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Runway Performance Report **2024**

BRUSSELS AIRPORT

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Runway performance report

Brussels Airport

EXECUTIVE SUMMARY

This report provides an overview of Air Traffic Management (ATM) performance at Brussels International Airport, hereafter referred to as Brussels Airport, for the year 2024. ATM Performance is driven by four Key Performance Areas (KPAs): safety, capacity, environment, and cost-efficiency. The first three of these four KPAs are covered in this report, to provide skeyes' stakeholders and anyone of interest with interesting insights into the operations at Brussels Airport.

Traffic

In 2024, Brussels Airport experienced a total of 198,620 movements, reflecting an increase to the previous year (+3% compared to 2023), but not yet reaching pre-pandemic figures with traffic being at 85% of 2019. The increase in passengers (6.4% vs 2023) was higher than the increase in movements, mainly due to the use of larger aircraft. Cargo movements maintained at the same level as in 2023 as Brussels Airport continued to play a crucial role for air cargo transport.

Overall, daily traffic patterns were showing a new trend in 2024 with a new afternoon peak at 14:00-15:30, while still maintaining a morning peak around 10:00 and an evening peak at 19:30/20:00. The most used runways were 25R and 25L, with the latter one being used almost solely for arrivals. Due to differences in the wind direction compared to previous years, the usage of these runways did not decrease between April and June as it usually does. In 2024, RWY 01/19 was closed from August 7th until September 1st for renovation works (with RWY 07R/25L being shortly closed as well for works on the crossing section of these two runways).

The use of a Communication, Navigation, Surveillance (CNS) drone has been introduced (in its testing phase) in 2023 to monitor the performance of navigation aids. These operations were among those that contributed to the total of 6,707 recorded authorized drone operations in the vicinity of Brussels Airport, representing a 33% increase compared to the previous year.

Safety

Safety is a fundamental aspect of air traffic control; hence, skeyes' safety unit follows up on safety occurrences and missed approaches to analyse situations, identify trends, and, when necessary, conduct thorough investigations.

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, 302 missed approaches were logged, which is an increase of 8% compared to 2023. The rate of missed approaches per 1,000 arrivals increased by 3%. The most common reasons for a missed approach in 2024 were unstable approaches, departing traffic on the runway, and weather conditions. skeyes promotes the increased use of Performance Based Navigation (PBN) procedures, which greatly improve predictability; and therefore also situational awareness.

Concerning the safety occurrences, the reported events on runways and taxiways remained the same, comparing to 2023. In particular, there were twelve runway incursions, one with indirect ATM ground contribution while all others were without ATM ground contribution. Deviations from Air Traffic Control (ATC) clearances decreased, while deviations from ATM procedures increased compared to 2023. Taxiway incursions and taxiway/apron events decreased significantly, while runway events maintained at the same level compared to 2023. The close collaboration between skeyes and Brussels Airport continued this year for the follow-up and monitoring of occurrences linked to push-back issues.

Capacity and Punctuality

For Brussels Airport, skeyes has defined a declared capacity for most of the used runway configurations. This declared capacity is calculated based on the airport layout, the traffic in Brussels Airport, and certain assumptions. Thus, it provides a theoretical value (that equals to 90% of the maximum RWY throughput) of an optimal combination of departures and arrivals the aerodrome can handle within an hour under optimal conditions for the runway configuration in use. At maximum, the declared capacity for Brussels Airport is 75 movements/hour (for runway configuration 25R – 25L,25R), however, Brussels Airport is a coordinated airport in Belgium and the declared capacity for slot coordination during the day is a maximum of 74 total movements per hour. In practice, this upper limit was never exceeded in 2024. The lower declared capacities for other runway configurations were exceeded on nine days by a maximum of four movements.

Since 2015 skeyes is subject to an annual target regarding Air Traffic Flow Management (ATFM) arrival delay, delay of a flight caused by a regulation attributable to the terminal and air navigation services of the destination airport. In 2024, only Brussels is considered as a contributing airport and the target for 2024 is set at 0.12 minutes per flight for delay due to reasons in the CRSTMP category (C-ATC Capacity, R- ATC Routing, S- ATC Staffing, T- Equipment (ATC), M- Airspace Management, P-Special Event). In 2024, Brussels Tower caused 27,145 minutes of delay in total, of which 2,386 minutes were due to reasons in the CRSTMP category. Translated to delay per flight, this is 0.28 minutes for all reasons and 0.02 for reasons in the CRSTMP category, under the target.

Environment

Brussels Airport is located in a densely populated area and has to interact with the neighbouring regions surrounding the airport. A Preferential Runway System (PRS) is in place at Brussels Airport and defines the runways to use in predefined conditions, mainly related to weather. When these conditions are not met, another runway configuration can be used. Such deviations from the PRS were observed 23% of the time in 2024, which is less than the 31% in 2023. The main reasons for deviations were meteorological conditions and non-availability of the runways.

Another environmental objective is the KPI of Continuous Descent Operations (CDO). Since 2023, a CDO flag has been incorporated to optimize the set of flights relevant to CDO monitoring. The update is done for all previous years as well to improve the transparency and fairness in the historical comparison of CDO performance. Of all arrivals that were capable of performing a CDO in ideal conditions, 66% did so below flight level (FL) 100 (or 10,000 ft), and 81% did so below FL60. These figures show a positive increase in CDO operations compared to the previous year. The 'average level-off time below certain altitude' (10,000 ft, 6,000 ft and 3,000 ft) shows that for the altitude band from ground level to 10,000 ft there is a notable peak in September, the month with the highest share of movements for RWY 01 (13% of the total movements that month) and for RWY 07L (12%).

Furthermore, to minimize the noise at night (between 23:00 and 06:00), the number of night slots is limited, in accordance with the airport's exploitation permit and regulation. Whereas the traffic during the day increased in 2024, the traffic at night was reduced by 2% compared to 2023 to a total of 16,380 movements. This is 94% of the night traffic in 2019. This development leads to less noise for local residents and was encouraged by new fees, which became effective in April 2023 that also take into account a day/night factor alongside other environmentally friendly incentives (such as higher fees for more aircraft noise and emission).
Finally, skeyes and Brussels Airport have been participating in the Highly Efficient Green Operations (HERON) project since 2023. They are contributing to the project by conducting operational flight demonstrations of green landings, that began on October 1st, in 2024. With these demonstration flights, skeyes and Brussels Airport are taking a major step towards cleaner, quieter, and more efficient aviation.

SAMENVATTING

Dit verslag biedt een overzicht van de prestaties inzake luchtverkeersbeheer (ATM, Air Traffic Management) op Brussels Airport voor 2023. Die prestaties worden bepaald door vier prestatiekerngebieden (KPAs, Key Performance Areas): veiligheid, capaciteit, milieu en kostenefficiëntie. De eerste drie van die vier prestatiekerngebieden komen in dit verslag aan bod en hebben tot doel interessante inzichten te verschaffen over de activiteiten op Brussels Airport aan de stakeholders van skeyes en andere belangstellenden.

Verkeer

In 2024 registreerde Brussels Airport 198.620 bewegingen, een stijging tegenover het jaar voordien. (+3% vergeleken met 2023); desondanks bereikte het verkeersvolume nog niet dat van vóór de pandemie, met 85% van het verkeer van 2019. Het aantal passagiers (+6,4% vs. 2023) nam sterker toe dan het aantal bewegingen, voornamelijk door het gebruik van grotere vliegtuigen. De bewegingen in het vrachtverkeer bleven op hetzelfde niveau als in 2023 omdat Brussels Airport een cruciale rol bleef spelen in het luchtvrachtvervoer.

In het algemeen vertoonden de dagelijkse verkeerspatronen een nieuwe trend in 2024 met een nieuwe namiddagpiek om 14:00-15:30 uur. De ochtendpiek omstreeks 10:00 uur en een avondpiek omstreeks 19:30/20:00 bleven aanhouden. De meest gebruikte start- en landingsbanen waren 25R en 25L, waarbij de laatste bijna uitsluitend voor aankomsten werd gebruikt. Wegens verschillen in de windrichting ten opzichte van voorgaande jaren werden die banen tussen april en juni niet minder gebruikt zoals gewoonlijk het geval is. In 2024 was baan 01/19 gesloten voor renovatiewerken van 7 augustus tot 1 september (en baan 07R/25L was ook kortstondig gesloten voor werken aan het kruispunt van die twee banen).

In 2023 werd voor het eerst gebruik gemaakt van een CNS-drone (Communication, Navigation & Surveillance) (in testfase) om de prestaties van navigatiehulpmiddelen te monitoren. Die operaties droegen o.a. bij aan het totaal van 6.707 geregistreerde toegestane drone-operaties in de nabijheid van Brussels Airport, een stijging met 33% ten opzichte van het voorgaande jaar.

Veiligheid

Veiligheid is een fundamenteel aspect van de luchtverkeersleiding. Daarom volgt de safety unit van skeyes veiligheidsvoorvallen en afgebroken naderingen op om situaties te analyseren, trends in kaart te brengen en, zo nodig, verder onderzoek te verrichten.

Het aantal afgebroken naderingen (een procedure die wordt gebruikt wanneer de nadering niet kan worden voortgezet met het oog op een veilige landing), en in het bijzonder de oorzaak ervan, kunnen aangeven welke maatregelen moeten worden genomen om de luchtvaartnavigatiedienstverlening veiliger te maken. In 2024 werden 302 afgebroken naderingen geregistreerd, goed voor een stijging van 8% ten opzichte van 2023. Het aantal afgebroken naderingen per 1.000 aankomsten nam toe met 3%. De vaakst voorkomende oorzaken voor een onafgebroken nadering in 2024 waren onstabiele naderingen, vertrekkend verkeer op de startbaan, en de weersomstandigheden. skeyes promoot het toegenomen gebruik van PBN-procedures (Performance Based Navigation), waardoor de voorspelbaarheid aanzienlijk verbetert, evenals het situationeel bewustzijn.

Wat de veiligheidsvoorvallen betreft, bleef het aantal gerapporteerde voorvallen op de start- en landingsbanen en taxibanen gelijk in vergelijking met 2023. Met name deden zich twaalf runway incursions voor: één voorval met onrechtstreekse bijdrage van skeyes, alle andere voorvallen zijn zonder bijdrage van skeyes. De afwijkingen van de klaringen door de luchtverkeersleiding (ATC clearances) namen af, terwijl de afwijkingen van de procedures voor luchtverkeersbeheer (ATM procedures) toenamen ten opzichte van 2023. De Taxiway incursions en voorvallen op taxibaan/platform daalden aanzienlijk, terwijl de voorvallen op de start- en landingsbanen op hetzelfde niveau bleven als in 2023. De nauwe samenwerking tussen skeyes en Brussels Airport inzake het opvolgen en monitoren van voorvallen die verband houden met push-back-kwesties, werd dit jaar voortgezet.

Capaciteit en stiptheid

Voor Brussels Airport heeft skeyes een opgegeven capaciteit gedefinieerd voor de meeste van de gebruikte baanconfiguraties. Die opgegeven capaciteit wordt berekend op basis van de lay-out van de luchthaven, het verkeer op Brussels Airport en bepaalde veronderstellingen. Ze voorziet dus in een theoretische waarde (die gelijk is aan 90% van de maximale doorvoer op de banen) een optimale combinatie van vertrekkende en aankomende vluchten die het vliegveld in een uur tijd kan verwerken onder optimale omstandigheden voor de in gebruik zijnde baanconfiguratie. De opgegeven capaciteit voor Brussels Airport bedraagt maximaal 75 bewegingen per uur (voor baanconfiguratie 25R — 25L,25R). Brussels Airport is echter een gecoördineerde luchthaven in België en de opgegeven capaciteit voor slotcoördinatie overdag bedraagt maximaal 74 bewegingen per uur. In de praktijk was die bovengrens in 2024 nooit overschreden. De lagere opgegeven capaciteitswaarden voor andere baanconfiguraties werden op negen dagen met maximaal 4 bewegingen overschreden.

Sinds 2015 geldt voor skeyes een jaardoelstelling inzake ATFM-vertraging (ATFM, Air Traffic Flow Management) bij aankomst. Dat is de vertraging die een vlucht oploopt door een regulering die toe te schrijven is aan de eindnaderings- en luchtvaartnavigatiediensten op de luchthaven van bestemming. In 2024 werd enkel Brussels Airport beschouwd als een bijdragende luchthaven en werd de doelstelling vastgelegd op 0,12 minuten per vlucht voor vertraging te wijten aan redenen uit de CRSTMP-categorie (C-ATC Capacity, R- ATC Routing, S- ATC Staffing, T- Equipment (ATC), M-Airspace Management, P-Special Event). In 2024 veroorzaakte de torenverkeersleiding van Brussels Airport in totaal 27.145 minuten vertraging, waarvan 2.386 minuten door redenen uit de CRSTMP-categorie. Omgerekend naar de vertraging per vlucht bedraagt ze 0,28 minuten voor alle redenen en 0,02 minuten voor redenen uit de CRSTMP-categorie, onder de doelstelling.

Milieu

Brussels Airport ligt in een dichtbevolkt gebied en moet in interactie gaan met zijn omgeving. Op Brussels Airport geldt een systeem van preferentieel baangebruik (Preferential Runway System of PRS) dat bepaalt welke banen moeten worden gebruikt onder vooraf bepaalde voorwaarden, voornamelijk gerelateerd aan de weersomstandigheden. Wanneer niet aan die voorwaarden wordt voldaan, kan een andere baanconfiguratie worden gebruikt. Dergelijke afwijkingen van het PRS vonden in 2024 gedurende 23% van de tijd plaats, wat minder is dan de 31% in 2023. De belangrijkste redenen voor de afwijkingen waren de weersomstandigheden en onbeschikbaarheid van de start- en landingsbanen.

Een andere milieudoelstelling is de KPI van de Continuous Descent Operations (CDO). Sinds 2023 wordt een CDO-indicator opgenomen om de reeks vluchten die in aanmerking komen voor CDO-monitoring te optimaliseren; de update wordt voor alle jaren uitgevoerd om de historische vergelijking van de prestaties inzake CDO transparanter en billijker te maken. Van alle aankomende vluchten die in ideale omstandigheden een CDO konden uitvoeren, deed 66% dat onder vliegniveau 100 en 81% onder vliegniveau 60. Die cijfers vertonen een positieve groei in CDO ten opzichte van het voorgaande jaar. De gemiddelde horizontale vliegtijd onder een bepaalde hoogte (10.000 voet, 6.000 voet en 3.000 voet) laat zien dat er voor de hoogteband van grondniveau tot 10.000 voet een opvallende piek is in september, de maand met het hoogste aandeel van bewegingen voor baan 01 (13% van het totale aantal bewegingen die maand) en voor baan 07L (12%).

Om de geluidshinder 's nachts (tussen 23.00 en 06.00 uur) tot een minimum te herleiden, is het aantal nachtslots bovendien beperkt, in overeenstemming met de exploitatievergunning van de luchthaven en met de reglementering. Terwijl het verkeer overdag toenam in 2024, nam het verkeer 's nachts af met 2% ten opzichte van 2023 tot een totaal van 16.380 bewegingen, goed voor 94% van het nachtverkeer in 2019. Die evolutie leidde tot minder geluidsoverlast voor de lokale omwonenden en werd in de hand gewerkt door nieuwe heffingen, die in april 2023 van kracht werden en die ook rekening houden met een dag-/nachtfactor, naast andere milieuvriendelijke stimulansen (zoals hogere heffingen voor meer geluidshinder en hogere uitstoot).

