**
	2023	1,049	2,672	2,054	2,256	2,865	2,880	2,382	2,614	3,004	2,453	1,676	1,636	**27,541**
	2024	2,217	1,924	3,635	2,401	1,952	1,856	2,032	1,892	1,758	2,340	1,346	913	**24,266**
	2024 *vs* 2019	+89%	-8%	+75%	-3%	-24%	-33%	-33%	-22%	-27%	-1%	-36%	-47%	-11%
	2024 *vs* 2023	+111%	-28%	+77%	+6%	-32%	-36%	-15%	-28%	-41%	-5%	-20%	-44%	-12%
Total	**2019**	5,276	5,712	6,159	7,412	7,472	7,722	8,149	7,656	7,270	7,304	6,063	5,913	**82,108**
	2022	4,661	5,512	8,212	7,136	7,802	7,622	7,953	8,056	7,357	7,739	6,166	5,273	**83,489**
	2023	5,349	6,654	6,642	7,449	8,240	8,211	7,976	8,451	8,347	8,130	6,049	6,407	**87,905**
	2024	7,075	6,248	8,579	8,234	8,193	7,895	8,375	8,337	7,623	8,525	6,334	6,263	**91,681**
	2024 *vs* 2019	+34%	+9%	+39%	+11%	+10%	+2%	+3%	+9%	+5%	+17%	+4%	+6%	+12%
	2024 *vs* 2023	+32%	-6%	+29%	+11%	0%	-4%	+5%	-1%	-9%	+5%	+5%	-2%	+4%

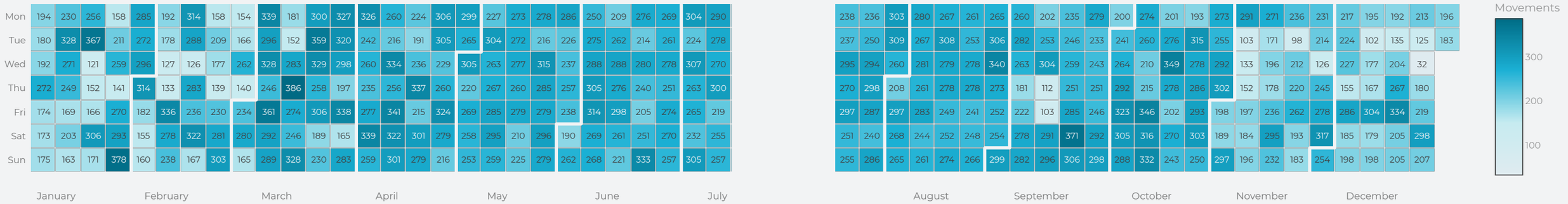


Figure 1.4: *Calendar view of movements per day in 2024*

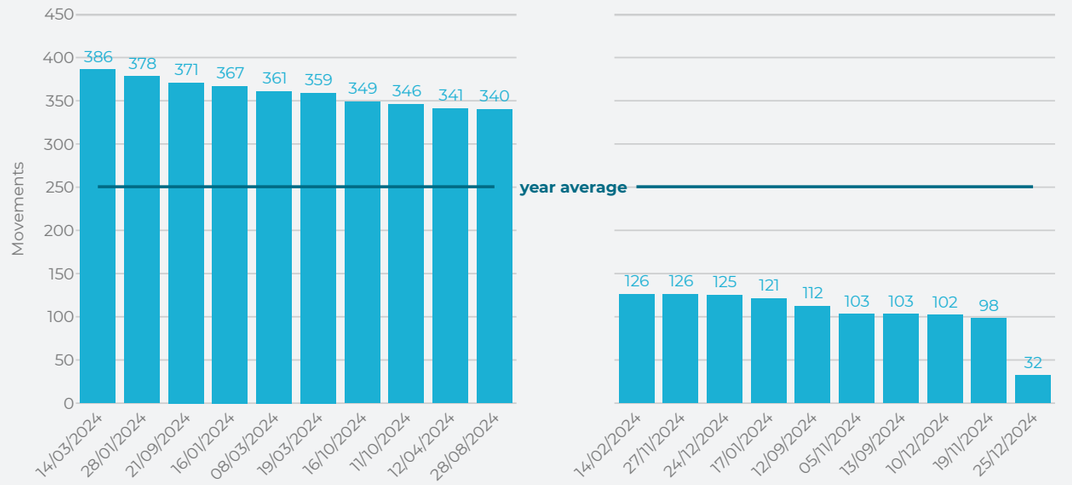
On average, there were 250 movements per day in 2024. ***Figure 1.5*** shows the top ten days with the highest traffic and the ten days with the lowest traffic. ***Figure 1.4*** shows a visualization of the movements per day in a calendar view.

The busiest period during 2024 was from March until October, despite the VFR restrictions in place between May and September. Eight of the top ten days of traffic (including the busiest day of the year with 386 movements) were outside the period of the VFR restrictions.

September was the month with less traffic, compared to the busy period around it. There were two days, the 12th and the 13th, when there was a strike at Charleroi Airport, resulting in being in the bottom ten days with less traffic in 2024. The rest of the bottom ten days of traffic took place during the winter period, where the one with the lowest traffic was the 25th of December (Christmas day).

On the 19th of July there was a global computer outage. This also generated some issues at the airport with a minimal impact on operations.

Figure 1.5: *Top ten and bottom ten days of traffic in 2024*



Traffic Patterns

The graph in ***Figure 1.6*** shows the average hourly movements throughout the day in local time (LT) for 2019 and over the period from 2022 to 2024. This figure illustrates a noticeable difference in the distribution of traffic over the day, reflecting the changes in air travel resulting from the COVID-19 pandemic. A change in the pattern can be seen with a more uniform distribution of traffic throughout the day. Comparing 2022, 2023 and 2024 to 2019, the morning peak followed by a big drop in traffic has almost disappeared, being replaced by a smaller drop with a more continuous and steady increase of traffic during the morning. Also, the evening decrease of traffic starts later in the day, with a last evening peak at 22:30 that has become flatter compared to 2019.

Figure 1.6: *Average hourly movements per year*

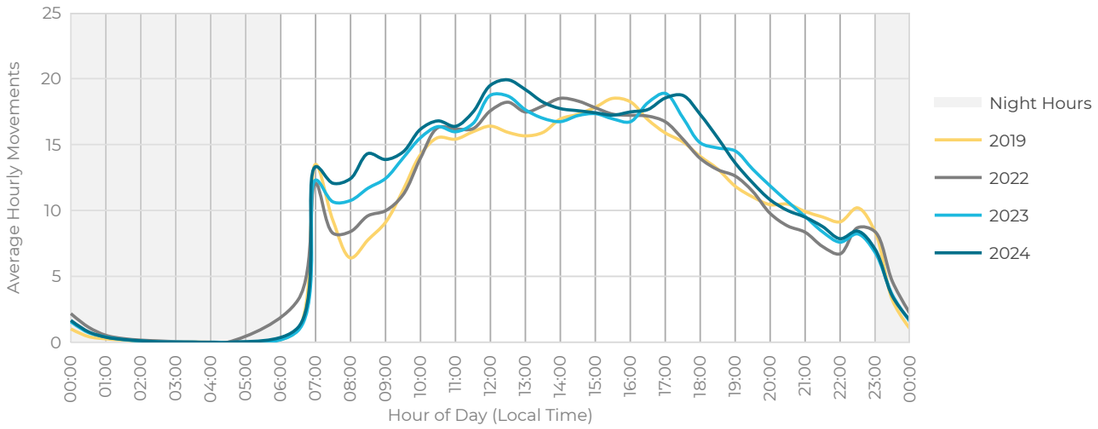


Figure 1.7 and ***Figure 1.8*** provide a yearly comparison for the period for 2019 and from 2022 to 2024 of the traffic patterns for IFR and VFR traffic, respectively. As already mentioned before, IFR traffic in 2024 was above 2019 traffic, and this is also clearly visible here. The drop in traffic after the morning peak has completely disappeared when looking at the IFR traffic. In addition, a new peak of IFR traffic has appeared on 2024 at 17:30.

Contrary to IFR traffic, VFR flights didn't have a morning and evening peak, as it was constantly busy between 10:00 and 17:00.

Figure 1.7: *Average hourly IFR movements per year*

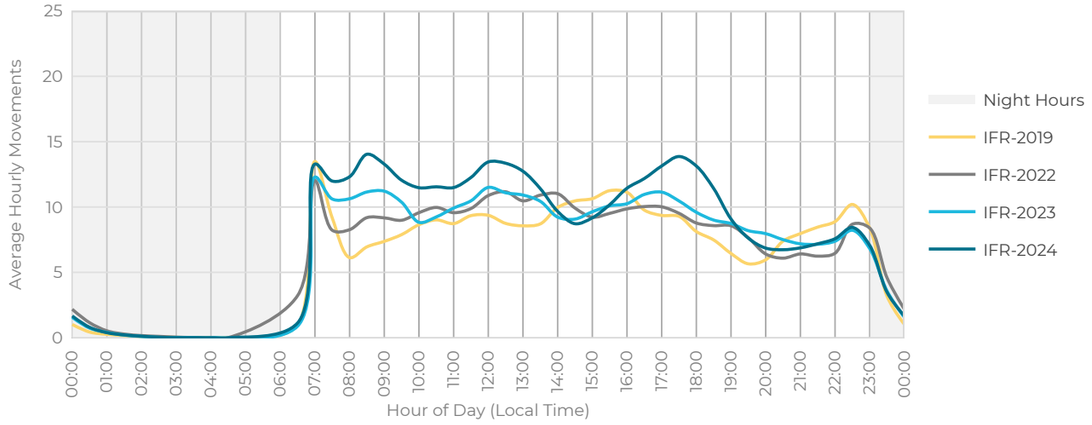
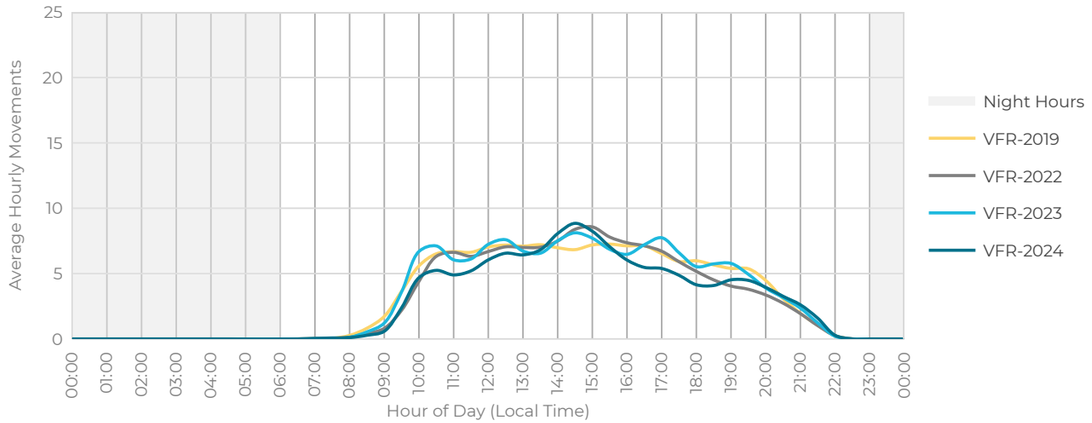


Figure 1.8: *Average hourly VFR movements per year*



Runway Use

The use of one runway configuration over another depends on several factors that have to be taken into account, such as meteorological conditions or runway equipment for example. In Brussels South Charleroi Airport, there is a preferential runway system to be used, as mentioned in the Aeronautical Information Publication (AIP). Runway 24 is the preferred runway for take-off and landing. Runway 24 is the preferred used runway at Brussels South Charleroi Airport due to the frequent wind blowing from a south-westerly direction. ***Figure 1.9*** shows the runway in Charleroi Airport as published in the Aerodrome Chart - ICAO in the eAIP.

Figure 1.9: *Aerodrome ground movement chart*

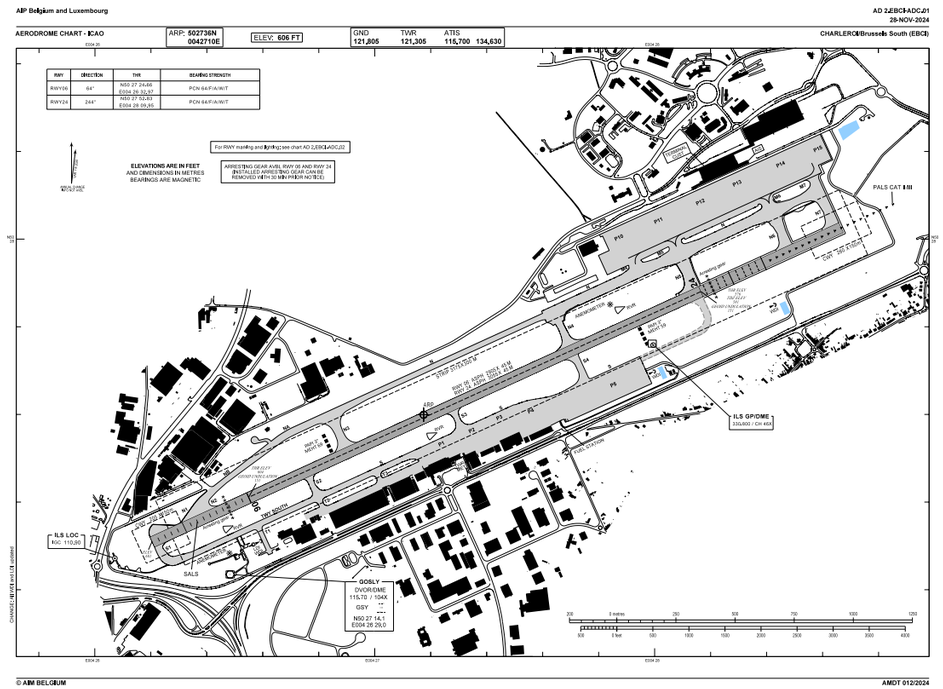
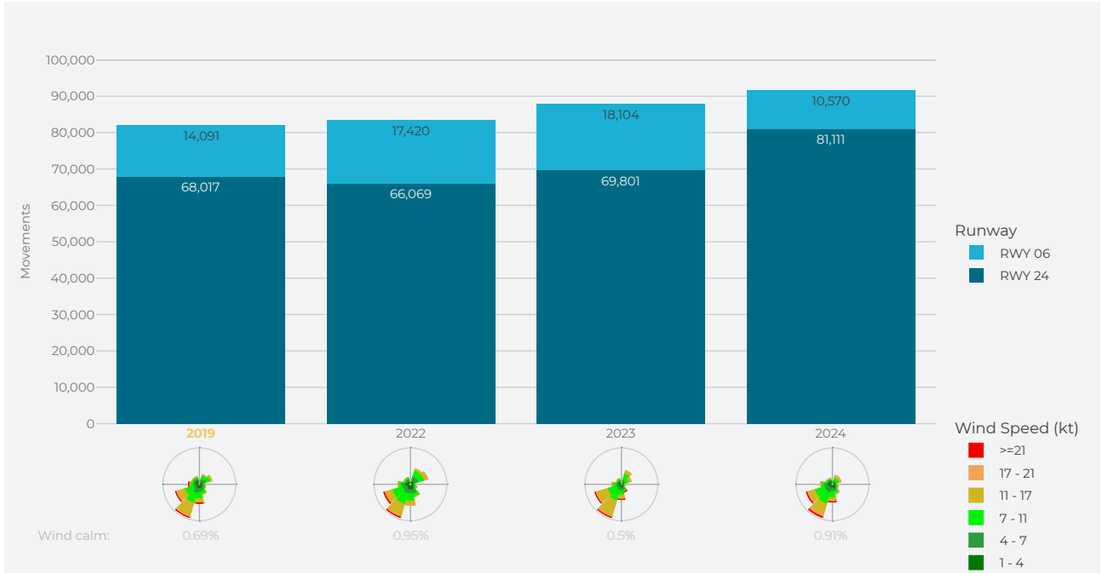


Figure 1.10 shows the runway used in Brussels South Charleroi Airport in 2019, 2022, 2023 and 2024. In 2024, runway 24 was used for 81,111 take-offs and landings. In the last years there was an increase of north-east winds over the years, generating a lower use of runway 24 in the last years. This is not the case for 2024, as it had fewer north-east winds.

Figure 1.11 shows the runway use per month in 2024 and ***Figure 1.12*** shows it for 2023. While runway 24 is the most used runway overall for both years, the period of April, May and June in 2023 shows a higher use of runway 06. This can be explained, as shown in the wind roses below the graph, by more north-east winds. The increase of wind blowing from the north-east in this period of the year is a yearly phenomenon that is seen in Brussels South Charleroi Airport and in other Belgian airports. More details about winds can be found in ***Figure 4.13*** and ***Figure 4.14*** in the fourth chapter of this report.

Figure 1.10: *Runway usage per year in movements*



In 2024, the typical winds coming from the north-east were less present. Some north-east winds can be observed in May and June, reducing the use of RWY 24 to 83% and 85% of the time during those months respectively. In January and September there were also some stronger winds blowing from the north-east, reducing the use of RWY 24 to 82% and 79% respectively.