Tot slot nemen skeyes en Brussels Airport sinds 2023 deel aan het project Highly Efficient Green Operations (HERON). Ze dragen bij tot het project, dat van start ging op 1 oktober 2024, door operationele vliegdemonstraties van groene landingen uit te voeren. Met die demovluchten zetten skeyes en Brussels Airport een belangrijke stap in de richting van een schonere, stillere en efficiëntere luchtvaart.

SYNOPSIS

Ce rapport offre un récapitulatif des performances de la gestion du trafic aérien (Air Traffic Management (ATM) Performance) à l'aéroport international de Bruxelles, ci-après l'aéroport de Bruxelles, pour l'année 2024. Les performances ATM reposent sur quatre domaines de performance clés (KPA, Key Performance Areas) : la sécurité, la capacité, l'environnement et l'efficacité économique. Les trois premiers de ces quatre KPA sont traités dans le présent rapport, afin de fournir aux stakeholders de skeyes, et à toute personne qui partage ses intérêts, des informations intéressantes sur les opérations à Brussels Airport.

Trafic

En 2024, l'aéroport de Bruxelles a enregistré un total de 198.620 mouvements, ce qui représente une augmentation par rapport à l'année précédente (+3% de plus qu'en 2023), mais n'atteint pas encore les chiffres d'avant la pandémie, le trafic se situant à 85% de 2019. L'augmentation du nombre de passagers (6,4% de plus qu'en 2023) a été supérieure à celle des mouvements, ce qui est principalement dû à l'utilisation de plus grands avions. Les mouvements de fret sont restés au même niveau qu'en 2023 et l'aéroport de Bruxelles a continué de jouer un rôle crucial pour le transport aérien de fret.

Dans l'ensemble, les modèles du trafic quotidiens montraient une nouvelle tendance en 2024, avec un nouveau pic l'après-midi de 14h à 15h30, tout en conservant un pic le matin aux environs de 10h et un pic le soir à 19h30/20h. Les pistes les plus utilisées étaient les 25R et 25L, cette dernière servant presque exclusivement pour les arrivées. En raison des changements de direction du vent en comparaison aux années précédentes, l'utilisation de ces pistes n'a pas été plus faible d'avril à juin, comme c'est généralement le cas. En 2024, la RWY 01/19 a été fermée du 7 août au 1er septembre en raison de travaux de rénovations (et la RWY 07R/25L a été fermée pour une courte durée également pour des travaux à l'intersection des deux pistes).

L'utilisation d'un drone de Communication, Navigation, Surveillance (CNS) a été introduite (dans sa phase d'essai) en 2023 pour contrôler la performance des aides à la navigation. Ces opérations faisaient partie de celles ayant permis d'enregistrer un total de 6.707 opérations de drones autorisées à proximité de l'aéroport de Bruxelles, ce qui représente une augmentation de 33% par rapport à l'année précédente.

Sécurité

La sécurité représente un aspect fondamental du contrôle aérien ; c'est pourquoi la Safety Unit de skeyes suit les événements de sécurité et les approches interrompues afin d'analyser des situations, identifier des tendances, et, lorsque c'est nécessaire, mener des enquêtes approfondies.

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, 302 approches interrompues ont été enregistrées, soit une augmentation de 8% par rapport à 2023. Le taux d'approches interrompues pour 1.000 arrivées a augmenté de 3%. Des approches instables, du trafic en partance sur la piste, et les conditions météorologiques sont les raisons les plus fréquentes d'une approche interrompue en 2024. skeyes encourage l'utilisation accrue des procédures PBN (Performance Based Navigation). Ce type d'approche améliore grandement la prévisibilité et par conséquent aussi la conscience situationnelle.

En ce qui concerne les événements liés à la sécurité, les événements signalés, survenus sur les pistes et les voies de circulation, sont restés au même niveau par rapport à 2023. En particulier, il y a eu douze incursions de piste, dont une due indirectement à l'ATM au sol, mais tous les autres ne sont pas imputables à l'ATM au sol. Le nombre d'écarts par rapport aux clearances du contrôle de la circulation aérienne a diminué, tandis que le nombre d'écarts aux procédures ATM a augmenté en comparaison à 2023. Le nombre d'incursions sur la voie de circulation et d'événements se déroulant sur la voie de circulation/l'aire de trafic a diminué considérablement, alors que le nombre d'événements ayant lieu sur la piste est resté au même niveau par rapport à 2023. La collaboration étroite entre skeyes et l'aéroport de Bruxelles s'est poursuivie cette année afin de suivre et de surveiller les évènements liés aux problèmes de push-back.

Capacité et ponctualité

Pour l'aéroport de Bruxelles, skeyes a défini une capacité déclarée pour la plupart des configurations de pistes utilisées. Cette capacité déclarée est calculée sur base de la configuration de l'aéroport et du trafic à l'aéroport de Bruxelles, et de certaines hypothèses. Elle fournit donc une valeur théorique (qui équivaut à 90% de la capacité maximale de la piste) d'une combinaison optimale de départs et d'arrivées que l'aérodrome peut traiter en une heure dans des conditions optimales pour la configuration de piste utilisée. Au maximum, la capacité déclarée pour l'aéroport de Bruxelles est de 75 mouvements/heure (pour la configuration de piste 25R - 25L, 25R). Toutefois, l'aéroport de Bruxelles est un aéroport coordonné en Belgique et la capacité déclarée pour la coordination des slots pendant la journée est de maximum 74 mouvements totaux par heure. En pratique, cette limite maximale n'a jamais été dépassée en 2024. Les capacités déclarées inférieures pour d'autres configurations de pistes ont été dépassées pendant neuf jours par un maximum de quatre mouvements.

Depuis 2015, skeyes est soumise à un objectif annuel concernant le retard ATFM (Air Traffic Flow Management) 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. En 2024, seul Bruxelles est considéré comme un aéroport contributeur et l'objectif pour 2024 est fixé à 0,12 minute par vol pour les retards dus à des raisons relevant de la catégorie CRSTMP (C-ATC Capacity, R- ATC Routing, S- ATC Staffing, T- Equipment (ATC), M- Airspace Management, P-Special Event). En 2024, la tour de Bruxelles a causé 27.145 minutes de retard au total, dont 2.386 minutes pour des raisons relevant de la catégorie CRSTMP. Converti en retard par vol, ce chiffre est de 0,28 minute pour toutes les raisons et de 0,02 minute pour les raisons relevant de la catégorie CRSTMP, ce qui est en deçà de l'objectif.

Environnement

L'aéroport de Bruxelles est situé dans une zone densément peuplée et doit interagir avec la région qui l'entoure. l'aéroport de Bruxelles a mis en place un système de pistes préférentielles (PRS, Preferential Runway System) qui définit les pistes à utiliser dans des conditions prédéfinies, essentiellement liées aux conditions météorologiques. Lorsque ces conditions ne sont pas réunies, une autre configuration de piste peut être utilisée. De telles dérogations par rapport au PRS ont été observées pour 23% du temps en 2024, soit moins que les 31% de 2023. Les principales raisons de ces dérogations étaient les conditions météorologiques et la non-disponibilité des pistes.

Un autre objectif environnemental est le KPI des Continuous Descent Operations (CDO ou opérations en descente continue). Depuis 2023, un indicateur CDO a été intégré pour optimiser l'ensemble des vols pertinents pour le monitoring des CDO. La mise à jour est effectuée pour toutes les années afin d'améliorer la transparence et l'équité dans la comparaison historique des performances CDO. Sur l'ensemble des arrivées qui étaient capables d'effectuer une CDO dans des conditions idéales, 66% l'ont fait en dessous du niveau de vol 100, et 81% en dessous du niveau de vol 60. Ces chiffres montrent une augmentation positive des CDO par rapport à l'année précédente. Le 'temps moyen de mise en palier sous une certaine altitude' (10.000 pieds, 6.000 pieds et 3.000 pieds) indique que pour la bande d'altitude du niveau du sol jusqu'à 10.000 pieds, il y a un pic notable en septembre, le mois au cours duquel a lieu le plus grand nombre de mouvements sur la RWY01 (13% des mouvements totaux du mois) et sur la RWY07L (12%).

En outre, afin de minimiser le bruit la nuit (entre 23h et 6h), le nombre de slots de nuit est limité, conformément au permis d'exploitation de l'aéroport et à la réglementation. Alors que le trafic de jour a augmenté en 2024, le trafic de nuit a été réduit de 2% (par rapport à 2023) pour atteindre un total de 16.380 mouvements. Cela représente 94% du trafic nocturne en 2019. Cette évolution entraîne moins de nuisances sonores pour les riverains et a été encouragée par de nouvelles redevances, qui sont entrées en vigueur en avril 2023 et qui prennent également en compte un facteur jour/nuit, parallèlement à d'autres incitations respectueuses de l'environnement (telles que des redevances plus élevées pour les aéronefs qui font plus de bruit et qui produisent plus d'émissions).

Enfin, skeyes et l'aéroport de Bruxelles participent au projet « Highly Efficient Green Operations (HERON) » depuis 2023. Ils contribuent au projet en effectuant des démonstrations de vol opérationnelles d'atterrissages verts, qui ont débuté le 1er octobre 2024. Avec ces vols de démonstration, skeyes et l'aéroport de Bruxelles font un grand pas vers une aviation plus propre, plus silencieuse et plus efficace.

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GLOSSARY

AAE	Above Aerodrome Elevation
AIP	Aeronautical Information Publication
AMC	Acceptable Means of Compliance
AMS	Airport Movement System
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATFM	Air Traffic Flow Management
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
BAC	Brussels Airport Company
BATC	Brussels Airport Traffic Control
BCAA	Belgian Civil Aviation Authority
BSC	Belgium Slot Coordination
BURDI	Belgium-Netherlands U-space Reference Design Implementation
BVLOS	Beyond Visual Line of Sight
CAA	Civil Aviation Authority
CCO	Continuous Climb Operations
CDO	Continuous Descent Operation
CEM	Collaborative environmental management
CINEA	European Climate, Infrastructure and Environment Executive Agency
CISP	Common Information Service Provider
COVID-19	Corona Virus Disease (2019)
CNS	Communication, Navigation, Surveillance
CRSTMP	C - Capacity, R - Routing, S - Staffing, T - Equipment, M - Airspace Management, P - Special Event
CTR	Control Zone of an Airport
DSA	Drone Service Application
EASA	European Aviation Safety Agency
EBBR	Brussels Airport ICAO Code
EU	European Union
FABEC	Functional Airspace Block Europe Central
FL	Flight Level
FMP	Flow Management Position
ft	Feet
GeoZone	Unmanned Aircraft System geographical zone
HERON	Highly Efficient Green Operations
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
ISGS	Increased Second Glide Slope
KPA	Key Performance Area
KPI	Key Performance Indicator
LIDAR	Light Detection And Ranging
LRST	Local Runway Safety Team
LT	Local Time
PANS	Procedures for Air Navigation Services
PBN	Performance Based Navigation
PRS	Preferential Runway System
PRU	Performance Review Unit
RAT	Risk Analysis Tool
RI	Runway Incursion
RNAV	Area Navigation
RNP	Required Navigational Performance
ROTA	Runway Occupancy Time for Arrival
RP3	Reference period 3
RPAS	Remotely Piloted Aircraft System
RWY	Runway
SRO	Simultaneous Runway Occupancy
TWY	Taxiway
UAS	Unmanned Aircraft System
USSP	U-Space Service Provider
UTC	Universal Time Coordinated
VFR	Visual Flight Rules
VHF	Very High Frequency
VLL	Very low level zones
VLOS	Visual Line of Sight
VOR	VHF Omnidirectional Range

1 TRAFFIC

This chapter presents the traffic data of Brussels International Airport (International Civil Aviation Organization (ICAO) code: EBBR) as recorded by the Airport Movement System (AMS). This AMS is an in-house developed tower Air Traffic Control (ATC) system that thoroughly records aircraft movements within the aerodrome and its Control Zone (CTR). Movements are categorized into movements of aircraft either crossing the CTR, landing or taking off at the aerodrome. As this report considers runway performance, movements such as crossings of CTRs are not considered.

The numerical data presented in this report thus encapsulates movements in the form of take-offs or landings, encompassing all kind of traffic at the aerodrome, including flights under Visual Flight Rules (VFR) and Instrumental Flight Rules (IFR), helicopters and airplanes, and traffic of any market segment (e.g. commercial, military, or general aviation).

Adhering to the aerodrome movement definition established by the Belgian Civil Aviation Authority (BCAA), each recorded instance is quantified as follows:

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

Traffic Overview

YEARLY FIGURES

Throughout this report, the yearly analysis is conducted using 2019 as the reference year, as it represents the last full year of pre-pandemic operations, while the past three years are analysed to highlight the evolving recovery patterns resulting from the impact of Corona Virus Disease (2019) (COVID-19). The number of aircraft movements over the past three years, showcasing the reference year of 2019, have evolved as follows:

2019:	**234,462 movements**	(231,275 IFR;	3,187 VFR)
2022:	**178,930 movements**	(176,179 IFR,	2,751 VFR)
2023:	**192,267 movements**	(189,408 IFR,	2,859 VFR)
2024:	**198,620 movements**	(196,134 IFR,	2,486 VFR)

Traffic at Brussels Airport in 2024 has continued to rise, as in all post-COVID years. There were a total of 198,620 flights operated at Brussels Airport in 2024, which is a +3% increase of traffic compared to 2023. However, the number of movements are not yet reaching the pre-pandemic figures of 2019, being at -15% compared to the reference year.

Figure 1.1 shows the traffic evolution at Brussels Airport since 1997. Peaks and drops are indicated with the events that caused them (Sabena's bankruptcy, Financial crisis, etc). Even though various events influenced the fluctuation over the last 27 years, it is COVID-19 that had the biggest impact on traffic. Nevertheless, traffic numbers in 2022, 2023 and 2024 show a stable increase.