Figure 1.11: *Runway usage per month in 2024 in share of movements*

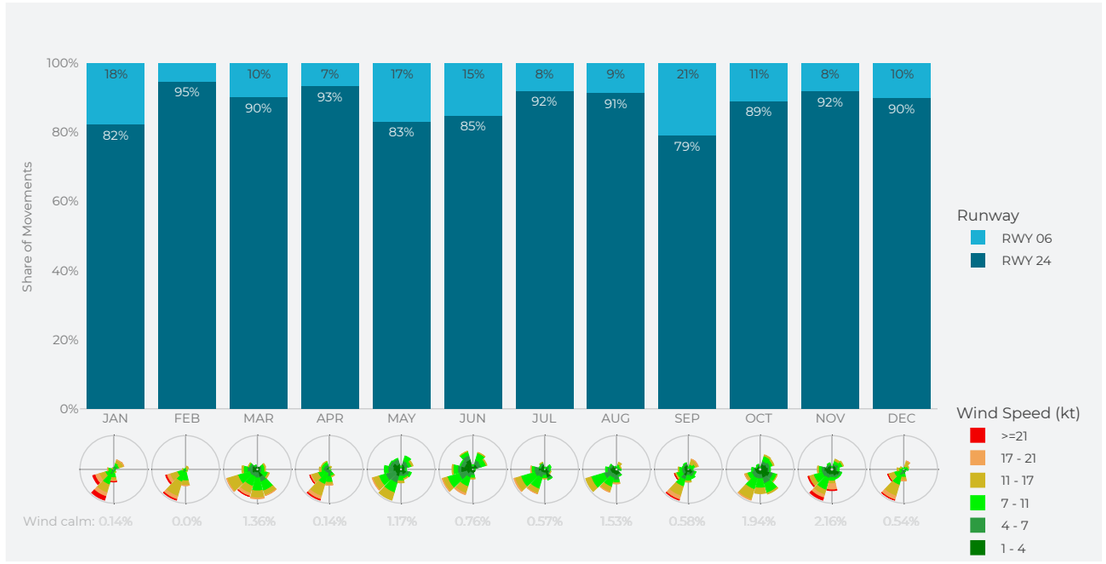
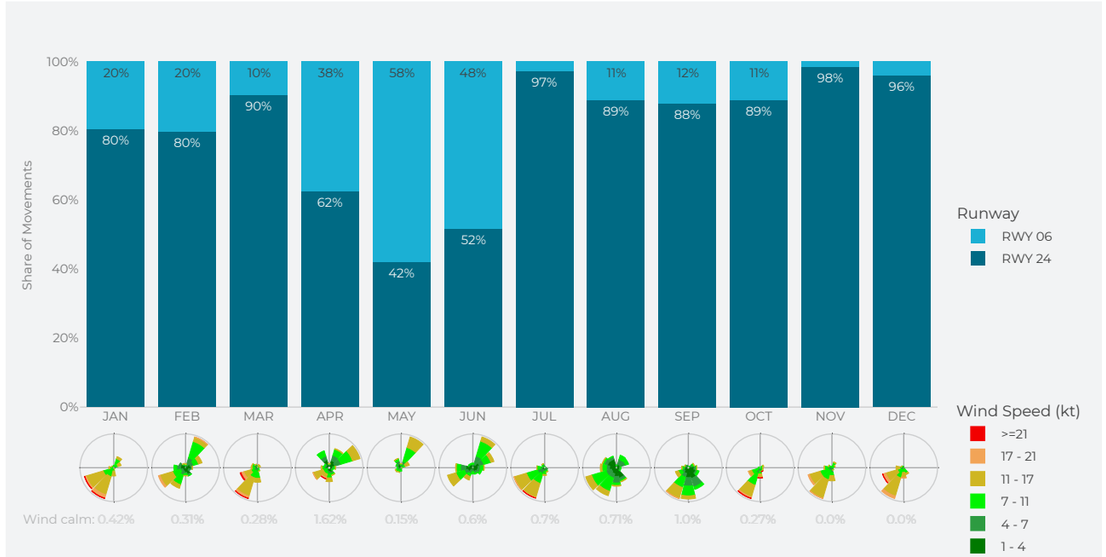


Figure 1.12: *Runway usage per month in 2023 in share of movements*

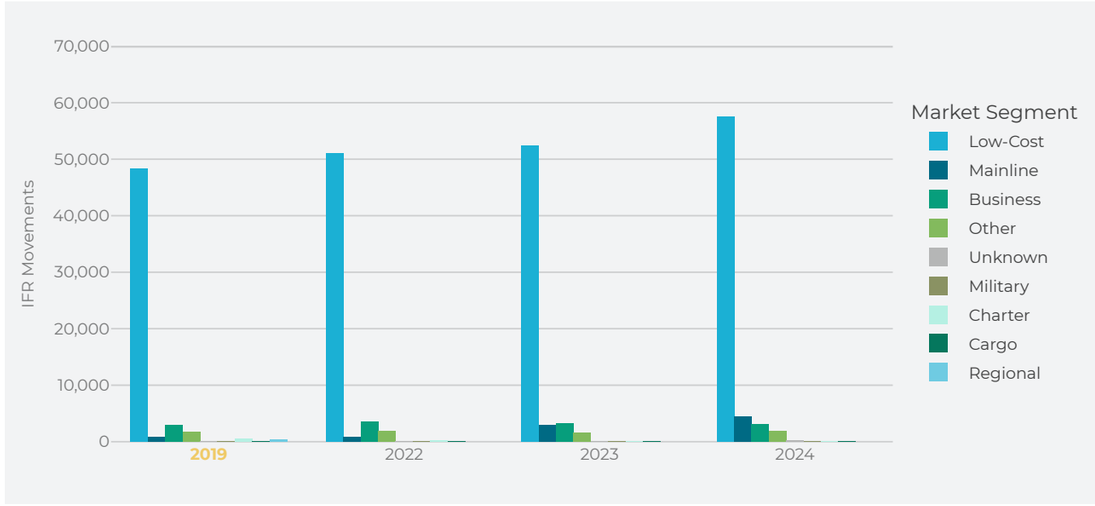


Market Contributions

This chapter delves into the type of market Brussels South Charleroi Airport serves. First, the market segment distribution is shown in ***Figure 1.13***, based on the IFR traffic at the airport. For this grouping, the air traffic market segmentation rules from STATFOR/EUROCONTROL[3] are followed, based on the flight plan information captured by skeyes' airport movement system. The EUROCONTROL's Market Segment Rules provide a definition for air traffic market segments based on lists of aircraft types, aircraft operators and the flight types filed on flight plans.

The main market segment operating in Brussels South Charleroi Airport is Low-Cost. EUROCONTROL has defined a list of operators to be included in the Low-Cost group. This group includes airlines like Ryanair, Vueling and Wizz Air among others. The operations of this market segment have increased over the years in Charleroi airport, surpassing 55,000 IFR movements in 2024. In addition, Mainline operations have also increased in 2024. Mainline is defined by EUROCONTROL as: other scheduled flights, usually hub & spoke operations by airlines' main operating units, using larger aircraft (>120 seats) and including long-haul operations.

Figure 1.13: *Market segments distribution volume and ratio (only IFR)*



3. **EUROCONTROL market segment rules,** https://www.eurocontrol.int/publication/market-segment-rules (URL retrieved on 02/02/2025)

Figure 1.14 provides the top ten connections, the airports to and from which most traffic arrives/departs. For Brussels South Charleroi Airport, Tirana international airport became the third top connection, while it was not in the top ten in the years before.

The top airlines operating at Charleroi airport are shown in ***Table 1.2.*** Ryanair (RYR) is the main airline operating in Charleroi Airport with 52,928 movements in 2024, 79% of all IFR traffic operating at Brussels South Charleroi Airport. Ryanair is followed by Wizz Air Malta (WMT), that started operating at Charleroi Airport in 2023, performing 3,898 operations in 2024, and Wizz Air (WZZ) with 2,985 operations in 2024.

Table 1.2: *Top 10 airlines of 2024 (only IFR)*

	RYR	WMT	WZZ	PGC	PGT	CCM	JFA	RUK	FCA	VOE	Total
2019	37,321	0	4,836	0	1,416	450	100	0	0	0	**44,123**
2022	42,070	0	4,692	1	1,364	650	140	142	80	4	**49,143**
2023	46,634	2,301	3,250	1,565	1,346	580	202	146	86	94	**56,204**
2024	52,928	3,898	2,985	2,251	1,518	596	167	148	102	76	**64,669**
2024 *vs* 2019	+42%	-	-38%	-	+7%	+32%	+67%	-	-	-	+47%
2024 *vs* 2023	+13%	+69%	-8%	+44%	+13%	+3%	-17%	+1%	+19%	-19%	+15%

Figure 1.14: *Top 10 International connections map (only IFR)*

Drone Activities

The emerging activities of unmanned aircraft systems (UAS) and the variety of their operations is one of the challenges driving the future of Air Navigation Service Providers (ANSP). To enable a reliable and efficient UAS integration, a framework is designed at European Union level: U-space. U-space is a set of specific services and procedures designed to ensure safe and efficient access to airspace for a large number of drones. Implementing U-space airspace requires states to define and designate U-space airspaces with mandatory service provision. For the provision of these mandatory services, the deployment of U-space will entail the integration of two new service providers into the system: the common information service provider (CISP) and the U-space service provider (USSP). The CISP will be in charge of making the common information required available, to enable the operation and provision of U-space services in U-space airspaces wherever it has been designated.[4]

skeyes is playing a central role in the development of the U-space as manager of UAS geographical zones in Belgium and by actively participating in the BURDI Project. The BURDI project which stands for Belgium-Netherlands U-space Reference Design Implementation, is dedicated to implementing a U-space airspace concept to ensure a reliable and efficient UAS integration. Additionally, since 2023, skeyes has been working on obtaining the certification to become the CISP in Belgium.[5]

The controlled airspace above and around an airport is a Unmanned Aircraft System geographical zone (GeoZone). GeoZone is a kind of zone that is only accessible to drones complying with technical and operational criteria called access conditions, and that can have restrictions with regard to the use of drones. skeyes is the GeoZone manager for controlled airspace above and around the airports of Antwerp, Brussels, Charleroi, Liege, Ostend and the Radio Mandatory Zone of Kortrijk.[6] [7]

A new drone detection system has been installed as a result of the collaboration between skeyes and SkeyDrone. The working methods and procedures to be followed are still being drafted.

4. What is U-space?, https://www.easa.europa.eu/en/what-u-space
   (URL retrieved 16/02/2024)
5. BURDI project, https://www.sesarju.eu/projects/BURDI
   (URL retrieved 16/02/2024)
6. UAS geographical zone statuses can be seen at https://map.droneguide.be
   (URL retrieved on 21/04/2022)
7. skeyes, "skeyes drone service application, https://www.skeyes.be/en/services/drone-home-page/you-and-your-drone/drone-service-application/
   (URL retrieved on 21/04/2022)
8. The data extraction method used by SkeyDrone has been update and discrepancies with data from previous years is to be expected.
9. Note that if an operation crosses multiple VLL zones, it will be counted multiple times in the table.

The figures in this report related to UAS are provided by the Drone Service Application (DSA) tool. This tool is a web application to facilitate planning, coordination and information flow between drone operators and Air Traffic Control, especially in controlled airspace.[8]

Table 1.3 below shows the authorized drone activities at and around Brussels South Charleroi Airport, as registered by the DSA tool. It also indicates the categories of risk involved in the operations. These categories are defined by the risk the drone activity forms for manned aviation in very low-level zones. They are categorised as:

VLL0 - high risk → runway and surroundings;

VLL1 - moderate risk → departure/approach track, visual circuits and rest of the control zone 400 ft above aerodrome elevation (AAE), excluding the high risk zone;

VLL2 - low risk → on the edge of the control zone below 400 ft AAE, outside the moderate and high risk zone.

A drone activity can take place in several VLL zones, therefore, it will be counted as one activity for each risk level. This means that the addition of activities in the low, moderate and high risk levels will not provide the total number of activated drone activities in Charleroi CTR.

Table 1.3: *Activated drone operations per VLL zone risk level*[9]

	Low	Moderate	High
2022	648	5	3
2023	780	11	0
2024	928	23	1
2024 *vs* 2023	+19%	+109%	-

In Brussels South Charleroi Airport area, there were 936 drone activities recorded in 2024. Those activities can also be classified into a different scheme, taking into account the complexity of the operation. There are two such categories with activities in Belgium, which are described as follows (as per EASA definition[10]):

OPEN → Presents low risk to third parties. An authorization from the Civil Aviation Authority (CAA) is not required;

SPECIFIC → More complex operations or aspects of the operation fall outside the boundaries of the Open Category. Authorization is required from the CAA.

Table 1.4 shows the drone operations recorded in Charleroi Airport following the EASA risk category. In Brussels South Charleroi Airport, almost two-thirds of the drone activities operated under the 'Open' category (657 activated operations). 279 (37%) were registered as 'Specific'. It can be observed that drone activities continue to grow (+43% compared to 2022 and +19% compared to 2023).

***Table 1.4**: Activated drone operations per VLL zone risk level*

	Open	Specific	Total
2022	406	248	**654**
2023	514	274	**788**
2024	657	279	**936**
2024 *vs* 2023	+28%	+2%	+19%

Furthermore, ***Table 1.5*** provides the number of exempted flights. These are operations performed by firefighters, police or different federal entities and are a service provided to the state. Exempted drone operations have increased at Brussels South Charleroi Airport from five activated operations in 2022 and three in 2023 to 18 in 2024.

***Table 1.5**: Activated drone operations per EASA risk category*

	Regular	Exempted	Total
2022	649	5	**654**
2023	785	3	**788**
2024	918	18	**936**
2024 *vs* 2023	+17%	+500%	+19%

Finally, the number of drone operations per type of are shown in ***Table 1.6***. Two type of operations are registered:

VISUAL LINE OF SIGHT (VLOS) → This means the drone is operated within the visual range of the pilot, allowing them to see the drone without any visual aids other than corrective lenses;

BEYOND VISUAL LINE OF SIGHT (BVLOS) → In BVLOS operations, the drone is flown outside the pilot's direct visual range, typically relying on technology such as cameras, GPS, or sensors to navigate and observe the environment.

2024 was the first year in which BVLOS operations (15) have been registered in Charleroi airport.

***Table 1.6**: Activated drone operations per type*

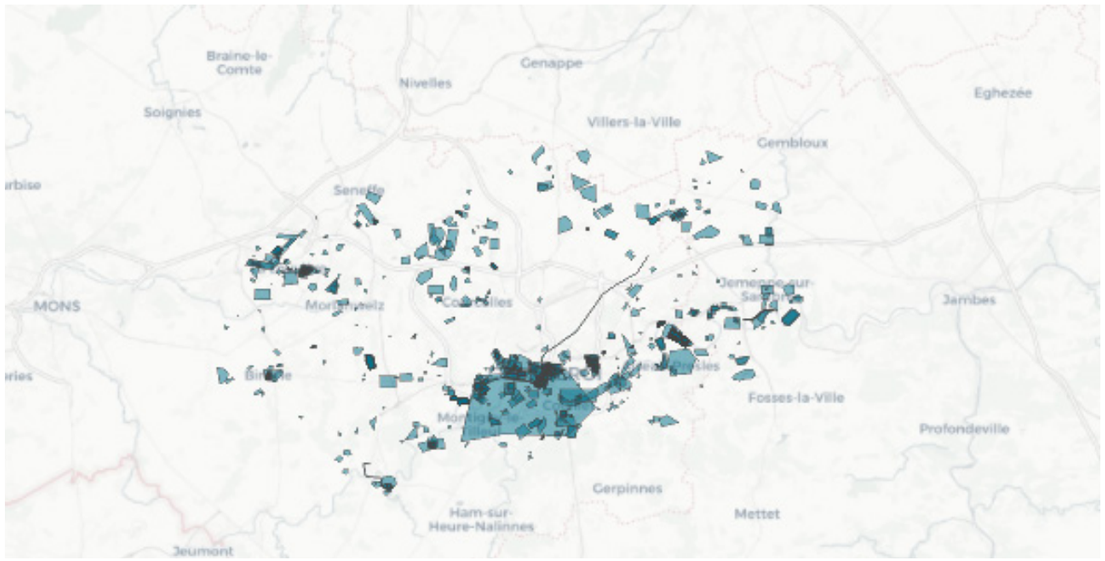
	VLOS	BVLOS	Total
2022	654	0	**654**
2023	788	0	**788**
2024	921	15	**936**
2024 *vs* 2023	+17%	-	+19%

10. EASA, "Drones - regulatory framework background". https://www.easa.europa.eu/domains/civil-drones/drones-regulatory-framework-background (URL retrieved on 21/04/2022)

The reserved airspace polygons, which were authorized for drone operations in Charleroi Airport's CTR in 2024, are shown in ***Figure 1.15***. The majority of the operations focused over the city of Charleroi and along the river. The top five activity types in the CTR are:

1. **Related to photo- and videography;**
2. **Photogrammetry** (art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring, and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena);
3. **Aerial photography;**
4. **Recreational;**
5. **Inspection missions** (not power line pylon inspection as they are considered in a separate group).

Figure 1.15: *Reserved airspaces of authorized drone operation in 2024*



2 SAFETY

- **Missed Approaches**
- **Runway Incursions**
- **Other Noteworthy Incidents**
- **Recommendations and Awareness**

This chapter is divided into four topics: missed approaches, runway incursions, other RWY/TWY events, and recommendations and awareness.

The missed approaches covered in the following chapter are based on internal logging. As such the quality and accuracy of the available information is commensurate with the level of reporting. These logs of missed approaches are not considered as safety occurrences. They are an operational solution allowing to maintain safety margins when the approach cannot be continued for a safe landing. At the same time, particularly during peak hours at busy airports, they also increase the traffic complexity and the residual safety risk. It could be argued that missed approaches are a hybrid leading indicator, and that by analysing the reasons leading to this type of procedure, it is possible to examine if there are any systemic deficiencies in a technical equipment, in a procedure or in manner in which Air Traffic Control Officers (ATCOs) and/or pilots apply these procedures.

The runway incursions are a lagging runway safety indicator. The runway incursions and the occurrences discussed in other RWY/TWY events are safety occurrences. These are subject to a risk classification using the Risk Analysis Tool (RAT) methodology to assess the contribution that skeyes had in the chain of events (in accordance with EU Reg 376/2014 and EU Reg 2019/317). The following chapters indicate the severity classification that was derived from the calculated RAT risk for the safety occurrences. The following definitions apply for the severity classification (in accordance with EASA AMC).

Table 2.1: *Severity classification*[11]

Severity Classification	Description
A – Serious incident	An incident involving circumstances indicating that there was a high probability of an accident and is associated with the operation of an aircraft, which in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time it comes to rest at the end of the flight and the primary propulsion system is shut down.
B – Major incident	An incident associated with the operation of an aircraft, in which the safety of the aircraft may have been compromised, having led to a near collision between aircraft, with ground or obstacles (i.e. safety margins were not respected; in this case, not as a result of an ATC instruction).
C – Significant incident	An incident involving circumstances indicating that an accident, or a serious or major incident could have occurred if the risk had not been managed within the safety margins, or if another aircraft had been in the vicinity.
D – Not determined	Insufficient information was available to determine the risk involved or inconclusive or conflicting evidence precluded such determination (RAT RF < 70 %).
E – No safety effect	An incident which has no safety significance.
N – No ATM ground contribution	No system, procedure or person involved in the provision of ATC services initiated or contributed to the incident.

In 2024, skeyes updated the data extraction method. This can generate small differences with the numbers published in previous reports.

Missed Approaches

Missed approaches are performed according to published procedures, under the instructions of the air traffic controller or they are initiated by the pilot, when, for any reason, the approach cannot be continued for a safe landing. Besides the discomfort for passengers and crew, the missed approaches increase the air traffic management complexity. The number of missed approaches and particularly their cause can therefore indicate which measures are to be taken to improve the safety of air navigation service provision. All missed approaches are recorded by cause of event, and the internal reporting is done by the ATCOs.

The number of missed approaches at Brussels South Charleroi Airport are monitored on a weekly basis. Missed approaches are closely followed by skeyes' safety unit, trends are analysed and when relevant, investigations are conducted to identify root causes and implement improvement measures.

The number of missed approaches in Brussels South Charleroi Airport increased by 39% in 2024 compared to the previous year. This increase is higher than the increase in number of arrivals (4%). ***Figure 2.1*** shows the comparison of the years 2019, 2022, 2023 and 2024 by visualising the number of missed approaches per 1,000 arrivals.

11. UI – under investigation (a non-official severity classification used during the process before a final classification is determined)

The number of arrivals is provided by the AMS under the BCAA's aerodrome movement definition. It can be observed that 2024 has the highest rate in the last years for both runways.

All missed approaches are recorded by cause of event and the reporting is done by the ATCOs. ***Figure 2.2*** shows the top five causes for missed approaches in 2024, ordered from the most to the least frequent. A total of 111 missed approaches were reported in 2024. Unstable approach was the most frequent reason for missed approaches (accounting for 41% of the occurrences), followed by reasons related to meteorological conditions with thunderstorm-windshear accounting for 15%, and poor visibility accounting for 10%. Oftentimes, unstable approaches occured due to tailwind at higher altitudes or when the aircraft took a very direct route and was therefore unable to reduce its speed/altitude sufficiently.

Figure 2.1: *Rate of missed approaches per 1,000 arrivals per runway per year*

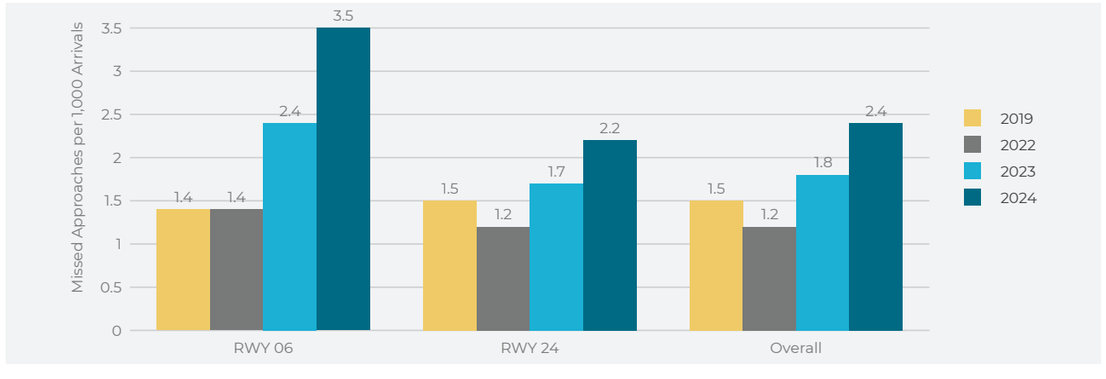
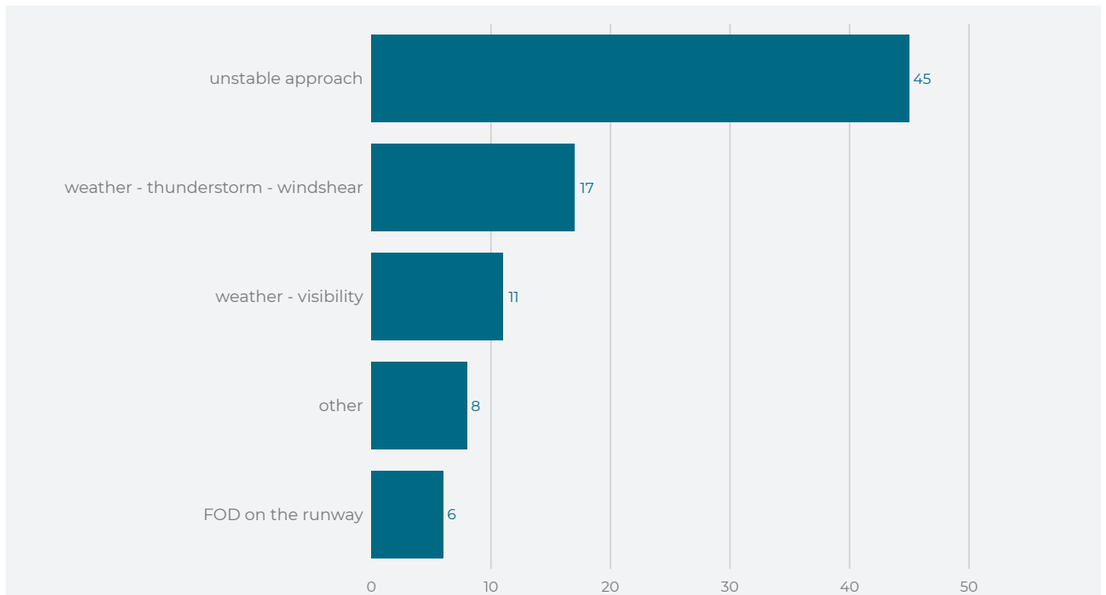


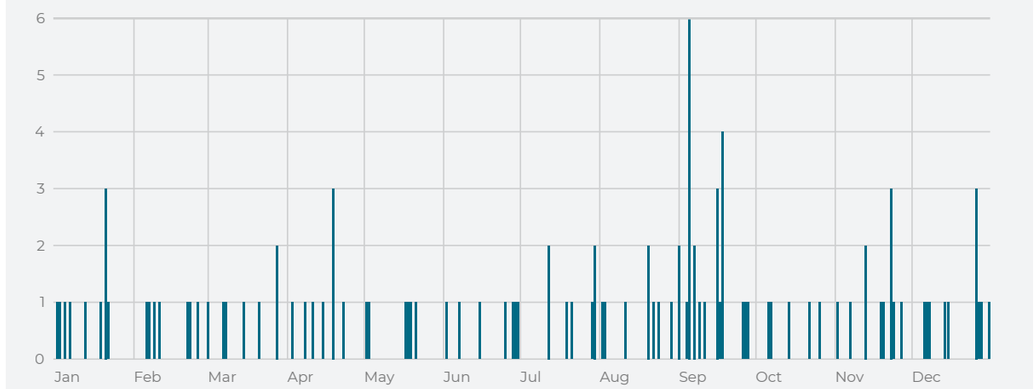
Figure 2.2: *Top five causes for missed approaches in 2024*



It is worth noting that unstable approach and thunderstorm-windshear have consistently been the main causes of missed approaches in previous years. In 2023, these factors accounted for 71% % of all missed approaches, or a combined total of 57 instances. In 2022, the same factors accounted for 72% (38 instances) of all missed approaches, while in 2019 they accounted for 68%.

Figure 2.3 shows the number of missed approaches per day in 2024. The peak on the fifth of September can be explained by bad weather conditions. There were six missed approaches that day, two missed approaches due to tailwind and four were diverted to an alternative airport due to low visibility.

Figure 2.3: *Number of missed approaches per day*



Further details can be found in the annex, which shows the main causes for missed approaches for each runway in ***Table 0.1***. Each table shows the number of missed approaches per year and cause. Most missed approaches were registered on runway 24 (91 missed approaches), the most used runway. The main reason for a missed approach on this runway was unstable approach (with 40 occurrences) followed by weather-thunderstorm-windshear (with 16 occurrences).

Runway Incursions

According to ICAO Doc 4444 – PANS–ATM, a Runway Incursion (RI) is defined as "any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft".

AMC 3 of EU Reg 2019/317 defines the "incorrect presence" as "the unsafe, unauthorised, or undesirable presence, or movement of an aircraft, vehicle, or pedestrian, irrespective of the main contributor (e.g., ATC, pilot, driver, technical system)".

Figure 2.4 gives an overview of runway incursions and their severity, while ***Figure 2.6*** gives the rate of runway incursion per 100,000 movements per severity. There was one runway incursion in 2024 with direct contribution from ATC with an endorsed severity of 'C-Significant incident'. For more details, ***Figure 2.5*** gives a monthly overview of the runway incursions in 2024. Brussels South Charleroi Airport experienced nine instances of runway incursions in 2024, with four being categorized as E-severity incidents, other four as N-severity incidents and one categorized as a C-severity incident. The C-severity incident occurred in March, where an aircraft on final was cleared to land but the ATCO had to issue a go-around instruction as an inspection vehicle had also received clearance to enter the runway. The E-severity incident from January was a situation where the ATCO instructed an aircraft to hold at the holding point for RWY 24, but the pilot lined up on RWY 24 instead. In June, the E-severity incident occurred when an aircraft, that was requested by ATCO to report on final, didn't report it and landed without clearance afterwards. The E-severity occurrence from August was a situation where an aircraft mistakenly read-back a clearance for take-off and subsequently lined-up and took-off while there was another aircraft lining up for departure. The last E-severity incident took place in September where an aircraft entered RWY 06 without clearance, while another aircraft on final. Subsequently the ATCO had to instruct the aircraft to vacate the RWY.

Figure 2.4: *Yearly runway incursions per severity category*

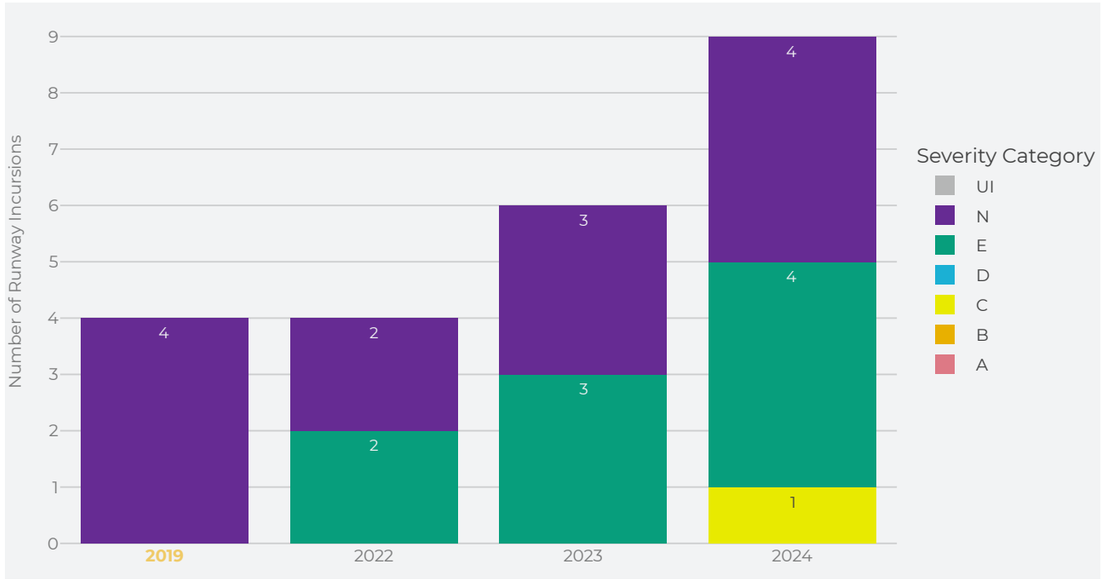


Figure 2.5: *Monthly runway incursions per severity category*

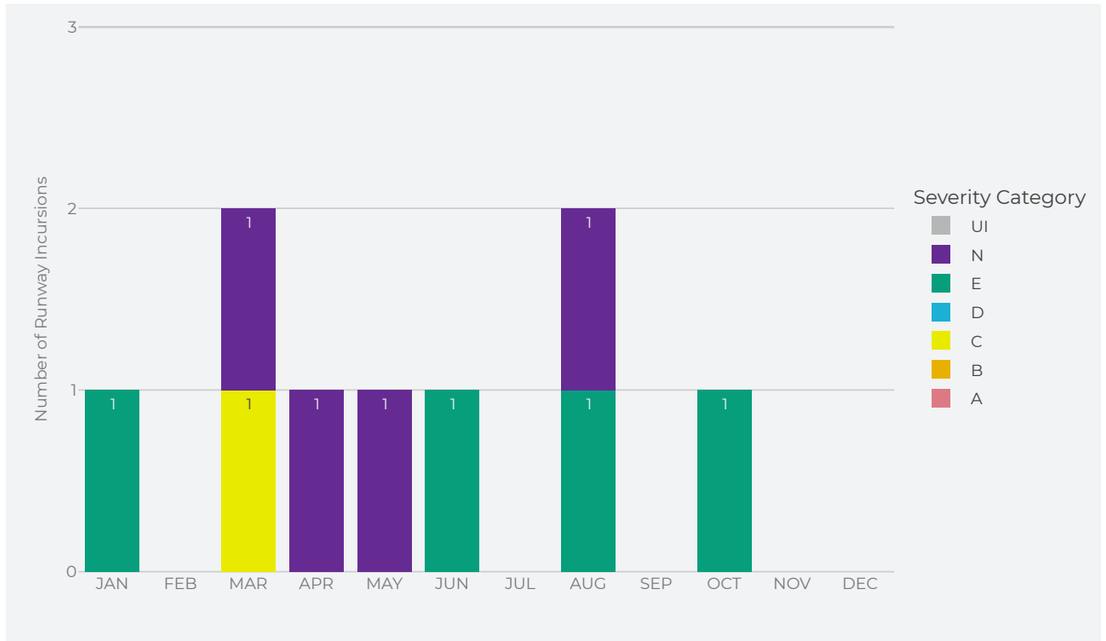
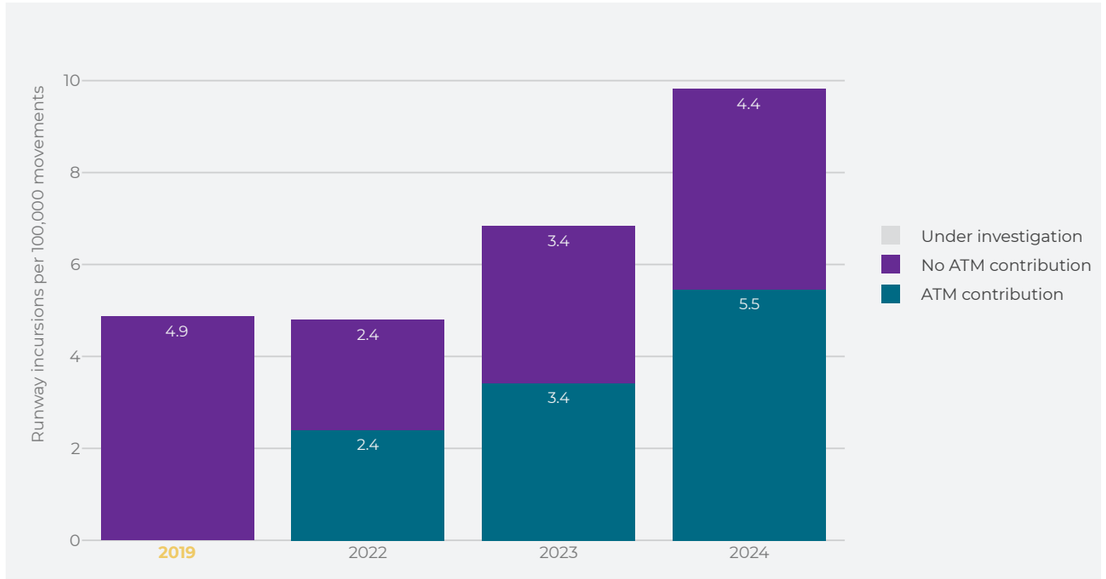


Figure 2.6: *Yearly rates of runway incursions per 100,000 movements by ATM contribution*

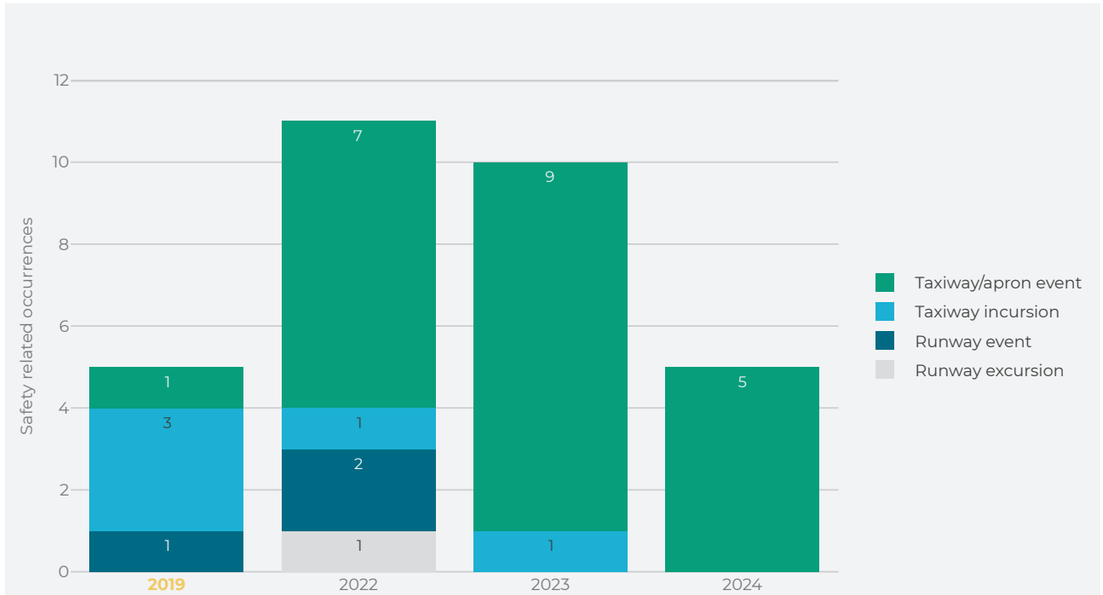


Other Noteworthy Incidents

Other safety occurrences are discussed in this section. In addition to runway incursions, other incidents can happen and must be reported, such as runway events, runway excursions, taxiway/ apron events and taxiway incursions. ***Figure 2.7*** gives a summary of those incidents in Brussels South Charleroi Airport, per year.