Figure 1.1: *Historical traffic overview*

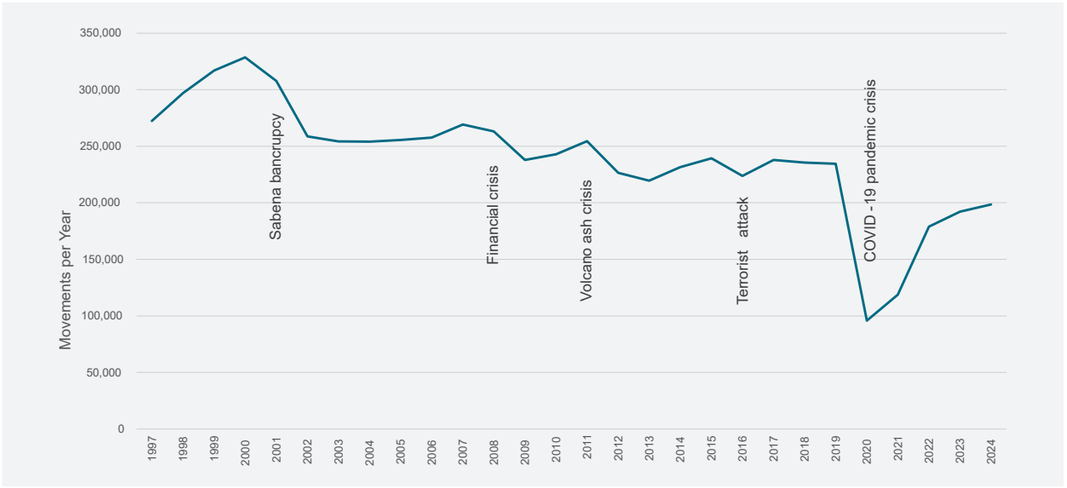
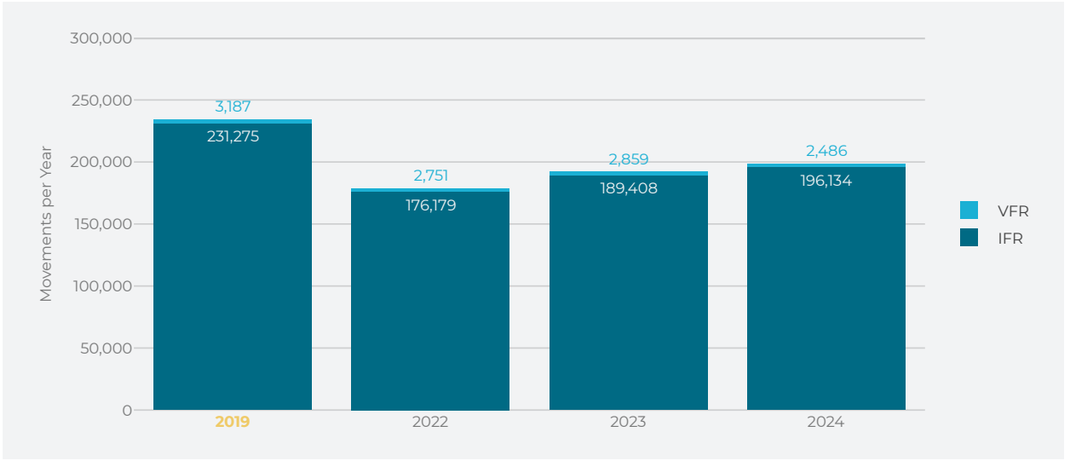


Figure 1.2: *Yearly traffic overview*



The visualization of yearly traffic overview in ***Figure 1.2*** shows traffic numbers in 2019 as the reference year followed by 2022, 2023 and 2024 as an ongoing recovery process. The 3% increase of traffic compared to 2023 is above the baseline scenario of STATFOR for Brussels Airport referred to in the Eurocontrol European Network Operating Plan 2024 - 2029[1], according to which there would have been an increase of 2.35% compared to 2023. It is however lower than the high scenario (an increase of 4.63% for 2024). Like most of the major European airports, traffic levels remain below those of 2019. Even if low-cost airlines have for the most part fully recovered and even exceeded pre-covid levels, mainstream airlines are still lagging behind.

According to Brussels Airport Company (BAC)[2], out of all 198,620 movements in 2024, only 1.25% (2,486 movements) stem from flights under visual flight rules (VFR). The high share of traffic under instrument flight rules (IFR – 196,134 movements) is a natural consequence of Brussels Airport's important role as Belgium's biggest commercial passenger airport as well as their non-negligible shares of cargo movements. According to the airport's statistics over 2024, Brussels Airport served 23.6 million passengers, reflecting a 6.4% increase compared to 2023. One of the main reasons for a higher increase of passengers compared to traffic is the change of fleet in non-low-cost airlines, that opted for larger aircraft for their 2024 operations. The airport also expanded its network, adding 10 new passenger destinations and welcoming five new airlines. In terms of cargo, overall volumes rose by 5%, reaching 733,000 tonnes, while the cargo division saw the addition of four new airlines.[3]

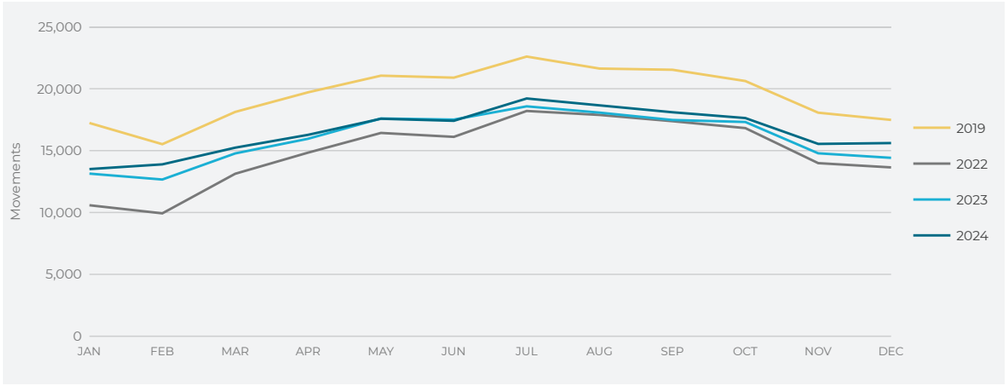
1. www.eurocontrol.int/publication/european-network-operations-plan-2024-2029:
2. https://www.brusselsairport.be/en/pressroom/news/23-6-million-passengers-in-2024 (URL retrieved on 24/01/2025)
3. https://www.brusselsairport.be/en/pressroom/news/23-6-million-passengers-in-2024 (URL retrieved 24/01/2025)

MONTHLY FIGURES

Figure 1.3 provides information about the monthly evolution of traffic at Brussels Airport including 2019 as the reference year and the last three years. ***Table 1.1*** further details these monthly figures per flight rule. The highest amount of traffic in 2024, just like in 2023, was recorded in July with 19,212 total movements, which is not unusual given that this includes the start of the summer holidays in Belgium, leading to a lot of holiday-related air travel.

Considering movements per flight rule separately, the peak months were July for IFR with a total of 18,937 movements, and October for VFR with 302 movements. Compared to 2023, most of the months showed an increase of total traffic averaging +3%, with the top months being February (+10%) and December (+8%), while the months with least change were June (-1%) and May (0%).

Figure 1.3: *Monthly movements per year*



From January until a gradual resumption of services by the end of March, the flights from Brussels airport to Tel Aviv (Israel) were suspended. New routes and the addition of carriers like Singapore Airlines and Wideroe were introduced in April. This expansion was driven by factors such as increased belly cargo capacity and growing demand in regions like Asia.[4] In May, airlines expanded by adding new routes, including Nouvelair's new route to Monastir (Tunisia), Air Arabia's to Rabat (Morocco), and Corendon Airlines' to Gazipasa/Alanya (Türkiye).[5] New routes in June included Shanghai (Hainan Airlines), Nairobi (Brussels Airlines), and Budapest (Wizzair). While cargo traffic faced a decline, especially in the full cargo segment, Brussels Airport recorded a significant rise in passenger numbers, driven by the beginning of the summer holidays and the expansion of intercontinental routes.[6]

4. https://www.aviation24.be/airports/brussels-airport-bru/brussels-airport-reports-surge-in-passengers-5-6-and-cargo-2-3-traffic-for-april/ (URL retrieved on 24/01/2025).
5. https://www.aviation24.be/airports/brussels-airport-bru/more-than-2-1-million-passengers-and-nearly-60000-tonnes-of-cargo-at-brussels-airport-in-may/ (URL retrieved on 27/01/2025).
6. https://www.aviation24.be/airports/brussels-airport-bru/brussels-airport-sees-4-increase-in-passengers-but-decline-in-cargo-for-june/ (URL retrieved on 27/01/2025)
7. https://www.brusselstimes.com/1177057/summer-holidays-drive-passenger-numbers-at-brussels-airport-to-pre-covid-times (URL retrieved on 07/02/2024)
8. https://www.brusselsairport.be/en/pressroom/news/23-6-million-passengers-in-2024 (URL retrieved on 07/02/2024)

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**	16,975	15,259	17,857	19,478	20,759	20,656	22,304	21,414	21,210	20,330	17,829	17,204	**231,275**
	2022	10,435	9,712	12,783	14,635	16,196	15,871	17,926	17,655	17,111	16,571	13,807	13,477	**176,179**
	2023	12,919	12,417	14,533	15,719	17,291	17,227	18,317	17,852	17,248	17,049	14,576	14,260	**189,408**
	2024	13,327	13,702	15,064	16,018	17,439	17,166	18,937	18,451	17,890	17,328	15,366	15,446	**196,134**
	2024 vs 2019	-21%	-10%	-16%	-18%	-16%	-17%	-15%	-14%	-16%	-15%	-14%	-10%	-15%
	2024 vs 2023	+3%	+10%	+4%	+2%	0%	0%	+3%	+3%	+4%	+2%	+5%	+8%	+4%
VFR	**2019**	256	259	269	232	296	239	295	215	323	292	235	276	**3,187**
	2022	150	218	346	201	232	239	278	227	266	248	180	166	**2,751**
	2023	221	247	240	239	304	279	259	217	226	264	207	156	**2,859**
	2024	180	187	173	257	136	242	275	187	209	302	175	163	**2,486**
	2024 vs 2019	-30%	-28%	-36%	+11%	-54%	+1%	-7%	-13%	-35%	+3%	-26%	-41%	-22%
	2024 vs 2023	-19%	-24%	-28%	+8%	-55%	-13%	+6%	-14%	-8%	+14%	-15%	+4%	-13%
Total	**2019**	17,231	15,518	18,126	19,710	21,055	20,895	22,599	21,629	21,533	20,622	18,064	17,480	**234,462**
	2022	10,585	9,930	13,129	14,836	16,428	16,110	18,204	17,882	17,377	16,819	13,987	13,643	**178,930**
	2023	13,140	12,664	14,773	15,958	17,595	17,506	18,576	18,069	17,474	17,313	14,783	14,416	**192,267**
	2024	13,507	13,889	15,237	16,275	17,575	17,408	19,212	18,638	18,099	17,630	15,541	15,609	**198,620**
	2024 vs 2019	-22%	-10%	-16%	-17%	-17%	-17%	-15%	-14%	-16%	-15%	-14%	-11%	-15%
	2024 vs 2023	+3%	+10%	+3%	+2%	0%	0%	+3%	+3%	+4%	+2%	+5%	+8%	+3%

Brussels Airport reported its highest monthly passenger count since 2019 this July, with approximately 2.5 million travellers passing through, which was a 5% increase compared to 2023. The airport noted that flights in July reached an "all-time record" average of 152 passengers per flight, two more than in July 2023. Over 19,000 flights were operated during the month, with passenger flights increasing by 3%. The ten most popular destinations remained consistent with June, including Spain, Turkey, Greece, Italy, Germany, Morocco, the United States, Portugal, France, and the United Kingdom.[7]

Overall, Brussels Airport expanded its passenger network by adding 10 new destinations and welcoming five new airlines in 2024. The majority of these additions were intercontinental destinations, providing passengers with more options for both direct travel and onward connections. In the long-haul segment, Brussels Airlines introduced a new route to Nairobi, while Singapore Airlines (Singapore) and Thai Airways (Bangkok) resumed services. TUI fly added Curaçao to its network, while Hainan Airlines and Juneyao Air launched daily direct flights to Shanghai, China. For short-haul routes, new destinations included Krakow (Brussels Airlines), Bergen (Wideroe), Gazipaşa (Corendon Airlines), Bari (Transavia), and Tromsø (Norwegian). Transfer passengers represented 14% of all departing travellers, particularly connecting between Europe, Africa, and North America. In this context, Brussels Airport continues to serve as a vital hub for the Star Alliance network.[8]

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

DAILY FIGURES

The calendar view in ***Figure 1.4*** shows the exact distribution of movements per day throughout the year. Hereby, the colour indicates the number of movements per day, revealing some interesting patterns: Saturdays, for instance, are generally less busy. Another pattern regarding daily movements in the Brussels Airport is that there are more movements per day during the International Air Transport Association (IATA) summer season, starting on the 31st of March 2024 and ending on the 26th of October 2024. For this season, more slots for recreational travel are typically foreseen.

On average, Brussels Airport witnessed 543 movements per day in 2024, which is an increase compared to 527 in 2023. When talking about the most and the least busy days throughout the year, the peak day, which was June 30th in 2023 with 679 movements, switched to July 26th in 2024 – there were 674 flights operated in Brussels Airport that Friday, being the day with a few extra flights on top of the busiest week of the year.

The day with the least traffic in 2024 was October 1th with 257 movements, the main reason for it – national strike by security staff at Belgian airports. Due to significantly reduced capacity at security checkpoints at Brussels Airport, Brussels Airlines cancelled majority of its scheduled flights to take pre-emptive action to minimize disruptions.[9] Other strikes which had no visible effect on traffic figures happened on February 26th, when protesting farmers blocked an important road to/from Brussels Airport (A201 roundabout), that lead to traffic congestion on the roads, while the flights in Brussels Airport weren't impacted.[10] Lastly, approximately 30 Lufthansa flights were cancelled at Brussels Airport due to the strike of the airline's ground staff between February 28th and March 2nd. The affected flights were primarily to and from the German cities of Frankfurt and Munich. Brussels Airlines, a subsidiary of Lufthansa, was not affected by the strike and operated flights to both Frankfurt and Munich as scheduled.[11]

9. https://www.aviation24.be/airlines/lufthansa-group/brussels-airlines/october-1st-brussels-airport-strike-most-brussels-airlines-flights-cancelled/ (URL retrieved on 07/02/2024)
10. https://www.aviation24.be/airports/brussels-airport-bru/protesting-farmers-jam-important-roundabout/ (URL retrieved on 07/02/2024)
11. https://www.aviation24.be/airports/brussels-airport-bru/thirty-lufthansa-flights-cancelled-at-brussels-airport-due-to-the-strike-of-the-airlines-ground-staff/ (URL retrieved on 07/02/2024)

HOURLY TRAFFIC PATTERNS

The average hourly movements detail how the traffic flows at Brussels airport change throughout the day. ***Figure 1.5*** provides this hourly distribution in local time (LT) for the reference year of 2019 and the last three years of 2022, 2023, and 2024. Overall, the general pattern throughout the day remains almost the same from year to year. From midnight until 06:00 all four years show very similar amounts of traffic. Traffic reaches its peak at 10:00 with 43 movements/hour. Between 12:00 and 15:30 the average hourly movement in 2024 has grown compared to the previous two years, even surpassing 2019 averages towards 14:30 – 15:00. This starts to show a new afternoon peak compared to the reference year. Evening traffic in 2024 remains close to the previous years, having the evening peak at 19:30 with 36 movements/hour. During the night hours, between 23:00 and 06:00, the number of movements is generally lower than during the day (see also Chapter 4 – Night Movements). The hourly traffic patterns for the week days from Monday to Friday follow roughly the same hourly distribution, as shown in ***Figure 1.5***. Subsequently ***Figure 1.6*** presents Saturday hourly traffic pattern. It follows roughly the same hourly distribution in the morning as on weekdays. The peak at 19:30 is a lot lower on Saturday (25 movements/hour) than any other day (37-41 movements/hour), likely because neither business trips nor recreational journeys tend to choose the middle of the weekend to travel. There are also less cargo operations on the weekends.