In 2024, there were five events, all of them classified as taxiway/apron events. Four of the taxiway/ apron events were classified as N (no ATM ground contribution), while the last one was classified as E (no safety effect). The safety exchange, good collaboration and the publication of the ATS guidance on apron has shown an improvement in the number of taxiway/ apron events.

Figure 2.7: *Yearly runway and taxiway safety events*



In 2024, there were the same number of deviations from Air Traffic Management (ATM) procedures as in 2023 (three), see ***Figure 2.8***. Concerning clearances, there was a decrease of deviations from Air Traffic Control (ATC) clearances compared to 2023 (seven in 2024, against eight in 2023). Two of the deviations from ATC clearances were aircraft that failed to follow a push-back clearance correctly. Three further deviations from ATC happened during arrival or departure in the Charleroi CTR, one of which was classified with an E-severity ATM contribution. One more was a deviation from taxi clearance. The last incident occurred when an aircraft deviated from ATC clearance twice: once just before landing and again while taxiing. There were no deviations relating to paradrop activities in 2024, showing an improvement after the updated agreement with the paradrop site, which decreased its complexity.

Figure 2.8: *Yearly deviations from ATM procedures and ATC clearance*

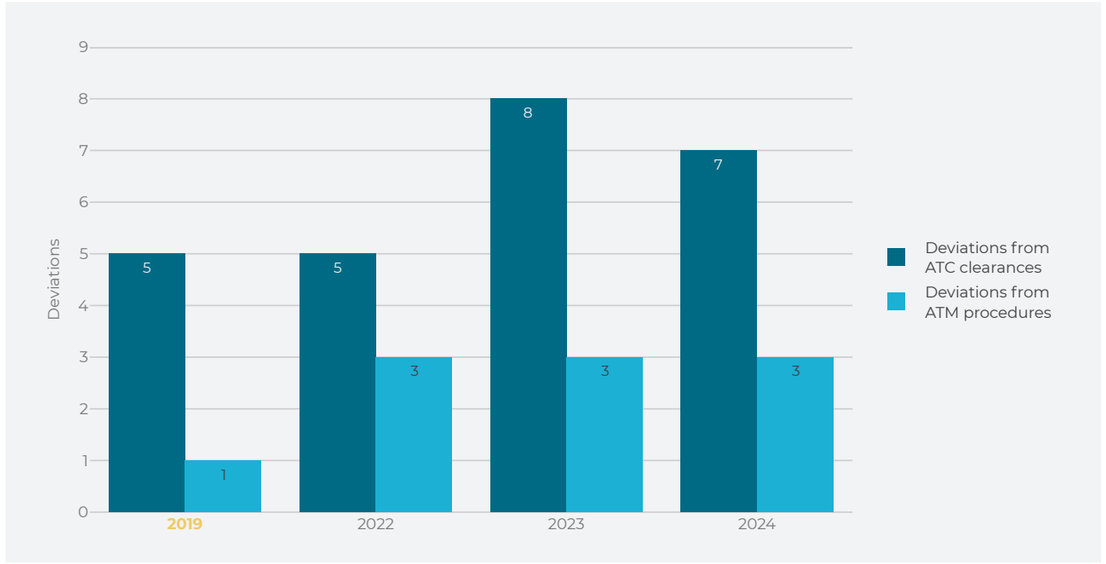
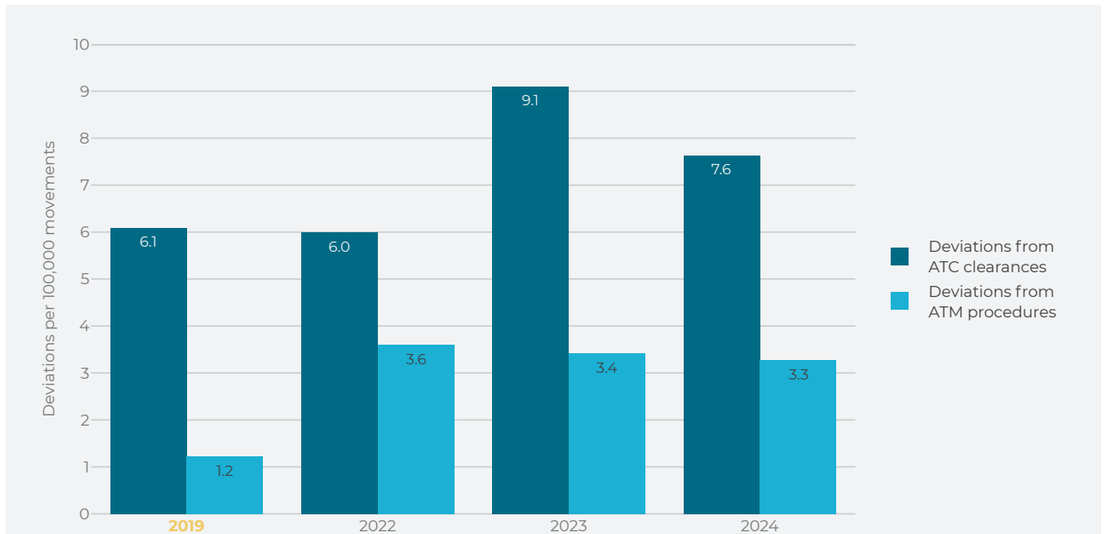


Figure 2.9 shows the deviations from ATC clearance and deviations from ATM procedures as a ratio of deviations per 100,000 movements. With the traffic increase, the rate of reports concerning deviations from ATM procedures decreased compared to 2023 and 2022 to 3.3 deviations per 100,000 movements. Furthermore, the rate of reports concerning deviations from ATC clearance decreased in 2024 to 7.6, compared to 9.1 in 2023.

Figure 2.9: *Yearly deviations from ATM procedures and ATC clearance per 100,000 movements*



Improvements And Recommendations

Runway Safety Team fostering shared safety culture

The Local Runway Safety Team (LRST) is committed to increasing runway safety, and is composed of pilots, air traffic controllers and safety departments of skeyes and the airport. The main objective is to reduce the number of Runway Incursions based on EUROCONTROL's European Action Plan for The Prevention of Runway Incursions.

That is the place where safety issues are discussed between partners. Also, outcomes of the safety investigations are shared among all the partners so that all parties may benefit from the lessons learned. When recommendations are made in an investigation report, these are also discussed with other stakeholders. If a recommendation from skeyes concerns the airport for instance, it will be discussed and agreed upon during an LRST meeting. For example, the two taxiway incursions that occurred in 2020 led to the development of new towing procedures. Based on reports from investigation, proposals were made in 2023 that had recommendations regarding the phraseology for multiple line-ups and taxiing. In February 2024, a N2ATS was published, providing the correct phraseology for taxi instructions for RWY 06 along with a recommendation to avoid using taxiways N1 and N2 in the taxi clearance (as the holding point for RWY 06 is NB).

Currently, there is a working group focused on reducing runway incursions. As a result, it has been agreed to implement the use of the stop bars 24/7.

Shaping future airspace with PBN

skeyes designed a PBN (Performance Based Navigation) implementation and transition plan describing the way ahead to 2030. The purpose of the transition and implementation plan 2024/2030 is the establishment of a full PBN environment within the Belgian part of the Brussels FIR and at the aerodromes of Antwerp, Brussels, Charleroi, Kortrijk, Liege and Ostend. Once the full PBN environment is realized, an optimization of this PBN environment will be initiated. This comprises the redesign of airspace as well as the routes which can then be redesigned independently from the ground-based infrastructure and placed at the most strategically beneficial location. For Charleroi Airport, skeyes is currently implementing PBN procedures for all the runways and more specifically Required Navigation Performance (RNP) approach transitions to the ILSs. Such approach procedures fit in the on-going transition towards a PBN Environment (EU regulation), and greatly improve predictability and therefore situational awareness can be improved.

Strengthening ground safety through radar-based monitoring

The Advanced-Surface Movements Guidance and Control System (A-SMGCS) at Charleroi Airport became operational in 2022, the operational validation for its safety nets started in 2023 and successfully ended in mid-December 2024. This radar monitoring tool provides air traffic controllers with the means to guide and control aircraft and ground vehicles, particularly in poor visibility conditions. It optimizes capacities while ensuring a high level of safety, which is expected to reduce the impact of runway incursions thanks to an early detection enabling the ATCO to react more quickly. The A-SMGCS acts as a safety net, enhancing the controllers' situational awareness by monitoring every target on the movement surface.

3 CAPACITY & PUNCTUALITY

This chapter addresses airport capacity and punctuality. In the first section, the declared capacities for different runway configurations are given along with a view on the effective utilisation of this capacity.

In the second section, the punctuality at Brussels South Charleroi Airport is studied. The arrival delay, delay due to regulations placed by Brussels South Charleroi Airport on the arrivals, is analysed and the ATFM delay from the airport's point of view is given, i.e., the impact on traffic to or from Brussels South Charleroi Airport caused by regulations not only at Brussels South Charleroi Airport, but also in the Belgian en-route airspace and by other Air Navigation Service Providers (ANSPs).

Airport Capacity

The capacity of an aerodrome, defined as the number of operations it can handle in a given time, is influenced by factors such as airport layout, fleet mix of the arriving and departing traffic, ATC procedures, weather conditions and technological aids.

Under optimal conditions, a theoretical measure, called **Theoretical Capacity Throughput**, is calculated for each runway configuration. This represents the average number of movements (arrivals and/or departures) that can be performed on the runway system within one hour, based on certain assumptions:

- *A continuous supply of arrivals and/or departures;*
- *Simultaneous Runway Occupancy (SRO) is prohibited (ATC rule);*
- *Safe Wake Vortex separation distances between flights are maintained (ATC rule);*
- *A static fleet mix (unchanging aircraft types);*
- *Unchanging approach and departure procedures;*
- *Optimal operational conditions (e.g., weather and staffing).*

The calculation also incorporates the following parameters:

- *The fleet mix from a monthly sample of traffic;*
- *A nominal radar separation of three NM;*
- *A 15% loss factor in inter-arrival times to account for conservative separation by controllers;*
- *Assumptions for the average Runway Occupancy Time for Arrivals (ROTA);*
- *An average approach speed of 136 knots (adjusted for headwind per runway);*
- *Inter-departure time, determined by the time between take-off clearance and reaching a specified altitude.*

Since safe wake vortex separation distances are specified only for IFR flights, the Theoretical Capacity Throughput applies exclusively to IFR movements, and represents the highest number of IFR movements that an aerodrome can handle per hour with a given runway configuration under ideal conditions.

In practice, optimal conditions are rarely achieved. To account for this, the **Declared IFR Capacity** is set at 90% of the theoretical maximum. ***Table 3.1*** shows the declared IFR capacity per runway configuration at Brussels South Charleroi Airport. Note that this is only a theoretical calculation and is currently not used for schedule coordination purposes.

Table 3.1: *Declared IFR capacity*

Runway Configuration		Declared IFR Capacity (movements/hour)		
Departures	Arrivals	Only Departures	Only Arrivals	Mixed Fleet
06	06	27	30	42
24	24	29	33	42

Figure 3.1: *Hourly movements for configuration 24-24*

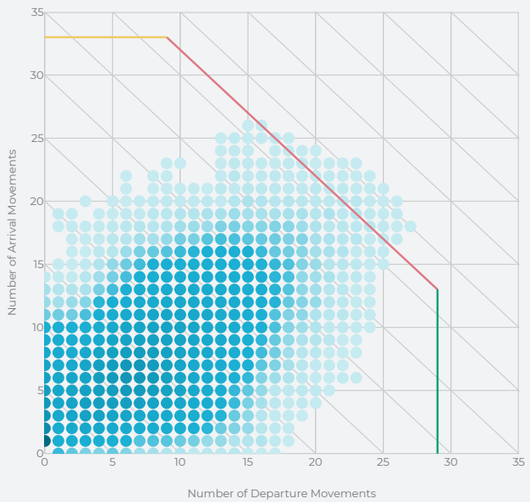
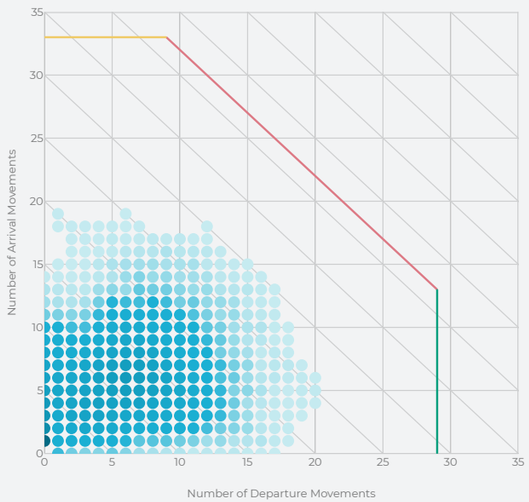


Figure 3.2: *Hourly movements of hours with 80% IFR movements for configuration 24-24*



To get a view on the actual usage of the aerodrome's capacity, the **Effectively Used Capacity** is an important performance indicator for the airport and the air navigation service provider handling the arrivals and departures. For each runway configuration, it compares the theoretical value of the declared capacity to the distribution of the actual number of movements performed within each hour of the year.

In ***Figure 3.1*** and ***Figure 3.2***, each dot represents a rolling hour throughout the year of 2024 (with a roll step of one minute), during which the runway configuration was active and there was at least one movement. The position of the dot indicates the number of arrivals (y-axis) and the number of departures (x-axis). The opacity of the dot indicates if there were many or few hours with this number of arrivals and departures. The mixed fleet declared capacity is shown by a diagonal red line, the declared capacity for only departures is shown with a green vertical line and the declared capacity for only arrivals is shown with a yellow horizontal line. Any dot above these lines indicates an hour exceeding the declared IFR capacity.

Even though the capacity is only declared for IFR movements, the plots consider both IFR and VFR movements. This is because only considering IFR flights would give a distorted view on the number of hourly movements – especially for airports with high VFR shares. Helicopter movements are not included, as they don't necessarily land

Figure 3.3: *Hourly movements for configuration 06-06*

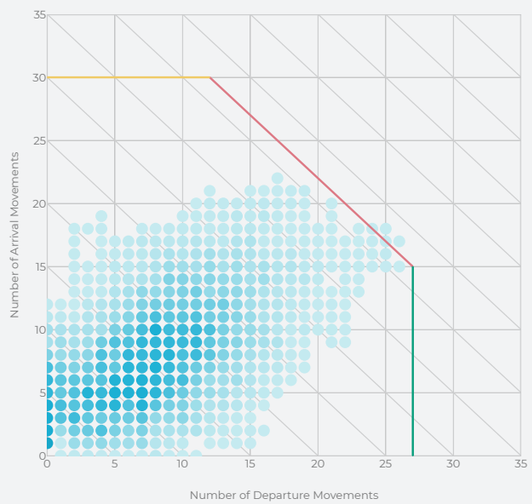
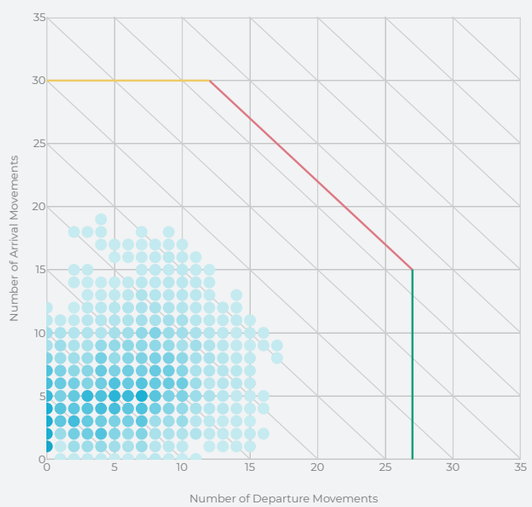


Figure 3.4: *Hourly movements of hours with 80% IFR movements for configuration 06-06*



on the runway of the configurations, but missed approaches are. The notation for the runway configurations in this report always mentions first the departure runway first, then the arrival runway, separated by a hyphen.

Figure 3.1 shows the hourly movements for runway configuration 24–24 in 2024. There was a maximum of 46 movements per hour registered in 2024, while it was 55 in 2023. The VFR restrictions put in place at Charleroi Airport between May and September allowed a more homogenic distribution of the traffic when compared to previous years. ***Figure 3.2*** shows the hourly movements for runway configuration 24–24 in 2024 for hours with ≥80% IFR. It can be seen that when IFR movements are more than 80% of the total traffic in the hour, the declared capacity is not reached.

In ***Figure 3.3*** and ***Figure 3.4*** the same exercise is done for runway configuration 06-06. ***Figure 3.3*** shows that with mixed (IFR and VFR) traffic, there were a maximum of 43 movements per hour in 2024, which is less than 51 in 2023, but still exceeds the declared capacity (42 movements/hour). When the IFR movements were more than 80% of the traffic, the declared capacity was not reached on any day in 2024.

As seen in the figures above, there were some hours in 2024 when the declared capacity was exceeded. ***Table 3.2*** includes a list of every day where capacity has been exceeded at least once throughout the year, along with the number of movements over capacity. It should be noted that during the hours where the declared capacity was exceeded, there was a high percentage of VFR movements (a minimum of 66% of the traffic was VFR during these periods), which do not require IFR separation rules, allowing for a higher throughput of traffic to be achieved. The mix of traffic (arrivals and departures) was balanced during these periods over capacity (always between 40% and 60% ARR-DEP distribution).

Table 3.2: *Days with hours exceeding the capacity at EBCI in 2024 per runway configuration.*

Runway Configuration		Date	Maximum	% of IFR	% of Departures
Departures	Arrivals	of Occurrence	Extra Movements	at Occurrence	at Occurrence
06	06	Sep. 21	1	44%	60%
24	24	Jan. 16	4	11%	57%
		Feb. 24	4	11%	52%
		Feb. 25	2	14%	50%
		Mar. 14	3	18%	53%
		Mar. 25	1	30%	49%
		Mar. 29	3	13%	60%
		May. 25	4	7%	50%
		Oct. 11	1	42%	56%
		Oct. 12	1	19%	51%
		Oct. 13	4	33%	54%
		Oct. 30	2	16%	57%
		Nov. 25	2	27%	52%
		Nov. 30	3	20%	53%
		Dec. 28	1	21%	42%

Punctuality

Punctuality can be seen as a service quality indicator from a passenger perspective. This section observes one of the factors that influences punctuality: Air Traffic Flow Management (ATFM) delay. ATFM delay is defined as the time difference between estimated take-off time and calculated take-off time of the Network Manager (EUROCONTROL) and is due to ATFM measures to ensure safe handling of operations in the air or at airports. These measures are classified according to the causes listed below:

A - Accident
C – ATC Capacity
D - De-icing
E - Equipment (non-ATC)
G – Aerodrome Capacity
I - Industrial Action (ATC)
M - Airspace Management
N - Industrial Action (non-ATC)
O - Other
P - Special Event
R – ATC Routeing
S – ATC Staffing
T - Equipment (ATC)
V – Environmental Issues
W - Weather
NA - Not Specified

The ATFM measures with Air Navigation Service Provider (ANSP) contribution are listed according to the Functional Airspace Block Europe Central (FABEC) performance plan:[12]

C – ATC Capacity
R – ATC Routeing
S – ATC Staffing
T - Equipment (ATC)
M - Airspace Management
P - Special Event

In the remainder of the report, all causes with ANSP contribution are referred to as CRSTMP. Additionally, the measures due to W – Weather are split in a separate category, resulting in three aggregated categories: CRSTMP, Weather and Other categories.

The next section focusses on a key performance indicator: arrival delay. The Airport Arrival ATFM Delay is an indicator of ATFM delays on ground for a flight, due to a regulation placed by the airport of arrival.

After this, the next section of this chapter provides an overview of the influence of ATFM measures on traffic arriving to or departing from Brussels South Charleroi Airport, regardless of which unit placed the regulations.

Airport arrival ATFM delay

As of January 1st, 2015, skeyes is subject to an annual target with regard to ATFM arrival delay. ATFM arrival delay is the delay of a flight attributable to terminal and airport air navigation services and caused by restrictions on landing capacity (regulations) at the destination airport. The average minutes of arrival ATFM delay per flight is a performance indicator in accordance with the European Performance Regulation (EU) no 317/2019, Annex 1, section 1, §3.1(b). This indicator is the average time, expressed in minutes, of arrival ATFM delay per inbound IFR flight and is calculated for the whole calendar year. The indicator includes all IFR flights with an activated flight plan submitted to the Network Manager landing at the destination airport and covers all ATFM delay causes excluding exceptional events.[13]

Targets are set on a national level and on an airport level, where the national target is the aggregation of the airport targets. For reference period 2, 2016-2019, the national target was 0.10 minutes/flight, and Brussels Airport and Liège Airport were considered as contributing airport. For reference period three (RP3), 2020-2024, the national target was initially 1.82 minutes/flight for all causes and 0.17 minutes/flight for CRSTMP causes with Brussels Airport the only contributing airport. However, due to the unexpected impact of COVID-19 on the air traffic, the European Commission requested a revision of Union-wide performance targets for RP3. The current proposal only includes arrival delay targets for Belgium as of 2022 (1.08 minutes/flight all causes and 0.12 minutes per flight for CRSTMP causes), and the only contributing airport remains Brussels Airport.

In 2025 the new reference period four (RP4), 2025-2029, starts. The new targets set for this period will bring a change on how the delay for the target is calculated. For RP3 the target was set on minutes/flight for CRSTMP causes, but this will change in RP4 as the target will be set on minutes/flight for all causes.

Despite not having its own target, skeyes registers the arrival delays for Brussels South Charleroi Airport as part of a continuous monitoring of the ANSP's performance and internal performance indicator. This indicator is the average time, expressed in minutes, of arrival ATFM delay per inbound IFR flight and is calculated for the whole calendar year. The indicator includes all IFR flights with an activated flight plan submitted to the Network Manager landing at the destination airport and covers all ATFM delay causes excluding exceptional events.[14]

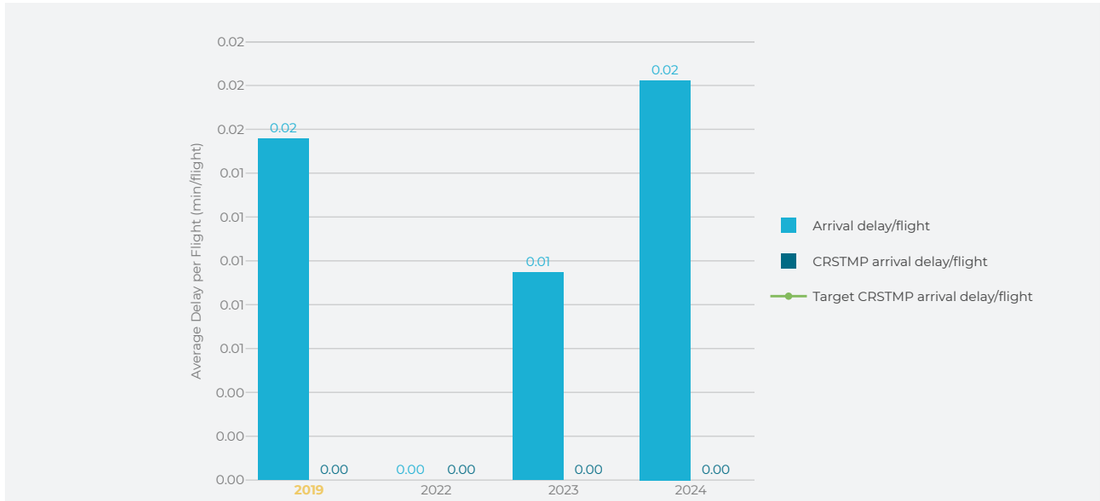
The number of arrivals and the arrival delay for the performance indicator for the years 2019 and 2022 to 2024 are given in ***Table 3.3***. The average arrival delay per flight is calculated by dividing the sum of arrival delay with ANSP contribution by the number of total flights calculated by the Network Manager (EUROCONTROL). Both the arrival delay and the included flights are provided by the Performance Review Unit (EUROCONTROL). This performance indicator is given in ***Figure 3.5***.[15]

12. A common FABEC Performance plan
https://www.fabec.eu/who-we-are/optimised-performance/a-common-fabec-performance-plan
(URL extracted on 12/02/2024)
13. EUROCONTROL, SES Performance Scheme Reference Period 3 (2020-2024),
https://www.eurocontrol.int/prudata/dashboard/metadata/rp3/
(URL retrieved on 02/02/2024)
14. European Commission, "Regulations," Official Journal of the European Union, p. 67, 2019
15. Note that in chapter 1, movements are defined by the AMS and the BCAA criteria. In this chapter, the Network Manager (EUROCONTROL) is taken as source for traffic numbers and only accounts for flights with a registered flight plan.

Table 3.3: *Number of IFR arrivals and minutes of arrival ATFM delay per reason and per year (with flight plan)*

	Minutes of ATFM Arrival Delay				IFR Arrivals
	CRSTMP	Weather	Other categories	Total	(with flight plan)
2019	0	0	426	426	27,347
2022	0	0	0	0	28,734
2023	0	0	285	285	30,129
2024	0	0	611	611	33,514

Figure 3.5: *Yearly target and actual rate of ATFM delay per IFR arrival*



In 2024, 611 minutes of delay were registered by the Network Manager at Brussels South Charleroi Airport due to 'G-Aerodrome Capacity' (RWY works) and 'O-Other' (hole on the RWY). The RWY had to be closed via NOTAM during different periods due to works. The majority of the works took place after airport closing hour to avoid impact on traffic. These regulations generated an average of 0.02 minutes per flight.

In 2023 there were 285 minutes of arrival delay due to 'G-Aerodrome Capacity' (airport electrical issues) and 'A-Accident/Incident' (security issue in the terminal due to a bomb threat). In 2022 there were zero minutes of arrival delay, but in 2019, there were a total of 426 minutes of delay at the airport due to 'I-Industrial Action' (ATC) and 'G-Aerodrome Capacity'.

Table 3.4 shows the impact of the regulations placed at Charleroi Airport on each IFR arrival to the airport grouped by no delay, delay up to 15 min and delay of more than 15 min. It can be seen that the closure of the runway generated an increase in the number of IFR arrivals with more than 15 minutes of delay in 2024. On the other hand, with the increase of movements, the amount of IFR arrivals with no delay increased and the amount of IFR arrivals with less than 15 minutes of delay decreased.

Table 3.4: *Delayed IFR arrivals per category of delayed time, according to PRU*

	No delay	Delay up to 15 min	Delay more than 15 min	Total
2019	27,353	2	9	**27,364**
2022	28,744	0	0	**28,744**
2023	30,122	8	6	**30,136**
2024	33,644	1	13	**33,658**
2024 *vs* 2019	+23%	-50%	+44%	+23%
2024 *vs* 2023	+12%	-88%	+117%	+12%

All ATFM impact on traffic at Brussel South Charleroi Airport

In this section of the report, the ATFM delay for all departing and arriving traffic in Brussels South Charleroi Airport is analysed. The impact of ATFM measures go beyond the restrictions placed by the airport of destination. Flights departing from and arriving at an airport can be delayed by ATFM measures in any of the sectors they cross on their route. The impact of all these regulations gives the total ATFM delay of the airport.

Figure 3.6 and ***Figure 3.7*** show the total ATFM impact for all traffic arriving and departing (respectively) in Brussels South Charleroi Airport for the years 2019 and 2022 to 2024. The delay is attributed to the regulation originating it. For the flights with Charleroi Airport as origin and destination, if they are impacted by any regulation, the delay is counted in the arrival delay and in the departure delay, as those flights are considered arrivals and departures to/from the airport. As a result, the total ATFM delay is not the sum of delays recorded for arrivals and departures, as this will count delays for the flights with origin and destination Charleroi Airport twice. In 2024, a total of 135,339 minutes of delay was generated on arrivals, thereof, 4% (4,851 minutes) is attributable to skeyes, while 96% (130,488 minutes) is attributable to other ANSPs. For departing traffic, a total of 130,135 minutes of delay was generated, of which, 2% (2,836 minutes) is attributable to skeyes, while 98% (127,299 minutes) is attributable to other ANSPs.

The impact of all these regulations gives the total ATFM delay of traffic at Brussels South Charleroi Airport. Traffic at Charleroi Airport was mainly impacted by ATC disruptions due to weather related reasons, capacity and ATC staffing issues primarily in France. Other events that impacted the punctuality in Charleroi Airport were the trials for the implementation of 4-Flight in France (4-Flight is the new ATM system that will be implemented by the French ANSP for their traffic management) or the implementation of iCAS (also a new ATM system) in Germany that continued during 2024. Some regulations were put in place to protect the different French airspaces, but also the neighbouring countries.

Figure 3.6: *ATFM delay for IFR arrivals per year and delay origin*

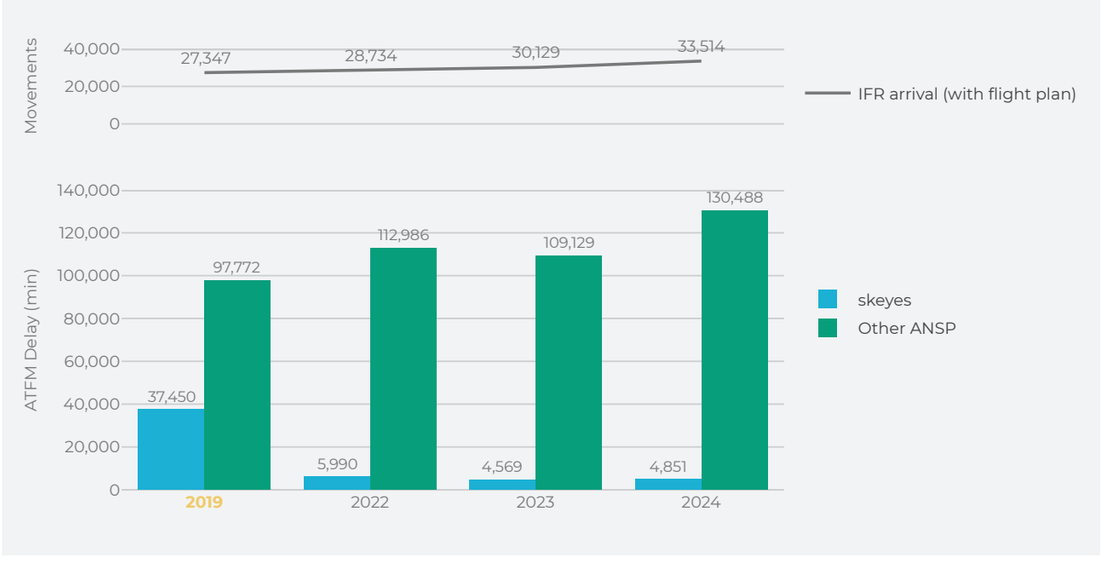
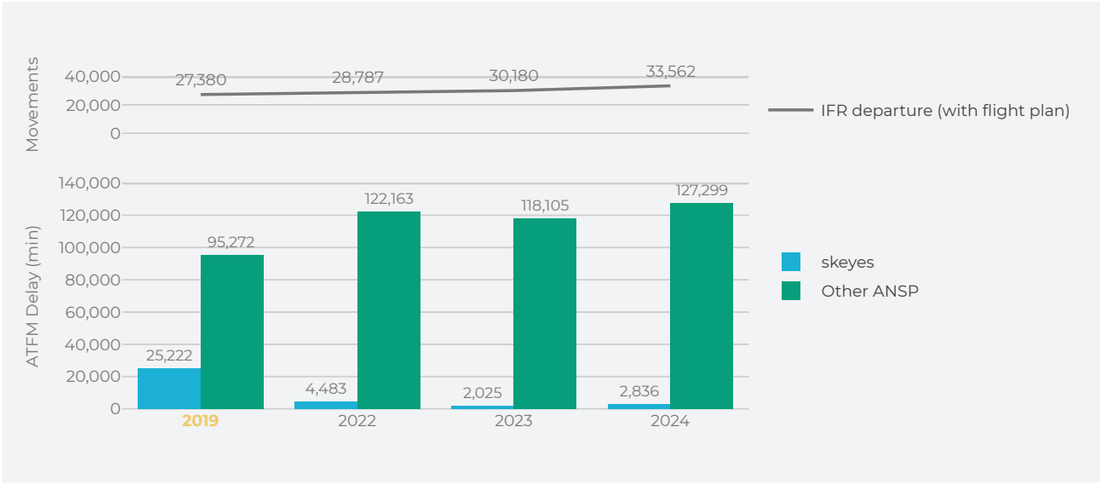


Figure 3.7*: ATFM delay for IFR departures per year and delay origin*



In total, in 2024, 7,743 arrivals and 7,289 departures were impacted by ATFM delay. These can be categorised by severity, based on the duration of the delay. There are four categories:

- *Between 1 and 15 minutes;*
- *Between 16 and 30 minutes;*
- *Between 31 and 60 minutes;*
- *More than 60 minutes.*

The figures below (***Figure* 3.8** and ***Figure* 3.9**) show that 59% of the delayed arrivals and 58% of the delayed departures were delayed for a maximum of 15 minutes. 4% of the delayed departure and arrival flights had a delay of more than one hour.