Figure 1.5: *Average hourly movements per year*

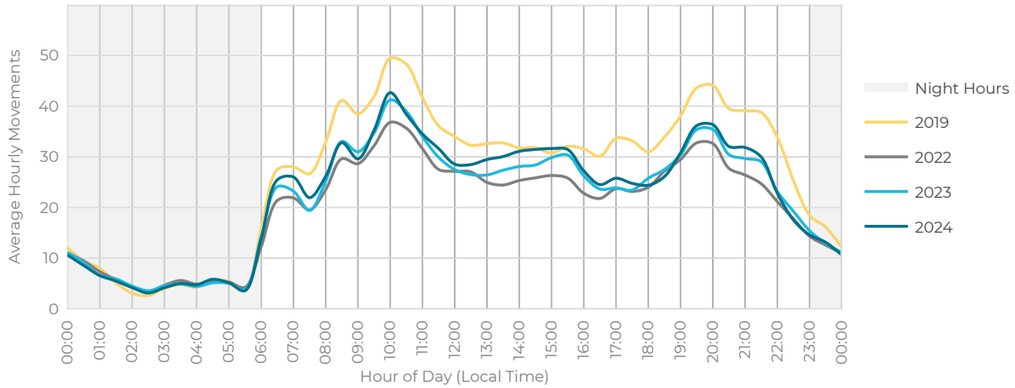
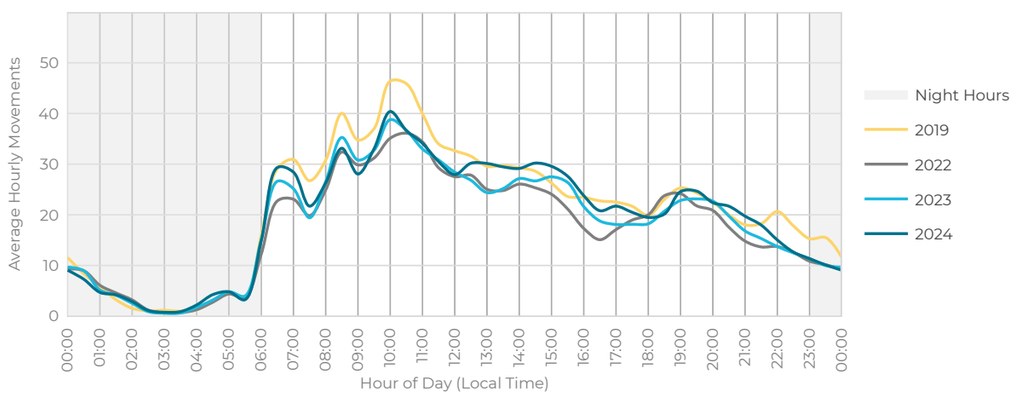


Figure 1.6: *Average hourly movements on Saturdays per year*



As it can be seen in ***Figure 1.7***, except for an equally pronounced initial morning peak at 06:30, Sunday mornings witness less movements than any other day – possibly for the same reason of unpreferred travel times. The afternoon, on the other hand, shows a similar trend to the one seen for the rest of days but Saturdays, with a peak at 20:00 of 51 movements/hour. ***Figure 1.8*** visualizes the seasonal movements' trends at Brussels Airport in 2024. The main differences between the seasons were during the day: traffic during the summer had a noticeable morning peak just before 07:00 with an average of 33 movements per hour, when traffic during the winter at that time was an average of 21 movements per hour. Another difference is observed in afternoon traffic – during the summer, traffic remained higher, with the greatest average being 37 movements per hour at 14:30, compared to winter, where the highest average was 27 movements per hour at 15:30. In the evening, starting from 16:30, the amount of traffic during spring, summer, and fall were very similar, while winter traffic was slightly lower, except for the alignment with other season at 18:30.

Figure 1.7: *Average hourly movements on Sundays per year*

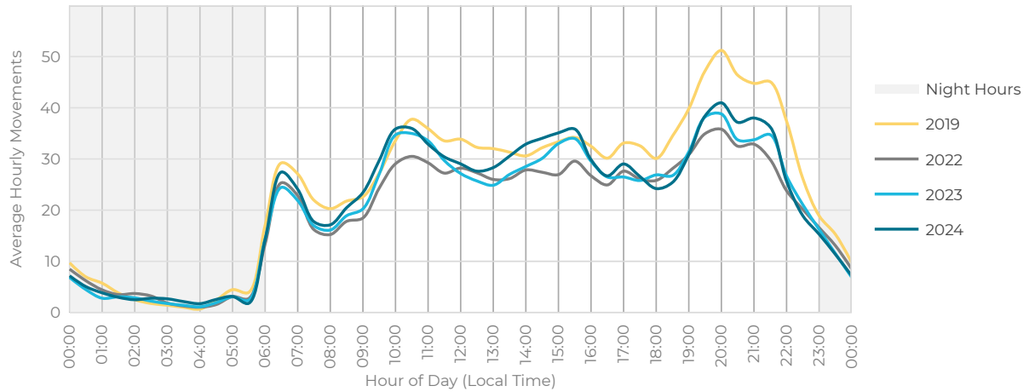
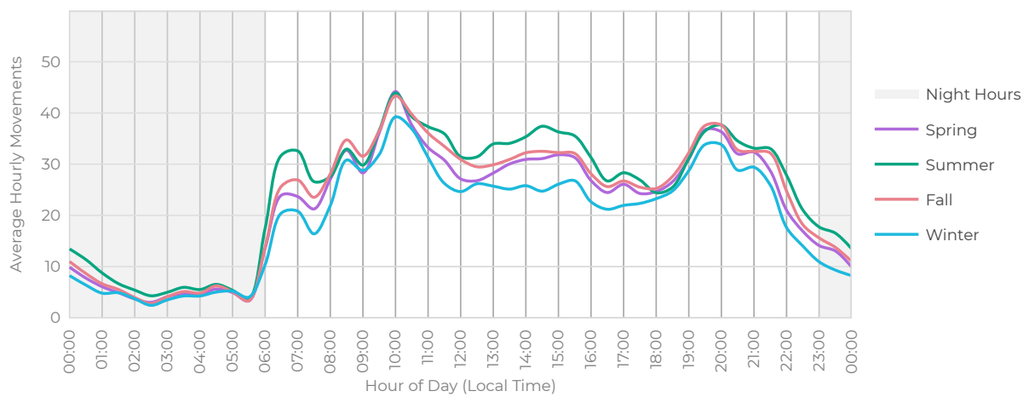


Figure 1.8: *Average hourly movements by season*

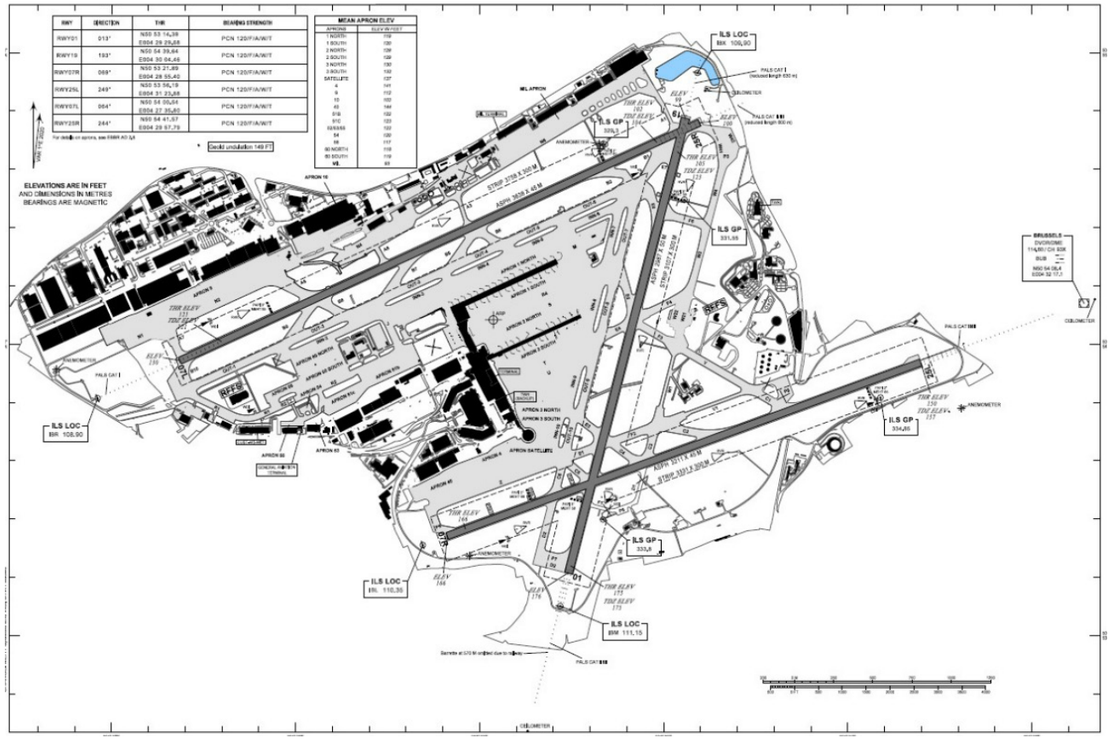


Runway Use

The ICAO chart in ***Figure 1.9*** shows how these runways are situated within the layout of Brussels Airport. Brussels Airport has six runways (short: RWY):

- RWY 25L & 07R
- RWY 25R & 07L
- RWY 19 & 01

Figure 1.9: *Aerodrome ground movement chart*



The decision of which runways are being used for arrivals and departures depends on several factors, such as meteorological conditions, airport layout, agreement with the state, etc. (see Chapter 4 for a more elaborate discussion). One very influential factor is the wind direction and speed, which is why some of the following charts also show wind roses as a correlate underneath the runway usage. ***Figure 1.10*** is an example of such a plot, showing which share of movements occurred on which runway per year. Absolute numbers, as well as the split into departure and arrival movements, can be seen in ***Figure 1.11***.

At Brussels Airport, RWY 25R is the most frequently used runway, mainly used for departures, followed by RWY 25L as second most used runway, mainly used for arrivals. In 2024, 113,038 (57%) of all movements occurred on RWY 25R, which is an increase compared to 103,271 (54%) in 2023. There were 51,748 (26%) movements on RWY 25L in 2024, which is also an increase compared to 43,550 (23%) in the previous years. The usage of RWY 19 saw an incline with 8,667 (5%) in 2023, but in 2024 it went back to 7,895 (4%), similar to 2022. The usage of RWY 07R had a decrease to 11,297 (6%) after having 14,443 (8%) in 2023 and 14,474 (8%) in 2022, similar to RWY 07L that had 5,389 (3%) after having 9,492 (5%) in 2023 and 8,687 (5%) in 2022. The usage of RWY 01 also dropped to 9,253 (5%) after having had an upward trend in the two previous years with 11,523 (6%) in 2022 and 12,844 (7%) in 2023. The drop of RWY 01 and RWY 19 in 2024 is a direct impact of the renovation works during the summer.

Figure 1.11 shows runway usage in the reference year of 2019 and the last three years of 2022, 2023, and 2024 in number of movements per departure and arrival separately. The 2024 figures remain consistent with previous trends, showing no substantial shifts – all the patterns of runway usage remained the same, just slightly more increased compared to previous years.

Figure 1.10: *Runway usage per year in movements*

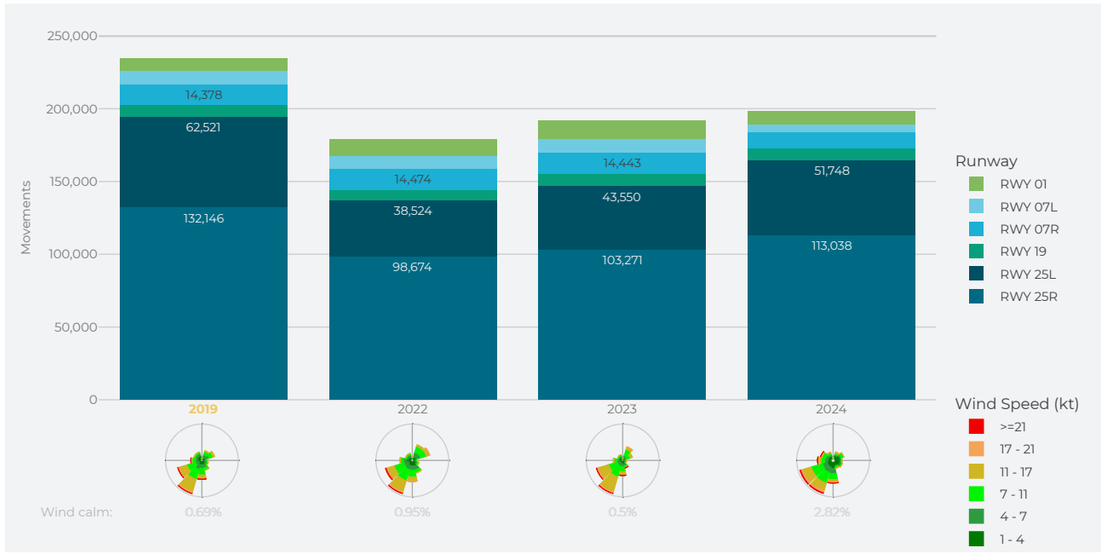


Figure 1.11: *Runway usage per year in number of movements per departure or arrival*