Figure 3.8: *Delayed IFR arrivals per category of delayed time*

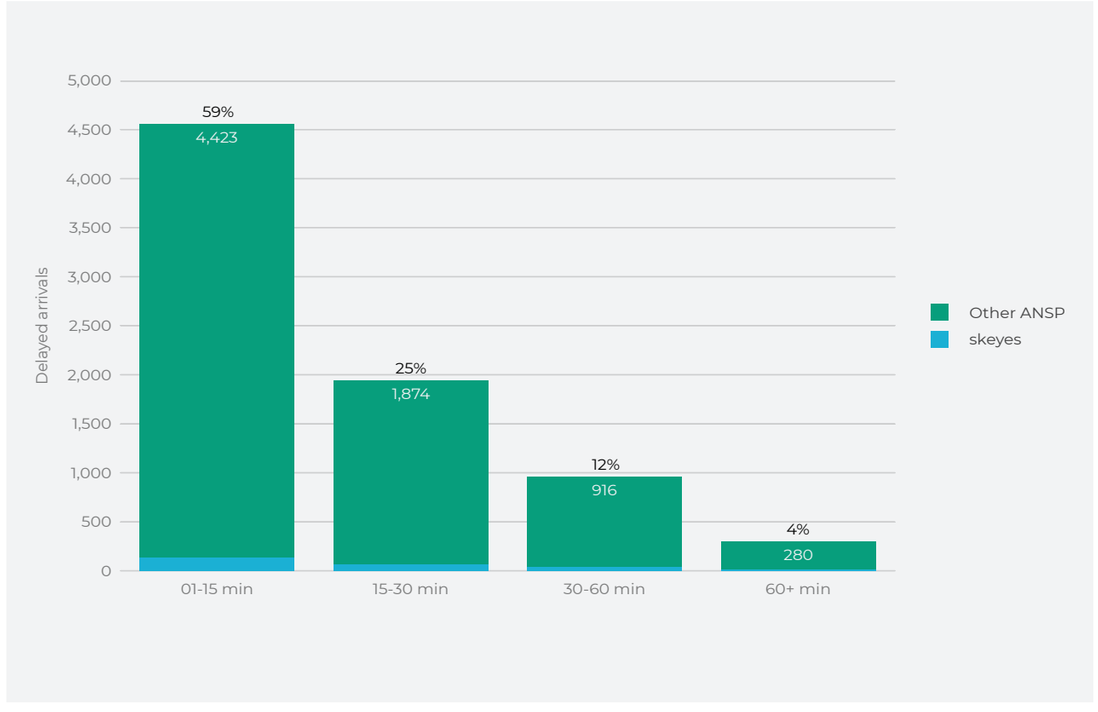
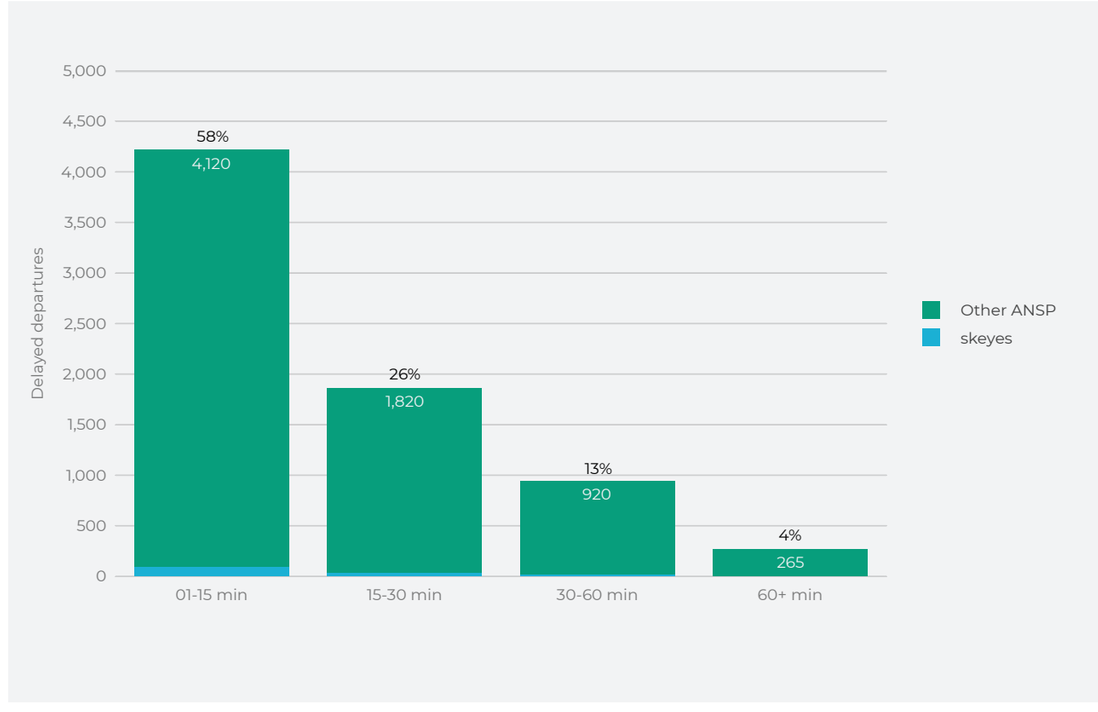
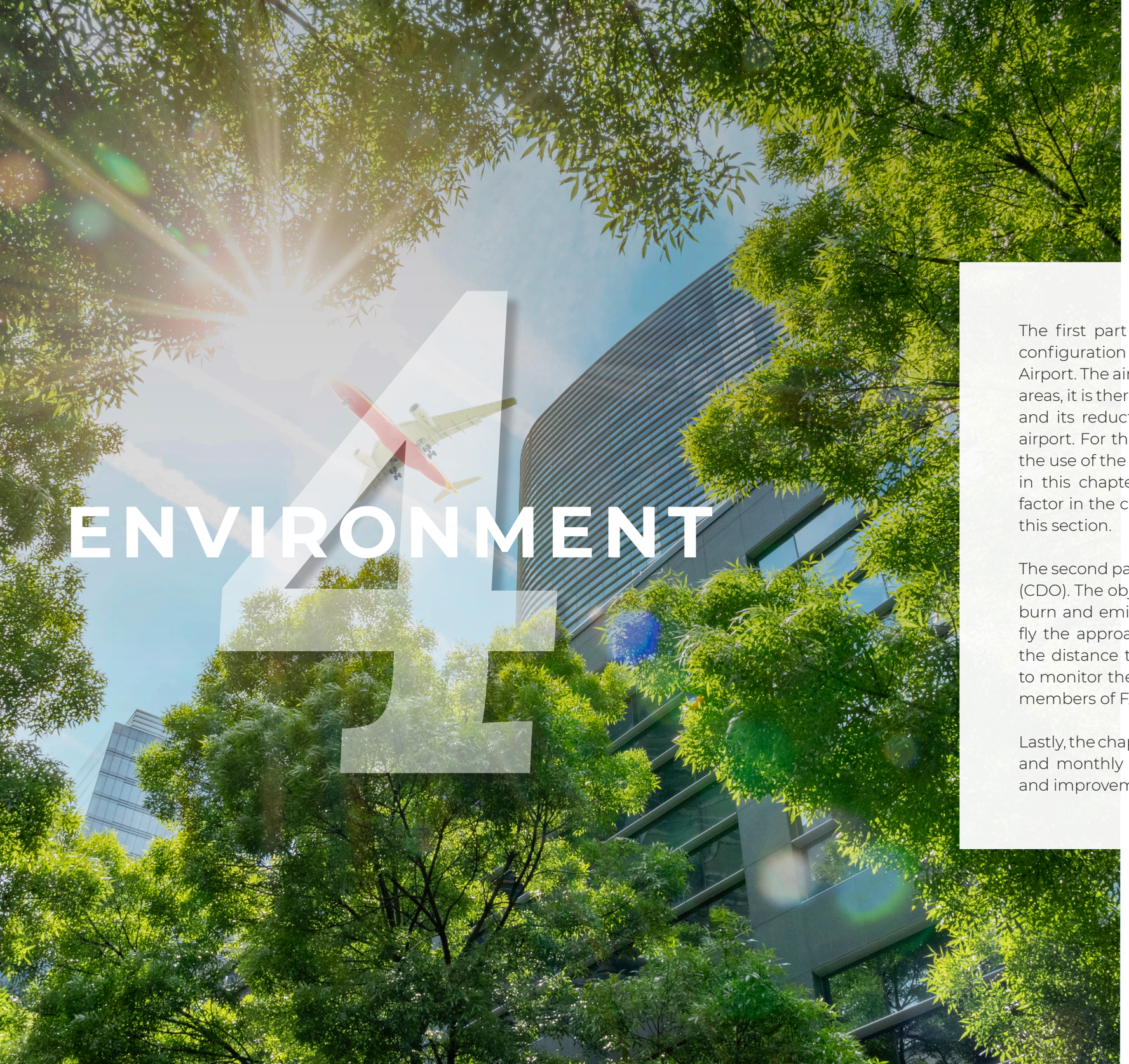


Figure 3.9: *Delayed IFR departures per category of delayed time*





ENVIRONMENT

- **Preferential Runway System**
- **Continuous Descent Operations**
- **Night Movements**
- **Wind Patterns**
- **Considerations and Improvements**

The first part of this chapter is dedicated to the runway configuration scheme in use at Brussels South Charleroi Airport. The airport is geographically located near populated areas, it is therefore all the more important to consider noise and its reduction, as far as possible, in the vicinity of the airport. For that purpose, a monthly and yearly overview of the use of the Preferential Runway System (PRS) is included in this chapter. Considering that wind is a predominant factor in the choice of runway use, wind data is provided in this section.

The second part focuses on Continuous Descent Operations (CDO). The objective of CDOs is to reduce aircraft noise, fuel burn and emissions by means of a continuous descent, to fly the approach glide path at an appropriate altitude for the distance to touchdown. skeyes put in place indicators to monitor the use of CDOs, in collaboration with the other members of FABEC.

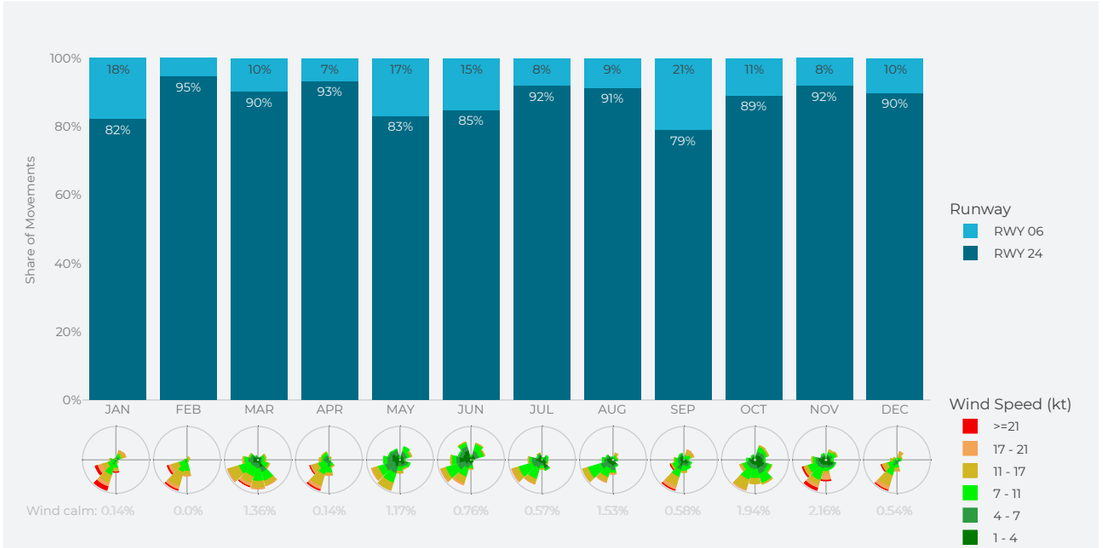
Lastly, the chapter also covers the night movemets, the yearly and monthly wind patterns, finishing with considerations and improvements.

Preferential Runway System

According to the Aeronautical Information Publication (AIP) for Brussels South Charleroi Airport, runway 24 shall be used as preferred runway for take-off and landing in case it is dry and the cross or tailwind components do not exceed ten and eight knots, respectively. When the runway is wet, the maximum tailwind threshold is five knots. For safety reasons, if one of the above-mentioned criteria is not met, the Preferential Runway System (PRS) will not be followed and the most suitable runway in the given case will be used.

The runway use was already discussed in Chapter 1 from ***Figure 1.10*** until ***Figure 1.12***. They show the runway usage per year for 2019 and the period from 2022 until 2024 as well as the runway use per month in 2023 and 2024. In ***Figure 4.1***, the fractions are based on the number of movements on each runway. For context purposes, this figure is a copy of ***Figure 1.11***. In 2024, 88% of all the movements throughout the year used the preferential runway.

Figure 4.1: *Runway use (based on % of movements)*



Continuous Descent Operations

A continuous descent operation (CDO) is an aircraft operating technique enabled by airspace design, instrument procedure design and facilitated by air traffic control to allow aircraft to follow an optimum flight path that delivers environmental and economic benefits (reduced fuel burn, gaseous emissions, noise and fuel costs) without any adverse effect on safety. A CDO allows arriving aircraft to descend continuously from an optimal position with minimum thrust. By doing so, the intermediate level-offs are reduced and more time is spent at more fuel-efficient higher cruising levels, hence reducing fuel burn (i.e., lowering emissions and fuel costs) and producing less noise.[16]

skeyes uses two methods to measure CDOs. For the first method, a descent is considered as a CDO if no level off lasting more than 30 seconds is detected. A level off is considered as a segment during which the aircraft has a rate of descent of less than 300 ft/minute. Based on the recommendations made by EUROCONTROL, two CDO performance indicators were developed in 2016:

- *CDO Fuel: binary indicator (yes/no) indicating if a CDO was flown from FL100 to 3000 ft;*
- *CDO Noise: binary indicator (yes/no) indicating if a CDO was flown from FL60 to 3000 ft.*

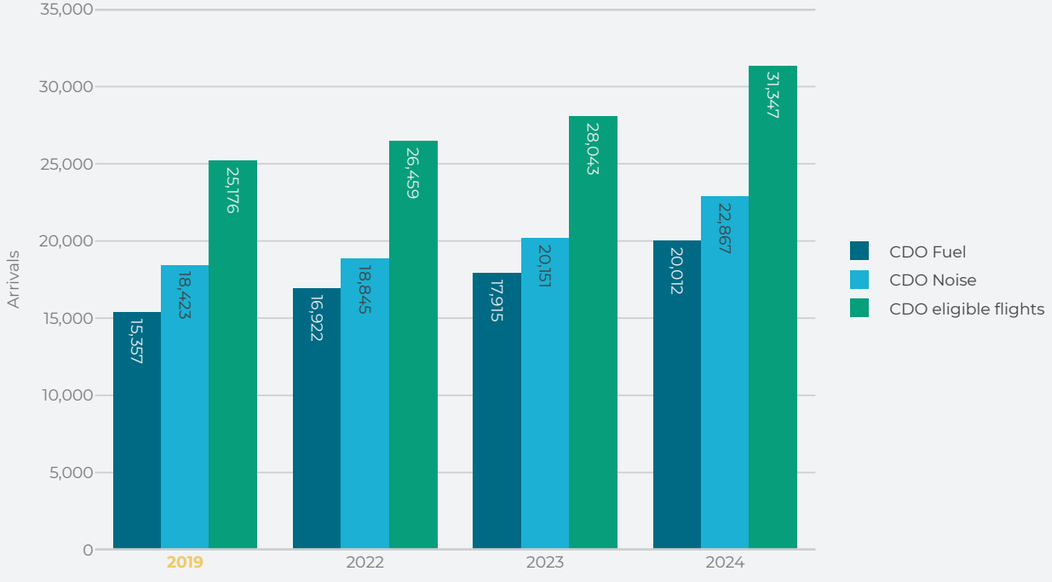
Only 'CDO eligible flights' are considered in this section, therefore the total of arrivals is different than the figures given in Chapter 1 Traffic. The following criteria have been defined for CDO eligible flights:

- *It is an IFR arrival;*
- *The aircraft is not categorized as "light", meaning its maximum take-off weight (MTOW) is above 7000 kg;*
- *It is not a helicopter;*
- *It is not a military flight;*
- *It is not a touch-and-go, i.e. the flight does not involve landing briefly and taking off again;*
- *The observed altitude during the flight must be at or above FL 60 (6,000 ft or 1.8 km).*

As shown in ***Figure 4.2*** in 2024 there were a total of 31,347 'CDO eligible flights'. In total numbers, the number of CDO fuel and noise has increased compared to previous years, along with the 'CDO eligible flights which are higher in 2024 than in previous years.

16. EUROCONTROL, "Continuous climb and descent operations," [Online]. Available: eurocontrol.int/concept/continuous-climb-and-descent-operations

Figure 4.2: *Yearly comparison CDO indicators*



In order to be able to compare the evolution of the use of CDOs over the years, ***Figure 4.3*** provides the rate of CDO fuel and CDO noise per year for runway 24 and runway 06. The overall CDO rates remain stable over the last years. The increase of traffic and the mix with other types of traffic (VFR or light traffic) didn't have an impact on the arriving performance, including CDOs. The restrictions put in place for VFR traffic between May and September allowed to maintain the rate of CDO fuel and CDO noise by reducing the complexity of the traffic mix (IFR and VFR) during that period.