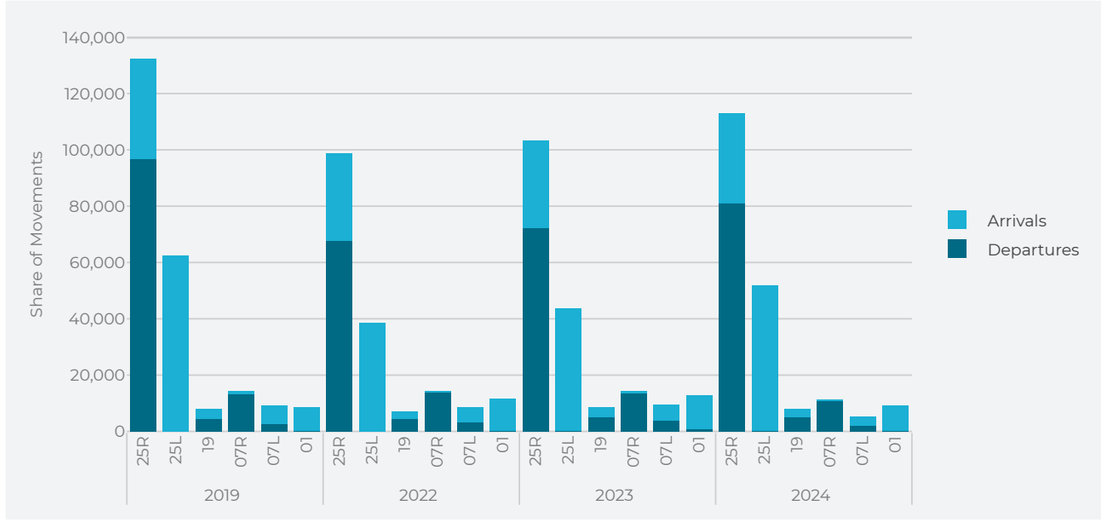


Figure 1.12: *Runway usage per month in 2023 in share of movements*

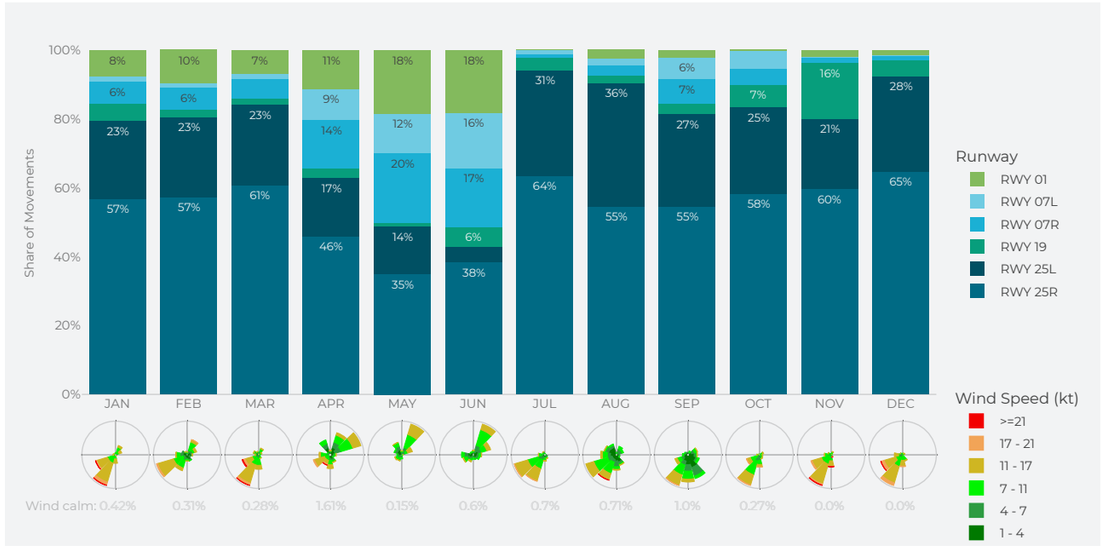
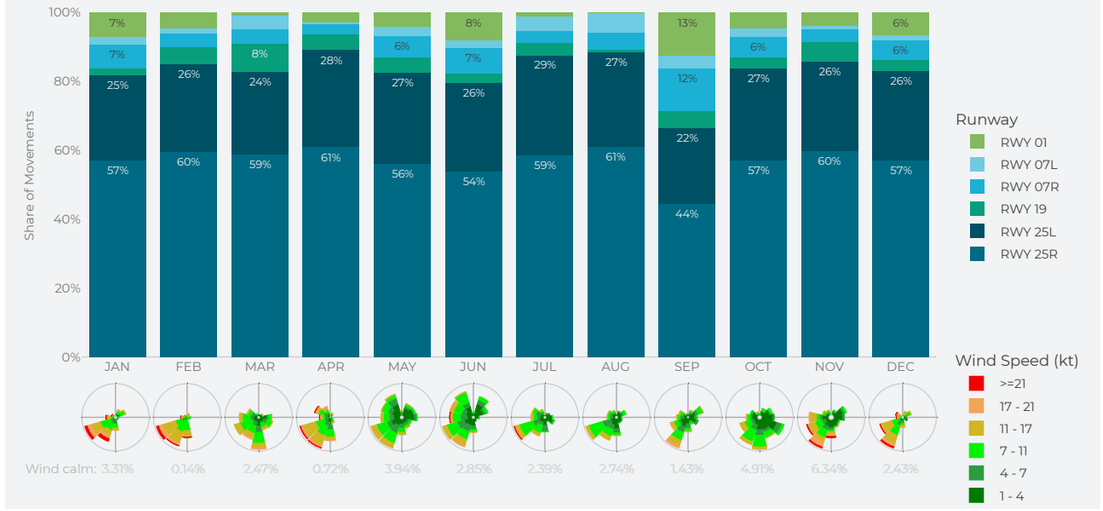


Figure 1.13: *Runway usage per month in 2024 in share of movements*



Monthly overviews of the runway usage for 2023 and 2024 are visualized in ***Figure 1.12*** and ***Figure 1.13***, respectively, showing the share of movements per runway in percentages. It is important to highlight that 2024 was a very different year in wind patterns compared to 2023 and even other previous years. The biggest changes in 2024 compared to 2023 are visible in the months of April, May, June, and September. In April, May, and June of 2023, RWY 01 was more in use compared to the same months in 2024. It is a known phenomenon in Belgium that winds are typically blowing from the south-west, but that the period from April to June in 2023 encountered predominant north-easterly winds, which was not the case anymore in 2024. Besides the wind direction and strength, another important factors influencing the choice of the runway(s) is the unavailability of runway(s) due to works. In 2024, RWY 01/19 was closed from August 7th until September 1st for renovation works (with RWY 07R/25L being shortly closed as well for works on the crossing section of these two runways). This is visible in ***Figure 1.18***, where the column of August shows the least amount of RWY 01 and RWY 19 usage separately throughout the year.

The strong correlation between the wind direction and the runway usage stems from the aeronautical principle that flights should depart and land with head wind. A larger view of the wind roses can also be found in Chapter 4 – Wind Pattern.

Market Contributions

This chapter examines the key contributions within the sector, focusing on the various market segments that drive growth. It explores the performance of top airlines, important routes, and the cargo sector, providing a clear picture of how these factors shape the overall traffic in Brussels Airport. This chapter only covers IFR flights, excluding all local IFR flights within Belgium (that are mainly training flights) and all VFR flights.

MARKET SEGMENTS

This chapter analyses the type of market Brussels Airport serves. First, the market segment distribution is shown in ***Figure 1.14***, based on the IFR traffic at the airport. For this grouping, the air traffic market segmentation rules from STATFOR/EUROCONTROL[12] 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.

Aviation market segments include various categories of air travel and transport, defined by their purpose, target customers, and business models. ***Figure 1.14*** visualizes the distribution of all market segments in Brussels Airport in the reference year of 2019 and the last three years of 2022, 2023, and 2024. Overall, the general trend maintained throughout all the years – mainline flights take up the biggest share of all the flight. In 2024, there were 113,282 mainline flights, which made 58% of all traffic that year. This indicates an increase compared to 57% in 2019, 52% in 2022, and 56% in 2023. Due to data incompleteness, movements with missing information are categorized as "Unknown." More details regarding the exact amount of flights and their ratio per category can be found in ***Table 1.2***

Figure 1.14: *Market segment distribution (only IFR)*

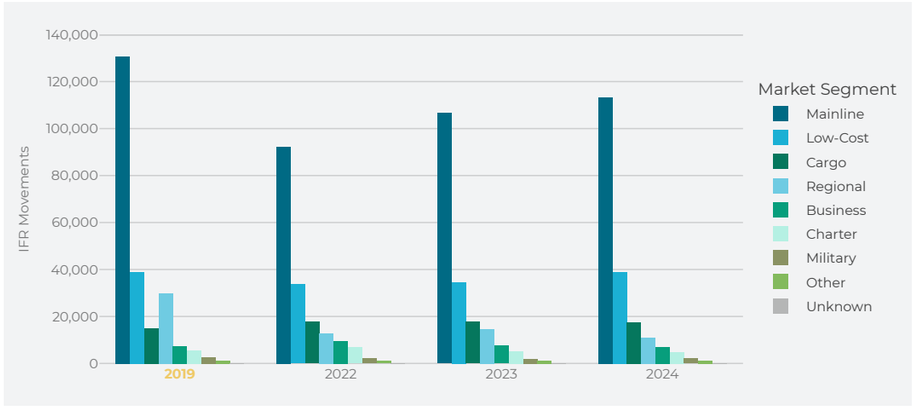


Table 1.2: *Market segment distribution ratio (only IFR)*

	Mainline		Low-Cost		Cargo		Regional		Business		Charter		Military		Other		Unknown	
2019	130,713	56.5%	38,964	16.9%	14,949	6.5%	29,745	12.9%	7,401	3.2%	5,651	2.4%	2,616	1.1%	1,131	0.5%	125	0%
2022	92,241	52.3%	33,712	19.1%	17,731	10.1%	12,856	7.3%	9,629	5.5%	6,833	3.9%	2,165	1.2%	997	0.6%	95	0%
2023	106,610	56.2%	34,507	18.2%	17,710	9.3%	14,691	7.8%	7,569	4.0%	5,198	2.7%	2,012	1.1%	1,172	0.6%	48	0%
2024	113,282	57.7%	38,984	19.9%	17,542	8.9%	11,017	5.6%	7,027	3.6%	4,799	2.5%	2,168	1.1%	1,180	0.6%	195	0.1%

TOP AIRLINES

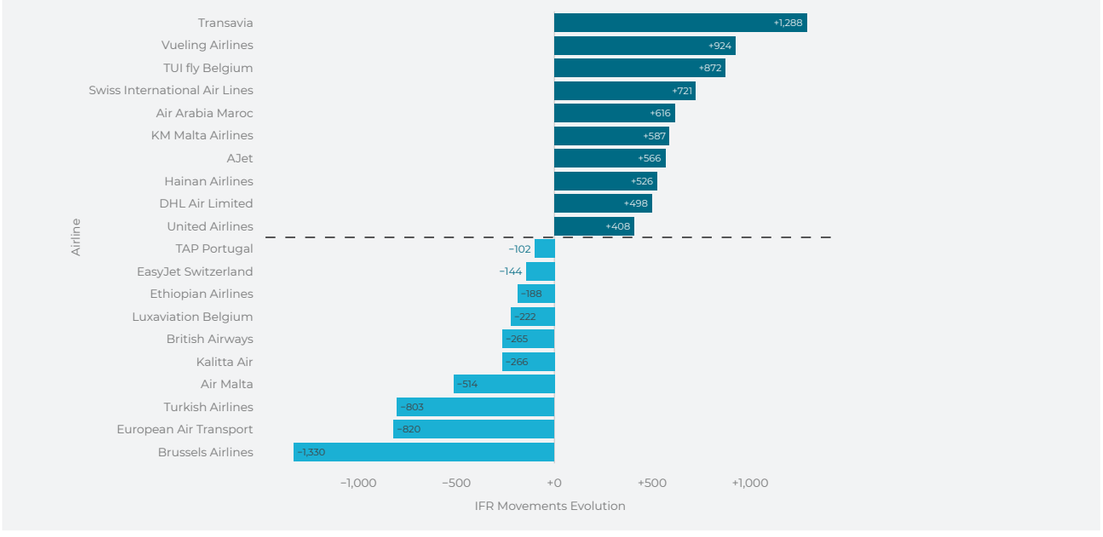
This subchapter covers the main airlines that operated in Brussels Airport in 2024. Top ten airlines, total amount of flights and ratio with 2019 and 2023 are listed in ***Table 1.3***. In 2024, Brussels Airlines (BEL) was the top one airline operating at Brussels Airport in all the years included in this report with 61,942 flights in 2024. As second airline with most movements in Brussels Airport there was TUI fly Belgium (JAF) with 13,442 flights followed by European Air Transport (BCS) with 10,298 flights.

Figure 1.15 visualizes the top ten yearly changes of airlines that operate in Brussels Airport. Transavia had the biggest increase in IFR movements in Brussels Airport - in 2024 it had 1,288 more IFR movements compared to 2023. Brussels Airlines had the biggest decrease of IFR movements in Brussels Airport – in 2024 it had 1,330 less IFR movements compared to 2023. Regarding KM Malta Airlines and Air Malta – these two airlines are shown separately, but as of March 30th 2024, Air Malta ceased flight operations, hence KM Malta Airlines will serve as the new national airline for the Maltese Islands.[13]

Table 1.3: *Top 10 airlines of 2024 (only IFR)*

	BEL	JAF	BCS	RYR	DLH	VLG	SWR	SAS	TRA	THY	Total
2019	81,845	12,838	9,274	14,498	10,289	3,442	3,308	4,823	21	3,884	**144,222**
2022	53,164	12,235	12,163	9,996	5,953	3,128	2,588	2,250	775	3,841	**106,093**
2023	63,272	12,570	11,118	7,285	6,230	4,030	3,139	3,550	2,308	4,253	**117,755**
2024	61,942	13,442	10,298	7,351	6,131	4,954	3,860	3,732	3,596	3,450	**118,756**
2024 *vs* 2019	-24%	+5%	+11%	-49%	-40%	+44%	+17%	-23%	>999%	-11%	-18%
2024 *vs* 2023	-2%	+7%	-7%	0%	-2%	+23%	+23%	+5%	+56%	-19%	0%

Figure 1.15: *Top 10 airlines' evolution (only IFR)*



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

13. https://kmairmalta.com/ (URL retrieved on 12/02/2025)

TOP CONNECTIONS

Talking about the ratio of short and long haul movements in Brussels Airport in 2024, 85,95% of all IFR movements were equal to or greater than 500 kilometres, 14% were less than 500 kilometres while the remaining 0,05% were circuit flights. ***Figure 1.16*** shows a map visualizing the top ten connections from Brussels Airport in 2024. A detailed list of those connections is shown in ***Figure 1.17***.

The most popular connection airport for both arrivals and departures was Adolfo Suárez Madrid-Barajas Airport with 7,042 IFR movements in 2024, which is 11% less compared to 2019. Following this, Josep Tarradellas Barcelona-El Prat Airport was second most popular connection airport overall with 5,671 IFR movements in 2024 (11% less compared to 2019). It was also the second most popular amongst departures, but third most popular amongst arrivals. Subsequently, London Heathrow Airport was the third connection airport overall with 5,515 IFR movements in 2024 (10% less compared 2019). It was also the third amongst departures, but second amongst arrivals. A similar situation is seen between two other connection airports. Copenhagen Kastrup Airport was 8th most popular connection overall with 4,284 IFR movements, that was also 8th amongst the departures and 9th amongst the arrivals. The competing connection airport is Rome-Fiumicino Leonardo da Vinci International Airport with 4,275 IFR movements in 2024 overall, that left this airport 9th most popular connection airport overall and amongst departures and 8th amongst arrivals.

Regarding the change of IFR movements when comparing 2024 and 2019, Málaga-Costa del Sol Airport showed the biggest increase of 15% overall (departures and arrivals combined), Munich Airport showed a 3% overall increase, while Geneva Cointrin International Airport showed a 17% overall decrease.

Figure 1.16: *Top 10 international connections map (only IFR)*

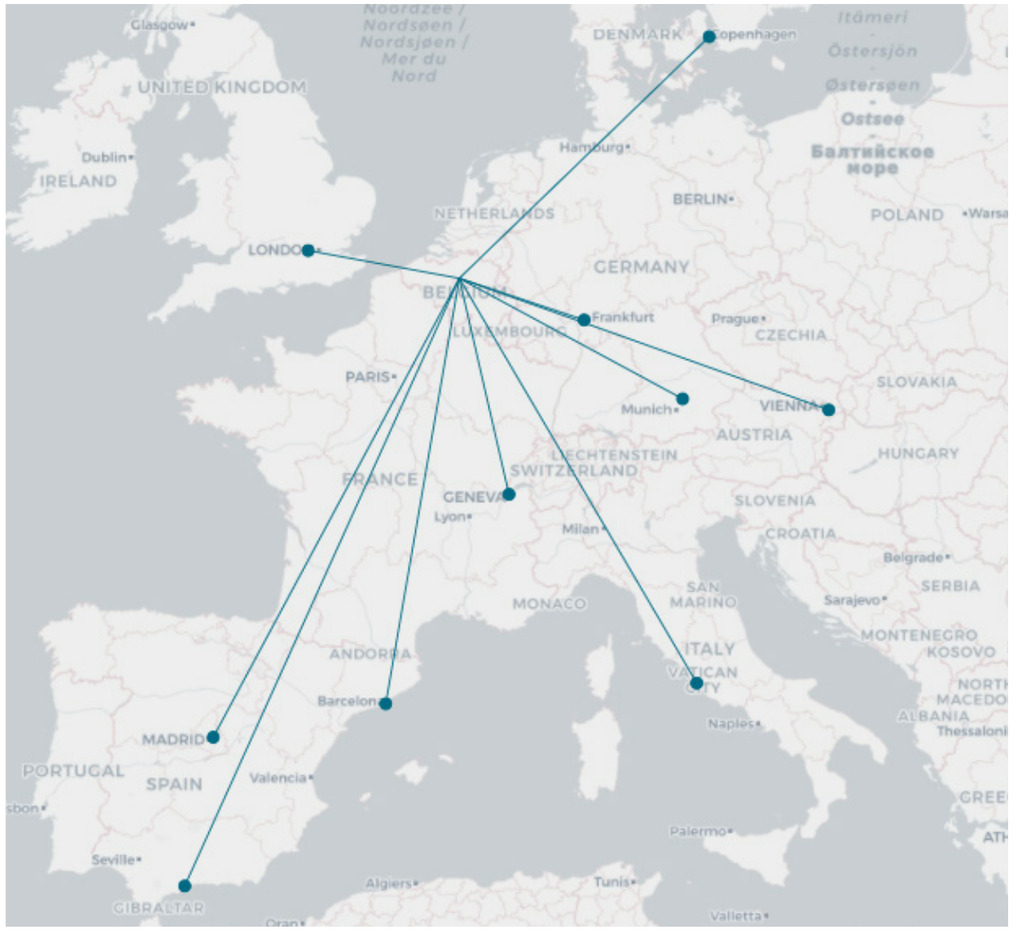
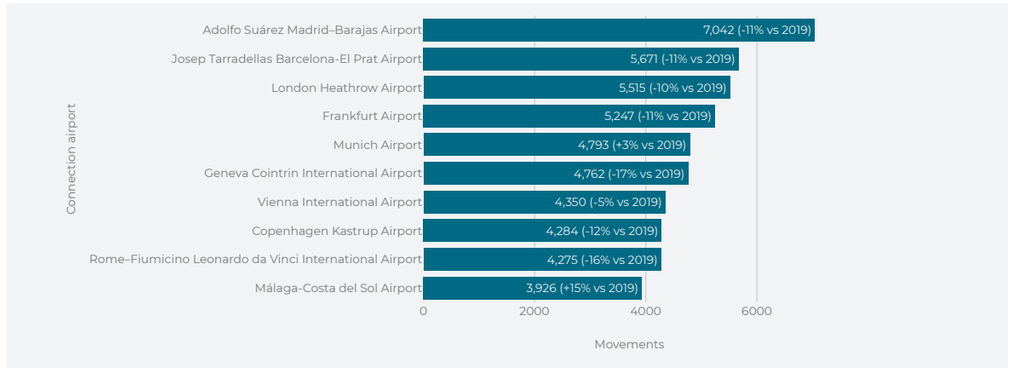


Figure 1.17: *Top 10 international connections (only IFR)*



CARGO

In 2024, cargo flights accounted for 9% of all IFR flights in Brussels Airport, which is the same as it was in 2023. This can be seen in ***Figure 1.18***. Looking at all the analysed years, in 2024 there were 17,542 cargo flights and 178,652 other IFR flights, in 2023 there were 17,710 cargo flights and 171,807 other IFR flights, in 2022 there were 17,731 cargo flights and 157,528 other IFR flights, and in 2019 there were 14,949 cargo flights and 216,346 other IFR flights. Comparing year to year, there were around 1% more cargo flights in 2024 than in 2023, 1% less than in 2022 and 17% more than in 2019.

Figure 1.18: *Cargo movements per year*

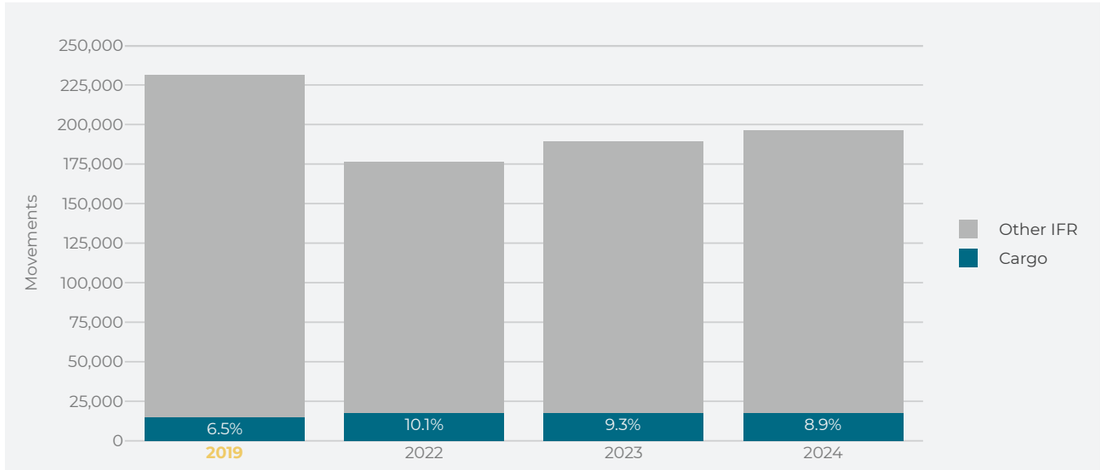
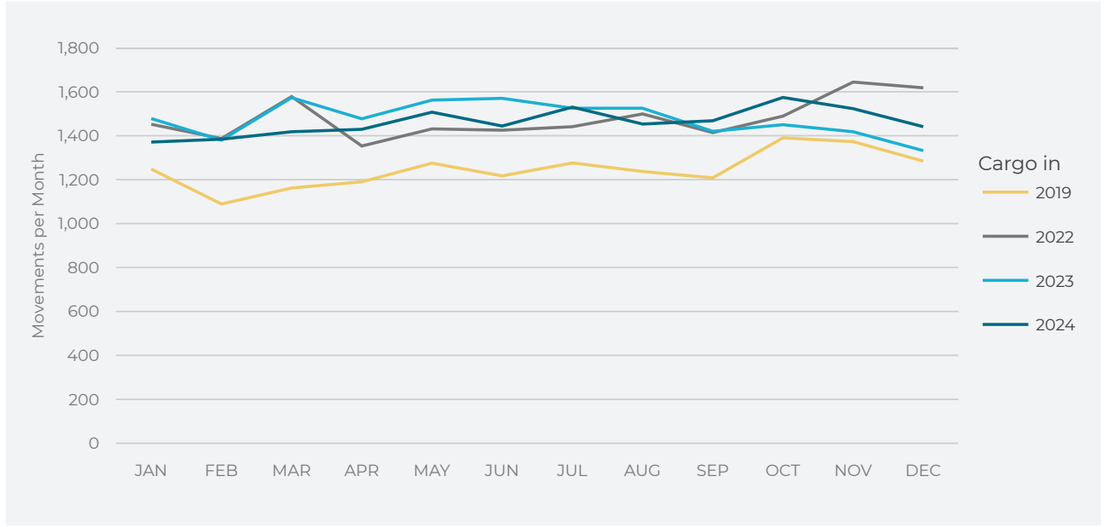


Figure 1.19 visualizes the monthly cargo movements evolution per year. In 2024, October had the biggest amount of cargo flights (1574), while January had the least amount of cargo flights (1371). Besides October, May had a peak of 1507 cargo flights and July as well with 1530 cargo flights. When comparing 2024 to previous years, February and July were very similar to previous years with 1,384 and 1,530 cargo flights in 2024 respectively, September and November were with more cargo flights than in previous year, while the remaining months had less cargo flights than (some of the) the previous years.

Figure 1.19: *Monthly cargo movements per year*



In 2024, flown cargo at Brussels Airport recorded a 5% increase compared to 2023, in line with the global trend. Four new airlines started cargo operations at Brussels Airport: LATAM Cargo, Lufthansa Cargo, Farcargo and Virgin Atlantic.[14] LATAM Cargo has announced a significant operational shift, rerouting all eastbound transatlantic cargo flights through Brussels starting 27 October 2024, establishing the airport as its primary European hub. This decision is driven by Brussels Airport's strong reputation as a leading pharmaceutical hub, supported by its extensive temperature-controlled facilities. The change will introduce 12 weekly Boeing 767 freighter services, providing 600 tonnes of cargo capacity, including ten connections to Frankfurt. This strategic decision highlights LATAM Cargo's commitment to the pharmaceutical and healthcare sectors, further strengthening Brussels' position as a key pharmaceutical hub within the European Union (EU).[15]

14. https://www.brusselsairport.be/en/pressroom/news/23-6-million-passengers-in-2024 (URL retrieved on 12/02/2025).
15. https://www.aviation24.be/airlines/latam/latam-cargo-chile/latam-cargo-shifts-focus-to-brussels-airport-with-expanded-pharma-capabilities/ (URL retrieved on 12/02/2025

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.[16]

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 Belgium-Netherlands U-space Reference Design Implementation (BURDI) project. The BURDI project 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.[17]

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.[18] [19]

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

16. What is U-space?, https://www.easa.europa.eu/en/what-u-space (URL retrieved 16/02/2024)
17. BURDI project, https://www.sesarju.eu/projects/BURDI (URL retrieved 16/02/2024)
18. UAS geographical zone statuses can be seen at https://map.droneguide.be (URL retrieved on 21/04/2022)
19. 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)
20. The data extraction method used by SkeyDrone has been update and discrepancies with data from previous years is to be expected.
21. Note that if an operation crosses multiple VLL zones, it will be counted multiple times in the table. ICAO Doc 4444 – PANS–ATM.

One of the other services proposed by SkeyDrone is a web application: the Drone & Aerial Activities (DAA) to facilitate planning, coordination and information flow between drone operators and Air Traffic Control, especially in controlled airspace. The figures in this report related to UAS are provided by the DAA tool.[20]

Table 1.4 displays the number of drone activities and the level of risk involved in the operations. The level of risk involved in the operations is sorted into three categories that are defined by the risk the drone activity forms for manned aviation in Very Low Level Zones (VLL). For all airports where a control zone exists, these are defined 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 Brussels CTR.

As seen in ***Table 1.4***, there were 6,584 low risk authorized drone activities recorded in 2024 in Brussels CTR, which is a 34% increase compared to 2023 and 58% increase compared to 2022, 287 moderate risk authorized drone activities, which is a 4% decrease compared to 2023 and 12% increase compared to 2022, and 30 high risk drone activities, which is a 400% increase compared to 6 in 2023 and 200% increase compared to 10 in 2022.

Table 1.4: *Activated drone operations per VLL zone risk level*[21]

	Low	Moderate	High
2022	4,164	257	10
2023	4,922	299	6
2024	6,584	287	30
2024 *vs* 2023	+34%	-4%	+400%

As per European Union Aviation Safety Agency (EASA) definition[22], activities can furthermore be categorized into a different risk classification scheme that considers the complexity of the operation. The following two classes exist:

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 1.5 provides an overview of the complexity of operations in Brussels CTR. In 2024, more than four fifth of the authorised drone activities were operated under the 'Open' category (5,490). 1,217 (18%) were registered as 'Specific'. Overall, it can be observed that drone activities continue to grow (+33% compared to 2023 and +58% compared to 2022).

***Table 1.5**: Authorized drone activities per EASA risk category*

	Open	Specific	Total
2022	2,951	1,293	**4,244**
2023	3,908	1,129	**5,037**
2024	5,490	1,217	**6,707**
2024 *vs* 2023	+40%	+8%	+33%

Furthermore, ***Table 1.6*** provides the number of exempted flights. These are operations performed by firefighters, police or different federal entities and are services provided to the state. Exempted drone operations have increased in Brussels CTR – there were 339 such operations in 2024, which is 31% more than in 2022 and 30% more than in 2023.

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

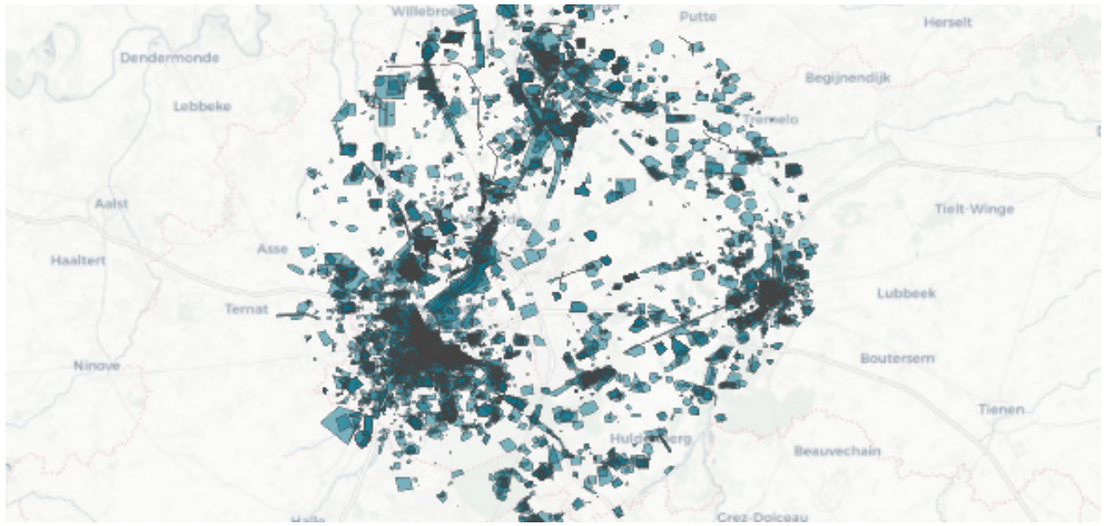
***Table 1.6**: Activated exempted drone activities*

	Regular	Exempted	Total
2022	3,985	259	**4,244**
2023	4,776	261	**5,037**
2024	6,368	339	**6,707**
2024 *vs* 2023	+33%	+30%	+33%

In addition, ***Figure 1.20*** provides a detailed view of the activated drone operations in Brussels CTR in 2024, displaying the reserved flying zones of all UAS. Three main hotspots of attention can be identified - the city centres of Brussels, Leuven, and Mechelen. Additionally, parks and famous landmarks (like the Atomium) seem to attract a lot of drone users.

The missions of the activities are oftentimes related to photo- and videography, recreational purposes and training, but also serve security reasons (e.g. crowd or road traffic management), scientific research, thermography, air measurements, agricultural and mapping purposes, or maintenance and inspection missions (e.g. of power lines, solar panels, wind turbines, air quality), etc. On the map (***Figure 1.20***) the powerline inspections are well recognizable: as the area one can reserve is limited, the inspectors design their drone airspace as a very narrow tunnel around the powerlines.

***Figure 1.20:** Reserved airspaces of activated drone operations in 2024*



Finally, the number of drone operations per type of are shown in ***Table 1.7***. 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.

In 2024, just 1% of all drone operations was BVLOS – there were 74 such operations, which is 1% less than in 2022 and 31% less than in 2023.