Figure 4.3: *Yearly CDO noise adherence per runway*

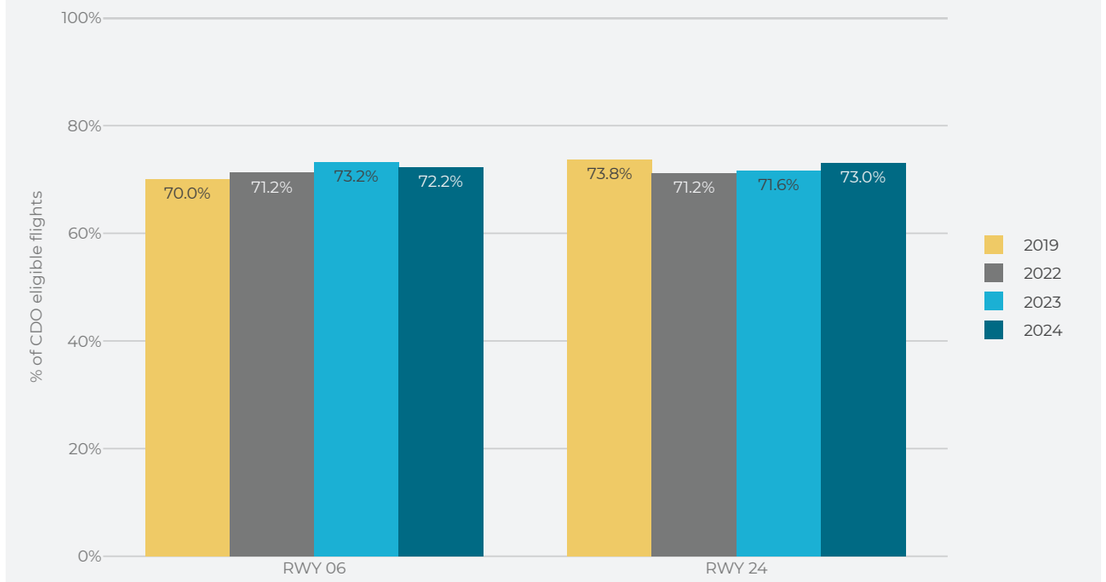


Figure 4.4: *Yearly CDO Fuel per runway*

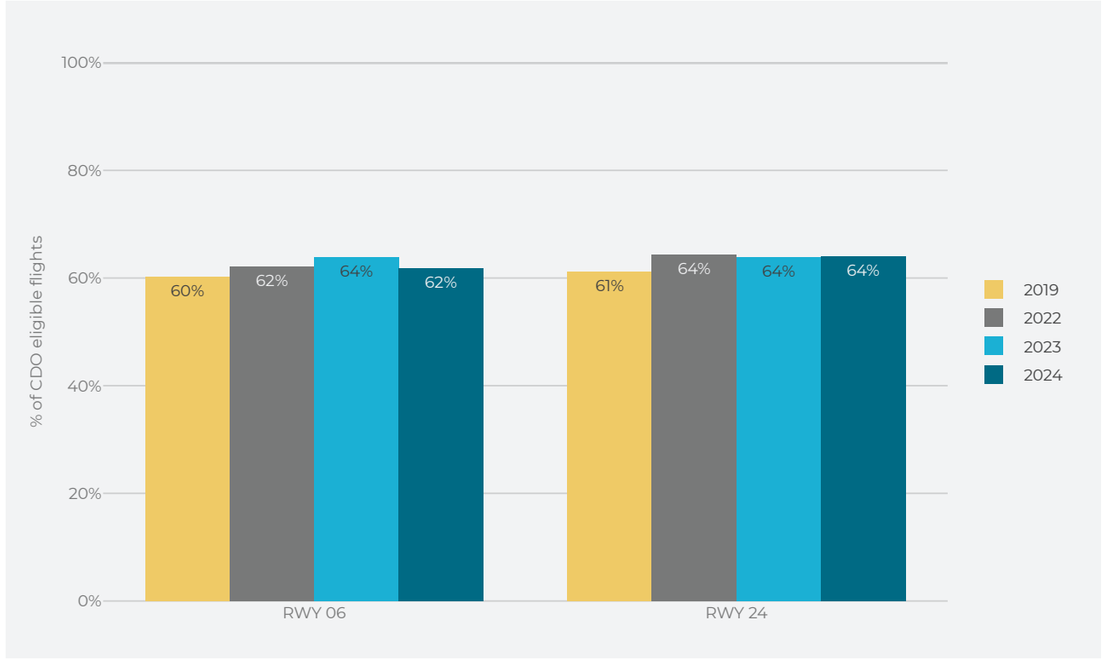
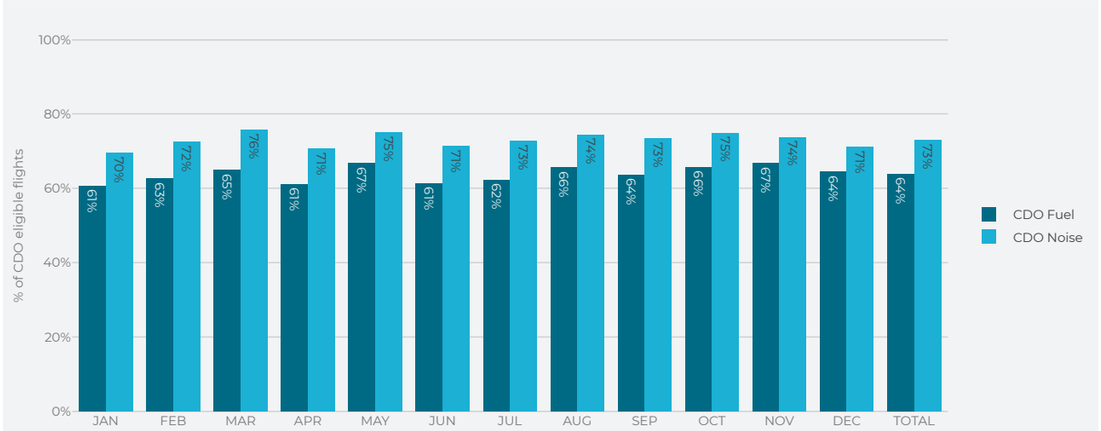


Figure 4.5 shows a view per month of CDO Fuel and CDO Noise respectively. The lowest number of CDO rates in 2024 were in the month of January. A multitude of external factors influence CDO statistics, such as:

- *Pilots' CDO flying experience;*
- *Pilots' experience with the airport;*
- *ATC experience;*
- *Equipment of the runway;*
- *Aircraft type and equipment;*
- *Military airspace being open or closed;*
- *Traffic flows and traffic streams that can have an impact on the arriving traffic.*

Figure 4.5: *Monthly CDO indicators*



The second method to measure CDOs used by skeyes considers CDO performance by non-binary means, delving into the duration during which an aircraft operates in level-off segment(s). The indicator used by skeyes is the 'Average level-off time below certain altitude'.

17. EUROCONTROL, "European Continuous Climb and Descent Operations Action Plan," [Online]: https://www.eurocontrol.int/publication/european-cco-cdo-action-plan (URL retrieved on 21/02/2024)

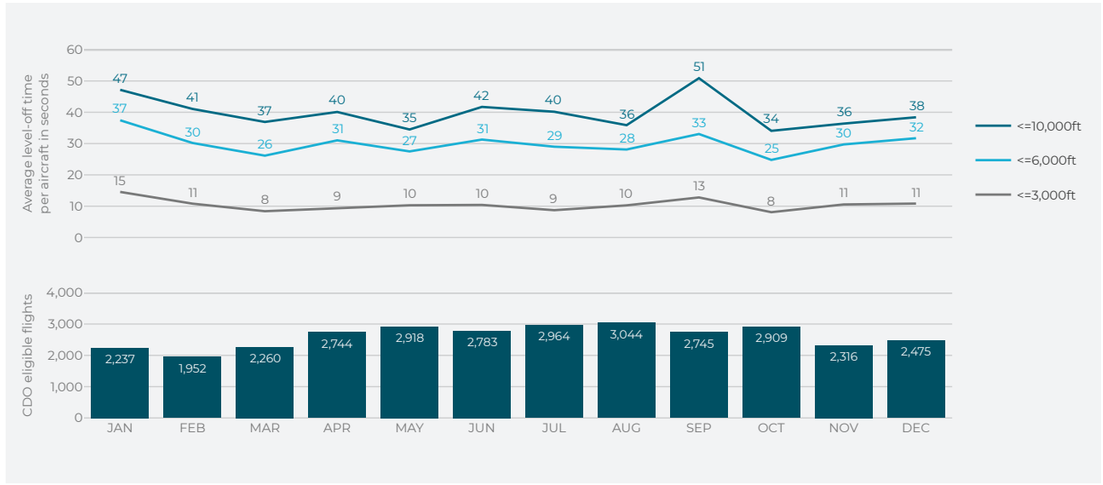
The 'Average level-off time below certain altitude' indicator provides a value representing the average time a descending aircraft spends flying level-off within specific altitude ranges. Three distinct altitude ranges are monitored:

- **10,000 *ft* to *Ground* (GND)**
  The upper boundary aligns with the altitude ceiling of 'CDO Fuel';
- **6,000 *ft* to GND**
  The upper boundary aligns with the altitude ceiling of 'CDO Noise';
- **3,000 *ft* to GND**
  This altitude range focuses on level-off segments in low altitudes, which are excluded from 'CDO Fuel' and 'CDO Noise'.

This indicator is based on recommendations from the European CCO/CDO Action Plan and EUROCONTROL ENV Transparency Working Group, emphasizing its alignment with industry best practices and standards.[17]

Figure 4.6 shows the monthly evolution of average level-off time in 2024, at Charleroi Airport. The chart is accompanied by the count of CDO eligible flights, considered for the calculation of the average values. The highest average of level—off time occurred in January for the range of <=6,000ft and <=3,000ft and in September for the range of <=10,000ft. These two months had the lowest use of RWY 24 due to north-easterly winds (Chapter 1 Traffic).

Figure 4.6: *Monthly average level-off time*



In ***Figure 4.7*** the distribution of average level-off time across runways in 2024 is depicted, along with the number of considered 'CDO eligible flights'. It shows a threefold higher average level-off time at ≤ 3,000 ft for RWY 06 compared to RWY 24. However, on a broader scale, the overall usage of RWY 06 in 2024 was significantly smaller compared to RWY 24. Arrivals on RWY 24 demonstrated notably better performance in terms of the average time spent flying level-off across all monitored altitudes.

Night Movements

The usual operational opening hours of Brussels South Charleroi Airport are from 06:30 until 23:00 local time. Several reasons can lead to adapted opening and/or closing times, as for example works at or in the vicinity of the airport or aircraft arriving outside the defined hours. In the latter case, air traffic services operational hours are extended until the last flight has landed.

A visualisation of the opening hours is given in ***Figure 4.8*** below. It can be seen that there are often extensions of the opening hours in Brussels South Charleroi Airport. Around Easter and between the months of May to October, the airport's closing time is frequently delayed to 00:00 or later, mainly due to late arrivals of Ryanair flights.

Figure 4.7: *Average level-off time per runway*

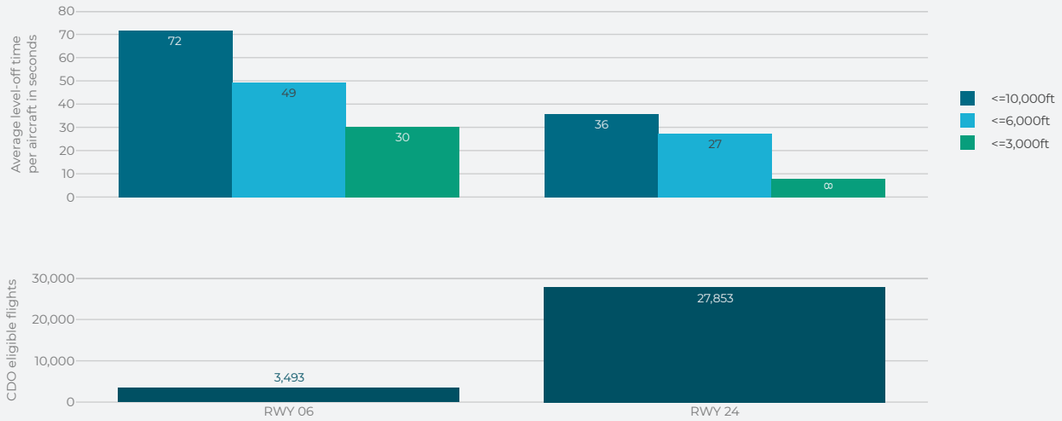
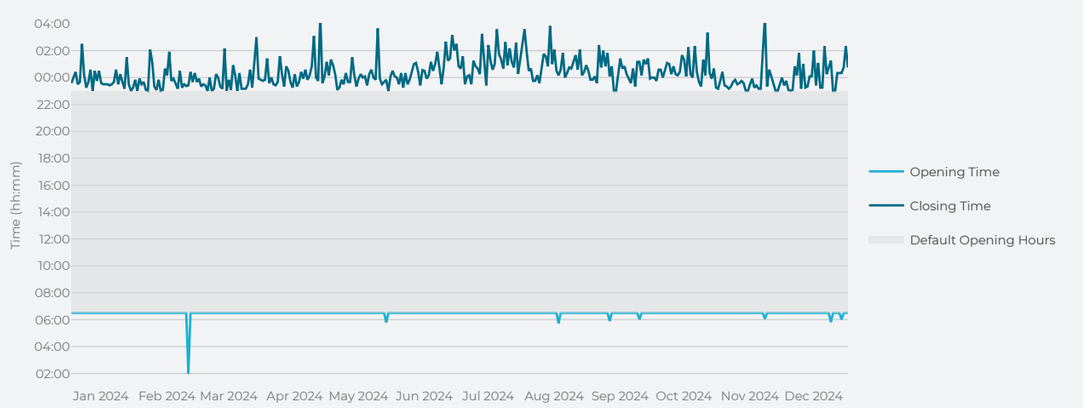
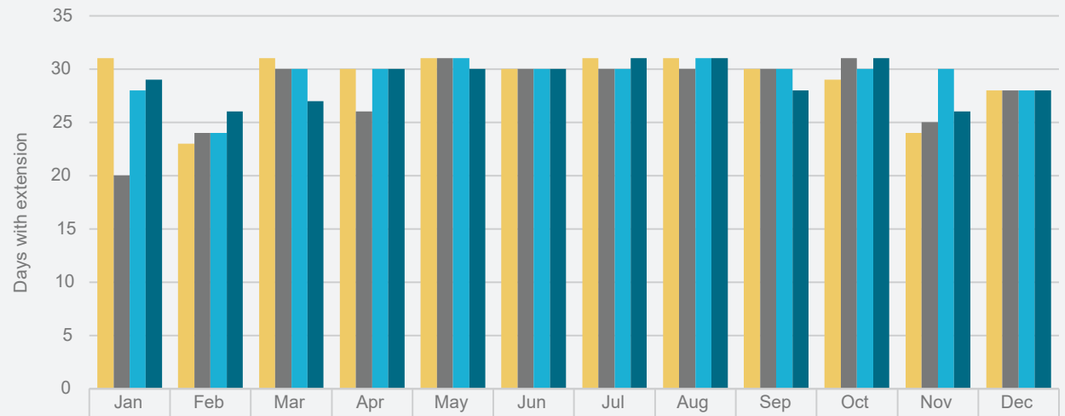


Figure 4.8: *Opening hour*



In 2024, there were a total of 347 days where the operational hours of the airport were extended. ***Figure 4.9*** shows the number of days with an extension of the opening times per month, for the years 2019 and from 2022 until 2024. The number of days with extension is close to previous years levels, with 352 days with extensions in 2023, 335 days in 2022 and 349 days of extensions in 2019.

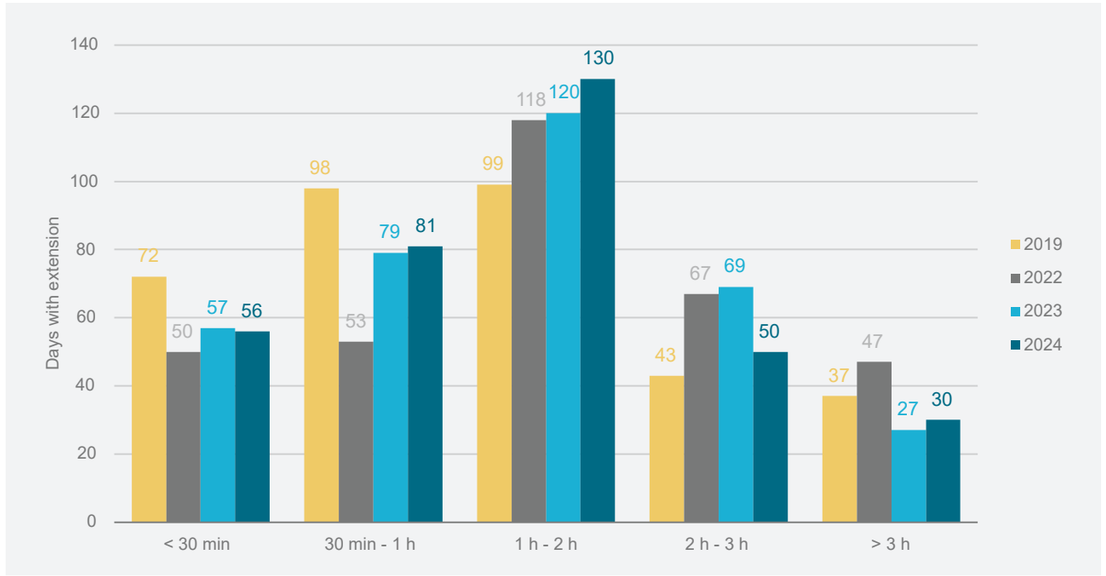
Figure 4.9: *Days with extension of operational hours in Charleroi Airport per year*



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019	31	23	31	30	31	30	31	31	30	29	24	28
2022	20	24	30	26	31	30	30	30	30	31	25	28
2023	28	24	30	30	31	30	30	31	30	30	30	28
2024	29	26	27	30	30	30	31	31	28	31	26	28

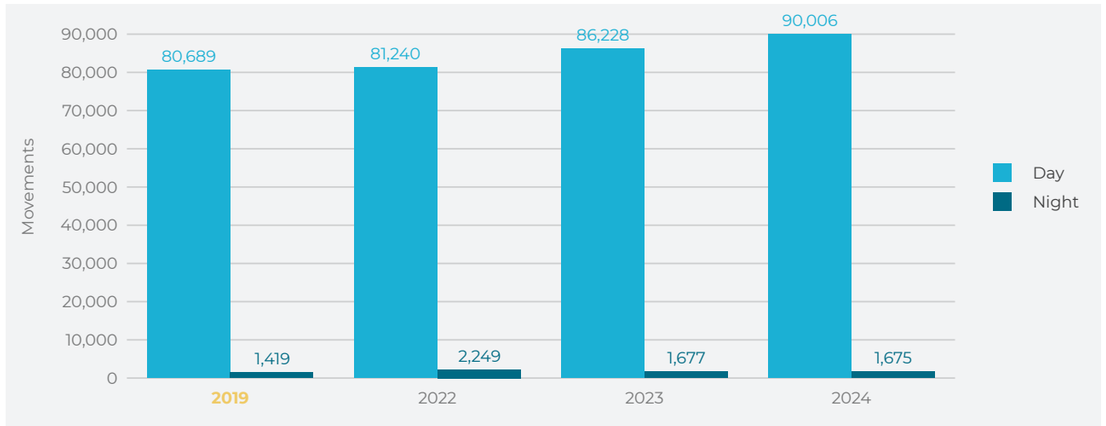
Figure 4.10 depicts the duration of those extensions per category of time: <30 min, 30 – 60 min, 1 – 2 h, 2 – 3 h and >3 h. In 2024, most of the extensions, 130 occurrences representing 38% of the total, lasted between one and two hours. On 30 occasions (9% of the total) the opening times were extended by more than three hours.