***Table 1.7**: Activated drone operations per type*

	VLOS	BVLOS	Total
2022	4,169	75	**4,244**
2023	4,929	108	**5,037**
2024	6,633	74	**6,707**
2024 *vs* 2023	+35%	-31%	+33%

skeyes is also using drones around the airport: operations with a so-called Communication, Navigation, Surveillance (CNS) drone started in November 2022 and are expanding gradually, focusing on monitoring the performance of navigation aids. 2024 was the first year with measurements done every two months on each Instrument Landing System (ILS). The use of this drone will lead to better measuring procedures, providing more accurate results by picking up signals from the air, which are then monitored and verified from the ground using a built-in software. The drone measurements are used to overall reduce the amount of CALIBRA flight time, which leads to reduced impact on traffic, fewer expense, and emissions. In 2023, the DAA recorded missions regarding the maintenance of ILS and VHF Omnidirectional Range (VOR) systems. These operations were among those that contributed to the total of 6,707 recorded authorized drone operations in the vicinity of Brussels Airport, representing a 33% increase compared to the previous year.

2 SAFETY

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

This chapter is divided into four topics: missed approaches, runway incursions, other noteworthy incidents, and recommendations & awareness. The number of arrivals is provided by the AMS under the BCAA's aerodrome movement definition.

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 occurrences discussed in other noteworthy incidents 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 Acceptable Means of Compliance (AMC)). This classification scheme is applicable for the later mentioned operational occurrences. In 2024, skeyes updated the data extraction method of logged incidents. This can generate small differences with the numbers published in previous reports.

Table 2.1: *Severity classification*[23]

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.

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 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 reporting is done by the ATCOs.

The number of missed approaches at Brussels Airport is closely monitored and followed up by skeyes' safety unit. Trends are analysed and, when relevant, investigated to identify root causes and to implement improvement measures.

In 2024, 302 missed approaches were logged at Brussels Airport, which is an increase of 8% compared to 2023. This increase is higher than the increase in number of arrivals in 2024 compared to 2023 (3%).

For better comparability between the years, ***Figure 2.1*** presents the rate of missed approaches per 1,000 arrivals for 2019 and 2022-2024. Note that the rate is provided for each runway as well as all runways together ("Overall"). For runways like RWY 07R, which are less frequently used for arrivals, small variations on the number of missed approaches or the number of movements can create large fluctuations on the rate of missed approaches due to the small sample size (e.g. nine missed approaches in 2019 leading to a rate of 7.7, three missed approaches in 2022 leading to a rate of 6.1, two missed approaches in 2023 leading to a rate of 2.8, whereas five missed approaches in 2024 leading to a rate of 8.4). Overall, the rate of missed approaches increased by 3% in 2024 compared to the previous year. When compared to 2023, 2024 didn't have any significantly bad day weather wise – the top days with the most missed approaches (five missed approaches) were August 2nd , September 1st, November 4th, and November 20th.

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

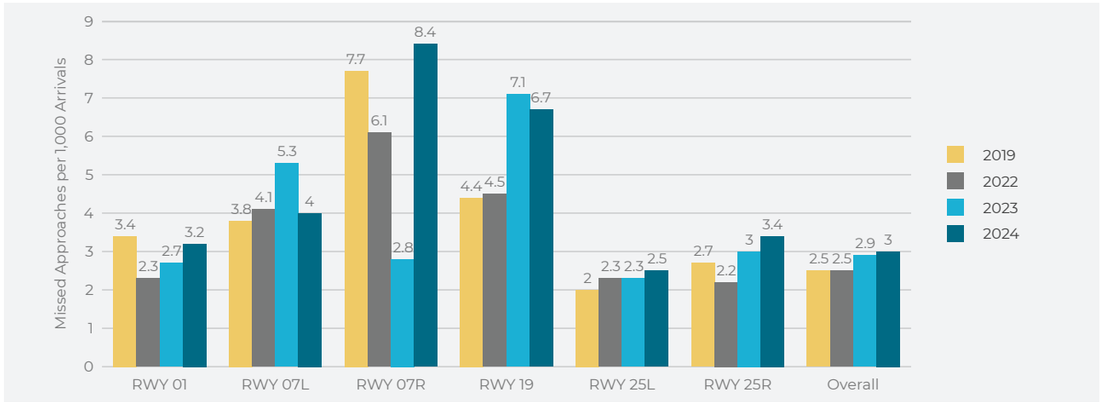
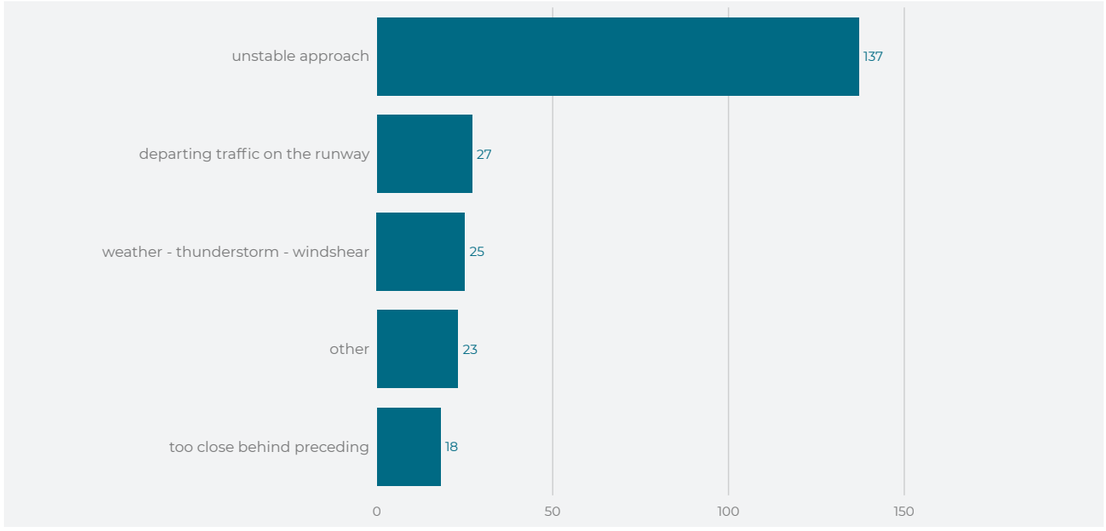


Figure 2.2 shows the top five causes for missed approaches in 2024. Unstable approach was the main reason for missed approaches in 2024 at Brussels Airport, accounting for a share of 55%. Oftentimes, unstable approaches occur due to tailwind at higher altitudes or when the aircraft takes a very direct route and is therefore unable to reduce its speed/altitude sufficiently. The second most common reason for missed approaches in 2024 was when an ATCO had to initiate a go around for the arriving traffic due to a departing traffic still being on the runway. Thunderstorm/windshear is another common reason in 2024.

Figure 2.2*: Top 5 causes for missed approaches in 2024*



A detailed view on all the reasons for missed approaches per runway during the past years can be found in ***Figure 0.1***, ***Figure 0.2***, and ***Figure 0.3*** in the **ANNEX**.

23. UI – under investigation (a non-official severity classification used during the process before a final classification is determined). In 2024, skeyes updated the data extraction method. This can generate small differences with the numbers published in previous reports.

Runway Incursions

According to the International Civil Aviation Organization (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".[24]

According to the Acceptable Means of Compliance (AMC) 3 of EU Regulation 2019/317, an incorrect presence is hereby defined as "the unsafe, unauthorized or undesirable presence, or movement of an aircraft, vehicle, or pedestrian, irrespective of the main contributor (e.g. ATC, pilot, driver, technical system)".[25]

Figure 2.3: *Yearly runway incursions per severity category*

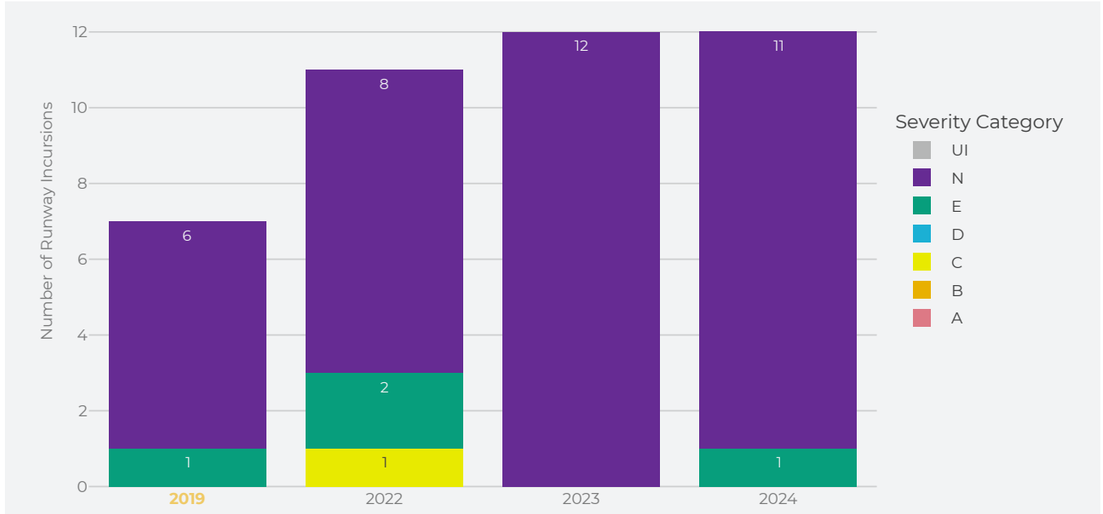
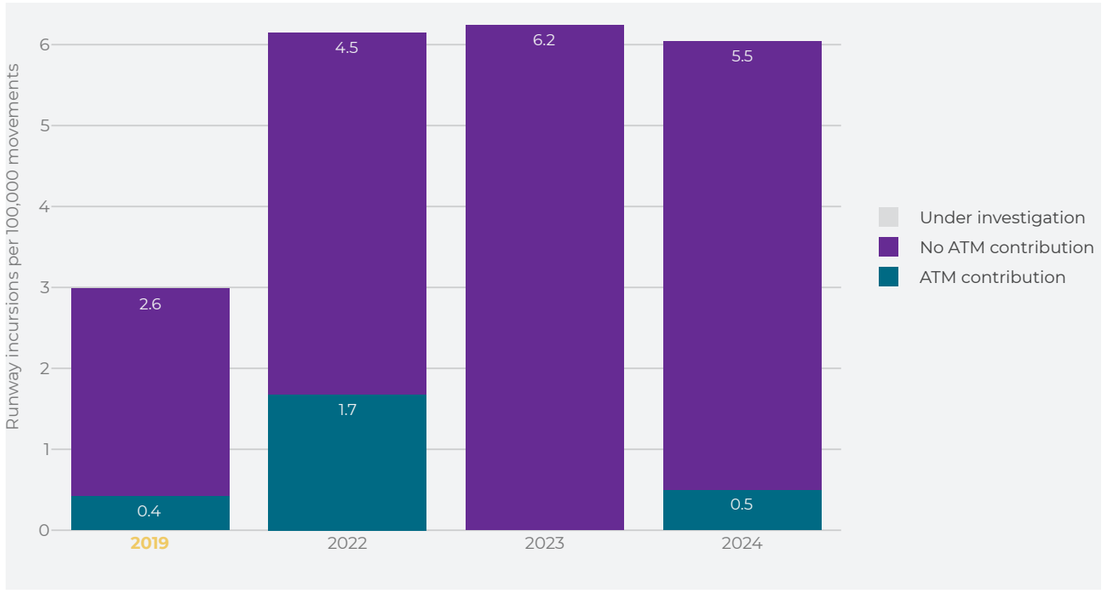


Figure 2.3 gives a yearly overview of runway incursions for the reference year of 2019 and the last three years of 2022, 2023, and 2024. The colours of the bar chart indicate the severity as defined in ***Table 2.1***. When compared 2024 to previous years, there were the same amount of runway incursions as in 2023, 33% more than in 2022 and 50% more than in 2019. However, putting these figures into perspective by comparing the ratio of runway incursions per 100,000 flights, it becomes evident that there was an improvement in 2024 compared to 2022 and 2023 (see ***Figure 2.4***). Although the rate of runway incursions was always bigger in the years after 2019, 2024 showed a decrease with an average of six (5.5 with no ATM contribution plus 0.5 with ATM contribution) runway incursions per 100,000 movements compared to a total of 6.2 in 2022 and also 6.2 in 2023.

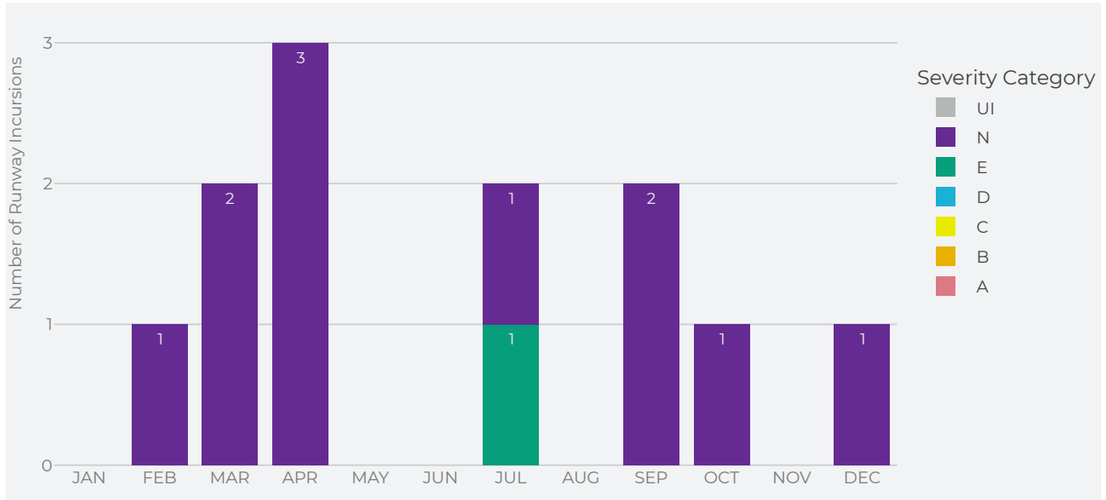
24. ICAO Doc 4444 – PANS–ATM
25. AMC 3 of EU Reg 2019/317

Figure 2.4: *Yearly rates of runway incursions per 100,000 movements by ATM contribution*



A monthly overview of the runway incursions in 2024 can be seen in ***Figure 2.5***. Just like in 2023, there were also twelve runway incursions in 2024, of which eleven were without air traffic management (ATM) ground contribution and one had no safety effect - E. April had the biggest amount of runway incursions (3), while there were no runway incursions in May, June, and August.