Figure 4.10: *Duration of opening hours extensions in Charleroi Airport per year*



There is a strong correlation between the opening times, possible extensions and the number of night movements. The nighttime is defined as time between 23:00 and 06:00 local time. ***Figure 4.11*** shows the number of movements separated between day movements and night movements for the years 2019 and from 2022 to 2024. Based on the present agreement, only traffic that is stationed at Charleroi Airport is operational during night hours, as only that traffic can request extensions. Despite the increase on traffic, the night traffic in 2024 decreased by two movements compared to 2023 and by 26% compared to 2022. It still remains higher than in 2019 by 18%.

Figure 4.11: *Yearly day and night movements*



The following graph and table show the distribution of hourly movements through the night (***Figure 4.12*** and ***Table 4.1)***. Night traffic is at 2023 level, being lower at 23:00 (1,271 in 2024 compared to the 1,304 movements in 2023 and 1,673 in 2022, a 3% and 24% less respectively). On the other hand, night traffic remains higher than in 2019, where the movements at 23:00 are 10% higher in 2024 than in 2019. skeyes has been in coordination with airlines to provide better schedule adherence and therefore fewer night movements.

Figure 4.12: *Yearly night movements per hour*

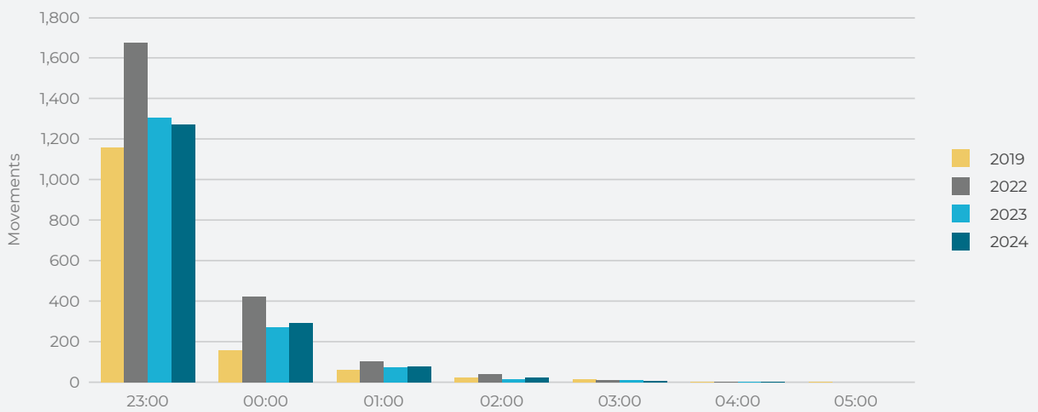


Table 4.1: *Yearly night movements per hour*

Year	23:00	00:00	01:00	02:00	03:00	04:00	05:00
2019	1,158	159	61	24	13	2	2
2022	1,673	421	102	39	11	3	
2023	1,304	270	74	16	12	1	
2024	1,271	294	78	23	7	2	

Wind Patterns

One of the factors that play a main role in the selection of the runway is the wind direction and speed. This is also confirmed in Chapter 1 Traffic, in the Runway Use section, where the relation between wind and runway use can be seen in the present charts. According to the wind rose diagram in ***Figure 4.13***, which shows the wind roses for 2019 and from 2022 to 2024, south-westerly winds are frequent at Charleroi Airport, resulting in a high share of the use of runway 24. Additionally, in 2022 and 2023, there were more north-easterly winds compared to 2024 or 2019, which led to an overall higher use of runway 06 in those years.

The wind roses of each month in 2024 are pictured in ***Figure 4.14***. In most months, the main wind direction was south-westerly. There are a few exceptions however, as January, May, June and September had some winds from the north-east. This explains the higher use of runway 06 during those months.

Figure 4.13: *Yearly wind roses*

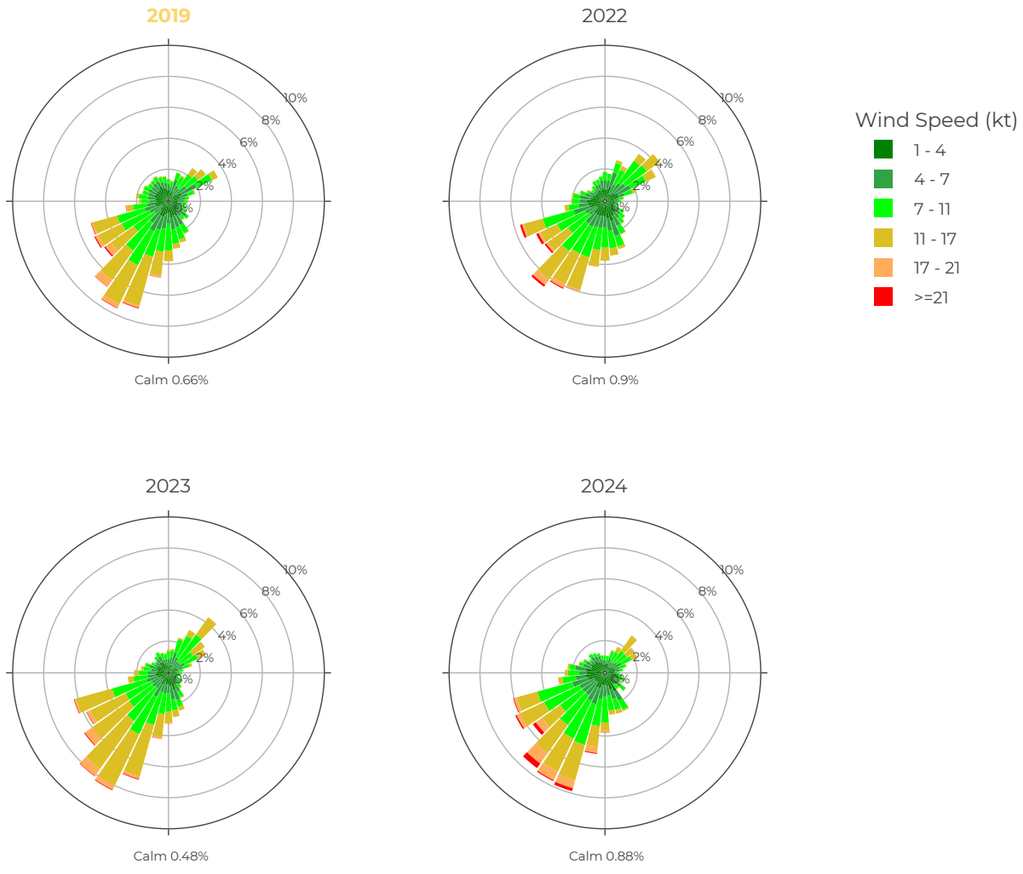
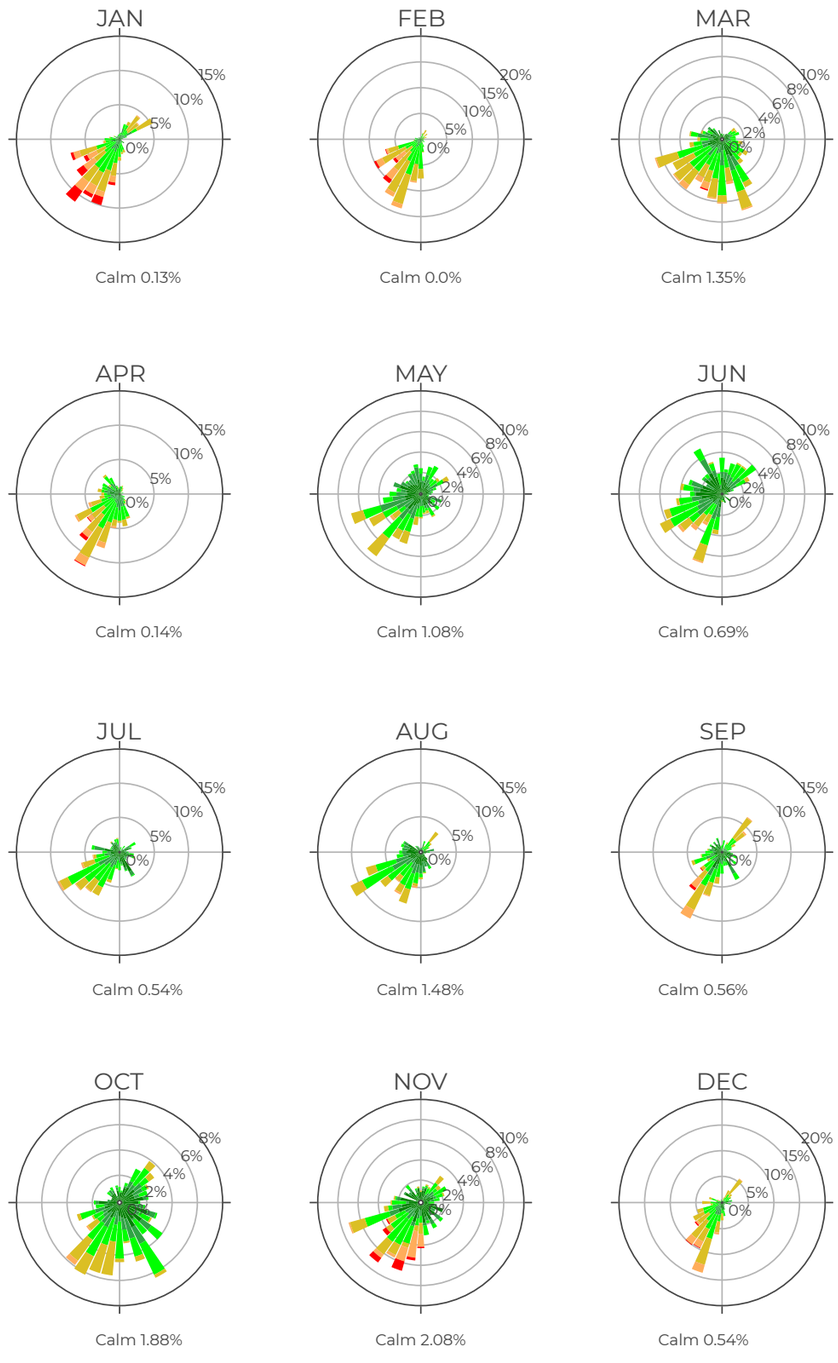


Figure 4.14: *Monthly wind roses in 2024*



Considerations and Improvements

Ongoing efforts to support sustainable operations

To promote green aviation and facilitate the number of CDOs flown to Brussels South Charleroi Airport, different measures are investigated or have already been implemented:

- skeyes monitors and adapts operations to enhance flight efficiency, where feasible. As mentioned in the recommendations and awareness section, skeyes designed a PBN implementation and transition plan describing the way ahead to 2030. The purpose of the transition and implementation plan 2024/2030 is the establishment of a full PBN environment within the Belgian part of the Brussels FIR and at the aerodromes of Antwerp, Brussels, Charleroi, Kortrijk, Liege and Ostend. Once the full PBN environment is realized, an optimization of this PBN environment will be initiated. This comprises the redesign of airspace as well as the routes which can then be redesigned independently from the ground-based infrastructure and placed at the most strategically beneficial location. For Charleroi Airport, since January 2023, the RNP approach on RWY 06 has been actively promoted via ATIS as the primary approach type. skeyes has been analysing its CDO performance, in comparison with other non-RNP approach types, and communicated the on-going results with Charleroi airport and the airlines to continuously improve the environment performance.
- skeyes renewed the GreenATM level 3 accreditation in 2024. Civil Air Navigation Services Organisation (CANSO) GreenATM is an environmental accreditation programme to provide air navigation service providers (ANSPs) with an independent, industry-endorsed, accreditation of their environmental efforts.
- skeyes is engaging with airlines to present CDO statistics and communicate the relevant phraseology, while also raising awareness among ATCOs through training courses and regular updates on current performance and statistics.
- As a member of FABEC, skeyes actively participates in workshops and initiatives to improve – amongst others – CDO performance. skeyes also participates in the AVENIR working group, an element in the EUROCONTROL – EASA Joint Working Program, discussing environmental improvements. An output of these discussions is the creation of the Level-off indicators.
- Additionally, the agreement on ‘collaborative environmental management’ (CEM) at Brussels South Charleroi Airport continues to show benefits.
- skeyes continuously expands and renews its toolset for performing (environmental) assessments. For this purpose, skeyesAnalyzer (a web-based radar visualisation tool) was developed and it is being implemented. This tool will – amongst others – assist various skeyes teams in visualizing, retrieving and analysing aircraft track data. The tool will also increase transparency towards the public, as it will comprise a publicly available interface.

ANNEX

Annex A: Missed Approaches

Table 0.1: *Missed approaches per category per runway*

	Reasons	2019	2022	2023	2024
RWY 06	FOD on the runway	-	-	1	-
	aircraft with technical problems	1	-	1	-
	authorized vehicle still on runway	-	1	-	1
	cabin crew not ready	-	-	-	1
	departing traffic on the runway	2	1	1	1
	other	1	2	-	1
	pilot's error	1	-	-	-
	previous landing on the runway	-	-	1	1
	runway condition	-	-	-	-
	runway incursion	-	-	1	1
	tail wind	-	-	-	1
	taken out of sequence	-	-	-	-
	technical problems of ground equipment	-	-	-	1
	too close behind preceding	-	-	-	1
	unstable approach	4	5	7	5
	weather - thunderstorm - windshear	-	-	-	1
	weather - visibility	1	3	10	4
	Total	**10**	**12**	**22**	**19**
RWY 24	FOD on the runway	1	-	2	6
	aircraft with technical problems	1	-	1	2
	authorized vehicle still on runway	-	-	1	-
	cabin crew not ready	-	-	2	1
	departing traffic on the runway	3	1	3	3
	other	5	2	4	7
	pilot's error	1	-	1	2
	previous landing on the runway	2	1	2	-
	runway condition	1	-	-	-
	runway incursion	-	-	-	-
	tail wind	-	2	2	4
	taken out of sequence	1	-	-	-
	technical problems of ground equipment	-	-	-	2
	too close behind preceding	-	-	-	1
	unstable approach	22	16	24	40
	weather - thunderstorm - windshear	11	14	15	16
	weather - visibility	2	2	1	7
	Total	**50**	**38**	**58**	**91**

Annex B: Fact sheets

Yearly Evolution

- *4% increase in movements compared to 2023.*

Movements	2019	2022	2023	2024	2024 vs 2023	2024 vs 2019
IFR	54,948	57,674	60,364	67,415	+12%	+23%
VFR	27,160	25,815	27,541	24,266	-12%	-11%
Total	82,108	83,489	87,905	91,681	+4%	+12%

Quarterly comparison

- *Largest increase in Q1 compared to 2023 and 2019.*

Movements	2019	2022	2023	2024	2024 vs 2023	2024 vs 2019
Q1	17,147	18,385	18,645	21,902	+17%	+28%
Q2	22,606	22,560	23,900	24,322	+2%	+8%
Q3	23,075	23,366	24,774	24,335	-2%	+5%
Q3	19,280	19,178	20,586	21,122	+3%	+10%

Missed Approaches

111 missed approaches in 2024 (+39% vs. 2023).

TOP 3 causes in 2024:

1. Unstable approach (24);
2. I: Wx - thunderstorm - Windshear (17);
3. H: Wx - visibility (11).

Safety Occurrences

- 9 runway incursions, one with direct ATM contribution (severity C);
- 5 TWY/Apron events, a decrease compared to the 9 in 2023, 7 in 2021 and 1 in 2019.

Capacity

- Capacity exceeded on 14 days for 24-24 and on 1 day for runway 06-06, only due to a majority of VFR traffic;
- IFR capacity was never exceeded.

Runway configuration	Declared IFR Capacity	Maximum Movements/Hour in 2024
24-24	42 movements/hour	46 movements/hour
06-06	42 movements/hour	43 movements/hour

Punctuality

Arrival delay:

- Arrival delay: 611 min/flight due to G-Aerodrome Capacity and O-Other (hole on the RWY);
- CRSTMP delay: 0 min/flight.

ATFM impact:

- Departures: 130,135 minutes of ATFM delay, 2% (2,836 min) due to skeyes' regulations;
- Arrivals: 135,339 minutes of ATFM delay, 4% (4,851 min) due to skeyes' regulations.

PRS

- 88% of the movements used the PRS.

Extensions of operational times

- 347 days with extension of operational times, with 210 extensions > 1 hour;
- 1,675 night movements, with 1,271 before 00:00.

CDO

- Increase of CDO numbers in comparison with previous years due to the increase in total movements, but similar CDO rates (percentage of arrivals) as in the previous years;
- The Average level-off time below certain altitude shows an increase of level-offs during the months with more north-easterly winds.

skeyes nice to guide you

Runway Performance Report **2024**

skeyes / tervuursesteenweg 303 / b-1820 Steenokkerzeel
T +32 2 206 21 11 / F +32 2 206 22 88
Member of FABEC

www.skeyes.be