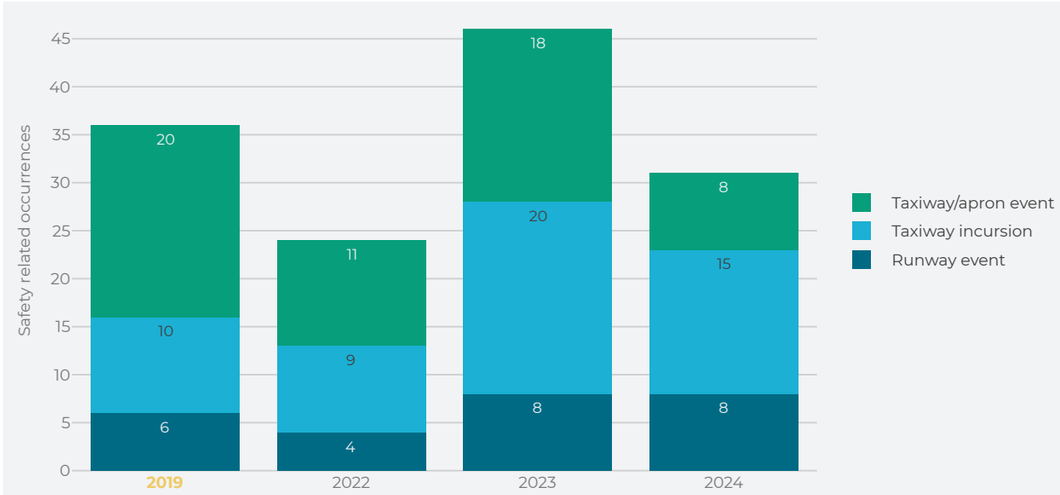
Figure 2.5: *Monthly runway incursions per severity category*



Other Noteworthy Incidents

Besides incursions of the runway, events can also occur on the runway, the taxiway, and on the apron. ***Figure 2.6*** shows the occurrence of these events per category for the reference year of 2019 and the past years of 2022, 2023, and 2024. Overall, the number of these events decreased in 2024 – there were eight taxiway/ apron events, which is ten less than in 2023, 15 taxiway incursions, which is five less than in 2023, and eight runway events, which is the same amount as in 2023. skeyes safety team meets with Brussels Airport every three months to analyse these incidents and agree on actions, when required. Note that an increase in events also might be caused by increased reporting by the air traffic controllers, which is generally welcomed as it showcases a good safety culture at skeyes. Reasons for the events are various and sometimes linked to nature of movements on the apron (e.g. to maintain the separation, or the limit of ATC guidance on the apron).

Figure 2.6: *Yearly runway and taxiway safety events*

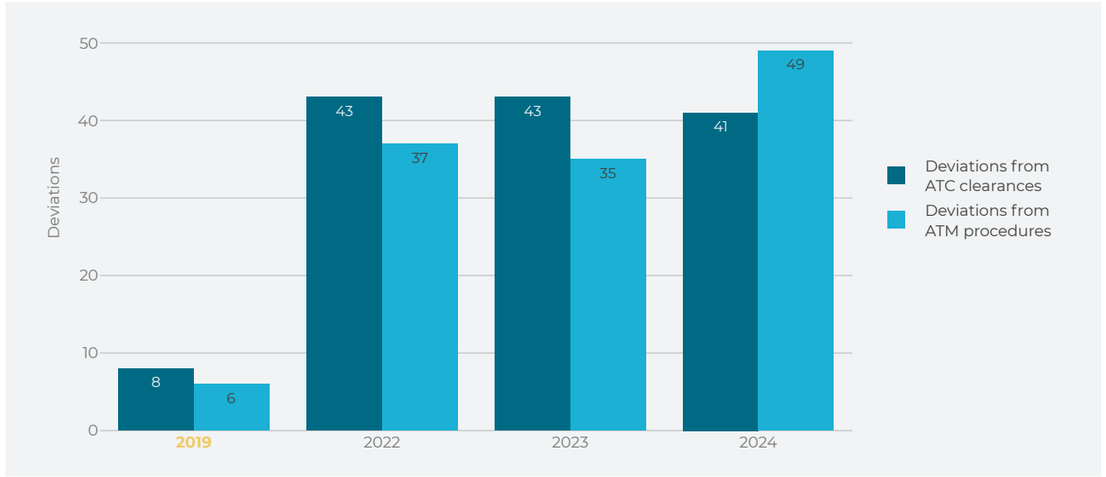


As seen in ***Figure 2.7*** and ***Figure 2.8***, in 2024, the amount of deviations from ATC clearances decreased to 41 compared to 43 in 2022 and 2023, while the amount of deviations from ATM procedures increased to 49 compared to 37 in 2022 and 35 in 2023.

Deviations happened most frequently during pushback operations. As a result of the reports regarding deviations from ATC clearance, skeyes together with BAC performed an awareness campaign to inform the different stakeholders about the push-back clearance. The decrease of such deviation in 2024 speaks for a successful collaboration between Brussels Airport and skeyes.

The increase of deviations from ATM procedures is explained by the update of the pushback procedures. This generated some confusion and increased the number of deviations from ATM procedures in 2024. The two parties will continue to closely monitor such events.

Figure 2.7: *Yearly deviations from ATM procedures and ATC clearance*



With the traffic increase, the rate of the reports concerning deviations from ATC clearances decreased compared to 2022 and 2023, while the rate of the reports concerning deviations from ATM procedures increased compared to 2022 and 2023.

Figure 2.8: *Yearly deviations from ATM procedures and ATC clearances per 100,000 movements*

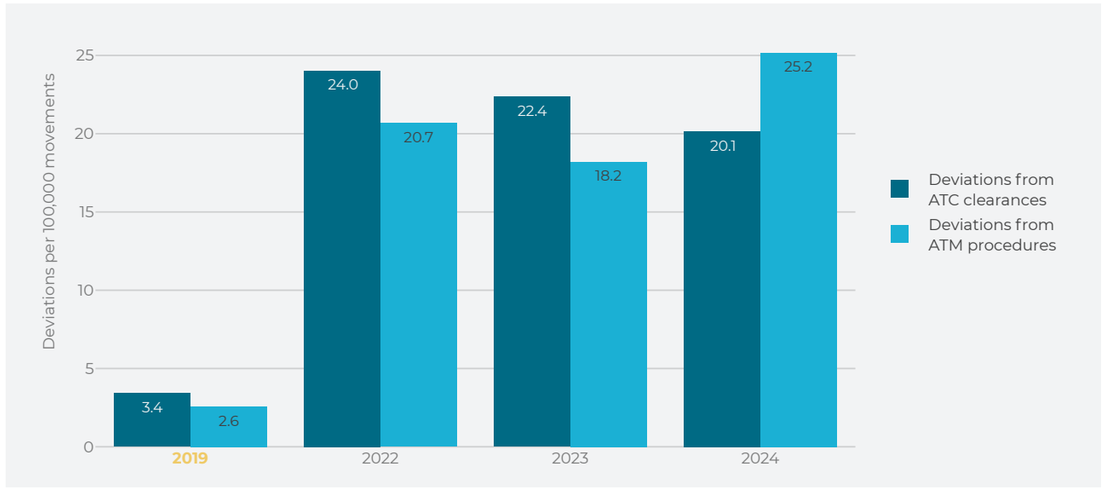


Figure 2.9 visualizes the top safety occurrences per cause. Overall, there were 569 safety occurrences (not including missed approaches as they are analysed separately), which is a minor increase compared to 563 safety occurrences in 2023. Wildlife reports (any pilot report of a confirmed or potential strike with wildlife) remained the leading safety occurrence with 66% (196) compared to other safety occurrences, which is the same trend as in 2023, 2022 and 2019. However, the amount of yearly wildlife reports shows a trend of improving, as there were 198 such occurrences in 2023, 262 in 2022 and 200 in 2019 (also when the yearly amount of traffic is taken into consideration).

Figure 2.9: *Top safety occurrences in 2024*

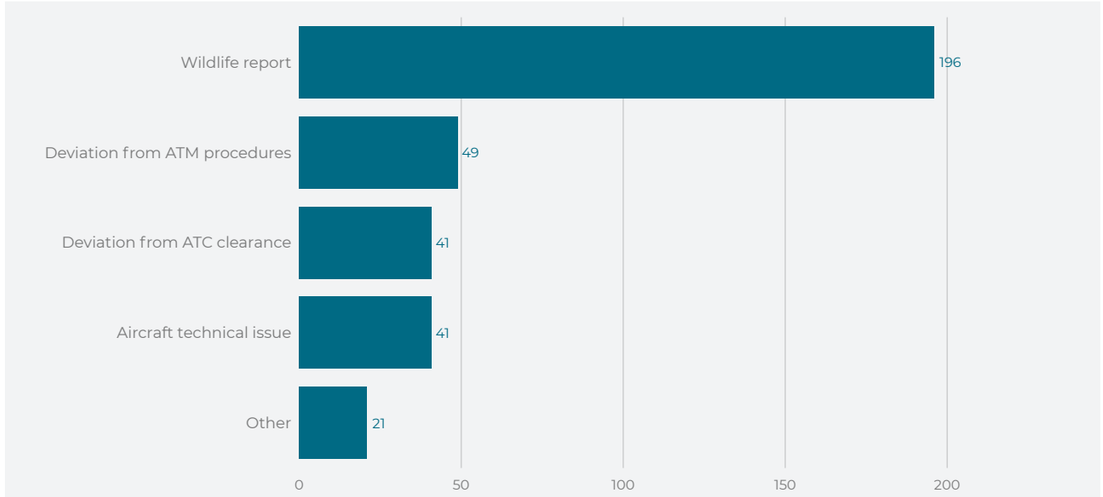


Table 2.2 shows the total numbers of safety related occurrences regarding Remotely Piloted Aircraft Systems (RPAS) and laser beams. When comparing the reference year of 2019 to the years of 2022, 2023, and 2024, the amount of safety occurrences relating to RPAS show a similar trend throughout all years – there were seven in 2019, five in both 2022 and 2023, and six in 2024. As for the laser beams, there were eight such occurrences in 2019, followed by a significant increase in the following years – 19 in 2022, 18 in 2023, and 15 in 2024, which shows that the trend is decreasing.

Table 2.2*: RPAS and lasers incidents per year*

Safety occurrence	2019	2022	2023	2024
RPAS	7	5	5	6
Laser beam	8	19	18	15

Improvements And Recommendations

Runway Safety Team fostering shared safety culture

The Local Runway Safety Team (LRST), which meets every two months, is committed to increasing Runway Safety and is composed of pilots, air traffic controllers and safety departments from 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 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.

The events mentioned above are examples of incidents, which were discussed during the LRSTs so that improvements could be made and awareness would be raised. Good examples are the joined efforts between skeyes and Brussels Airport Company in bird control operations, the update of skeyes' pushback procedures or working together with the stakeholders to find a solution to reduce the deviations from ATC clearances.

Shaping future airspace with PBN

skeyes also promotes the increased use of Performance Based Navigation (PBN) procedures. Such approach procedures fit in the on-going transition towards a PBN Environment (EU regulation), and greatly improve predictability, therefore, situational awareness can be improved. More information on the PBN procedures can be found in Chapter 4.

Implementing practical solutions for operational safety and coordination

In 2024, there were a total of 3 closed recommendations for EBBR. Firstly, there was a recommendation received from the safety department of Brussels Airport Company to only provide crossing clearance of RWY 01 to (fire) vehicles when it is unlikely that they will encounter taxiing aircraft when proceeding to the apron (e.g. when an aircraft have already passed or have clearance limits). Secondly, a N2OPS has been sent, reminding ATCOs that crossing RWY 01/19 by (fire) vehicles can create some confusion for the vehicle drivers. Therefore, it is considered a good practice to only provide crossing clearance to vehicles when it is unlikely they will encounter taxiing aircraft on the inner taxiway (INN TWY) and the outer taxiway (OUT TWY) when proceeding towards the aprons. If this is not the case, it is recommended to postpone crossing clearance until INN and OUT are clear. Lastly, there was a third recommendation to develop a procedure or workflow together with BAC to determine what should happen in case of drone flights for ILS calibration. An agreement has been reached with BAC, the NOTAM text is adapted and it matches to the working method used for cranes.

Monitoring and mitigating low approach incidents

In addition, in 2024, there were several incidents reported with aircraft being too low compared to the VOR approach path for RWY 07L in Brussels Airport. As a result, approaches are monitored closely with ELVIRA tool and it is seen that some are indeed below approach path. This is sometimes not detected by ATC if the pilot doesn't report it. skeyes safety unit contacted the accident board and a letter was prepared by skeyes to the BCAA and the minister promoting the RNP approach while urging to end the existing procedure.

2 CAPACITY & PUNCTUALITY

This chapter addresses airport's capacity and punctuality. In the first section on the airport's capacity, 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 Airport is studied. Statistics on the arrival delay, which is the delay due to regulations placed by Brussels Airport on the arrivals, are provided. Furthermore, the delay from the airport's perspective reflects the impact on traffic to and from Brussels Airport caused not only by regulations at Brussels Airport but also by those in the Belgian en-route airspace and from other ANSPs.

To be noted that although the greatest IFR capacity for 25R-25L,R runway configuration is 75 movements per hour, the number of slots that the coordinator can allocate is 74, as seen in the Belgium Slot Coordination website.[26]

26. www.brucoord.org/capacity

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 Airport. Note that this is only a theoretical calculation and currently not used for schedule coordination purposes.

27. NOTE: Due to the complex dependencies (both ground and air) of runways in configuration 19,25L,25R the theoretical declared capacity could not be calculated analytically. Factors like controller workload need to be accounted for to calculate a theoretical capacity.

Table 3.1: *Declared IFR capacity*[27]

Runway Configuration		Declared IFR Capacity (movements/hour)		
Departures	Arrivals	Only Departures	Only Arrivals	Mixed Fleet
01	01	38	33	40
07L,07R	01	34	27	54
07R	-	34	-	34
19	19	38	33	39
19,25R	25R	35	34	45
25R	25L,25R	41	68	75
25R	25R	41	34	41
-	07L	-	32	32
-	25L	-	34	34

The variations per runway configuration in the declared capacity add to the complexity of the flight planning, therefore also impacting the performance of other areas, e.g. by deviations from the preferential runway system due to traffic exceeding the capacity of this configuration – or ATFM regulations due to the runway configuration in use at the time.

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.

Figure 3.1 to ***Figure 3.8*** provide an easy way to visually inspect if the declared capacity has ever been exceeded. In these plots, 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 for at least an hour within the default opening times of the aerodrome and during which 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, with more translucency indicating less hours. The histograms on the sides show the distributions of arrivals and departures. The declared capacity is shown by a diagonal red line: At any point on this line, the x-axis value (departures) and y-axis value (arrivals) will add up to the threshold number (total movements). Any dot above this line indicates an hour exceeding the declared capacity. Note that this capacity is usually only declared for IFR movements, yet this plot considers 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 land on the runways of the configurations, but missed approaches are. The notation for the runway configurations in this reports always mentions the departure runways first and the arrival runways, separated by a hyphen, afterwards.

Figure 3.1: *Hourly movements for configuration 25R–25L,25R*

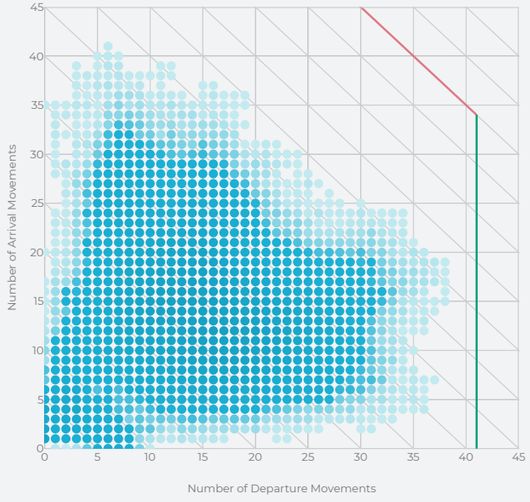


Figure 3.2: *Hourly movements for configuration 19,25R–25R*

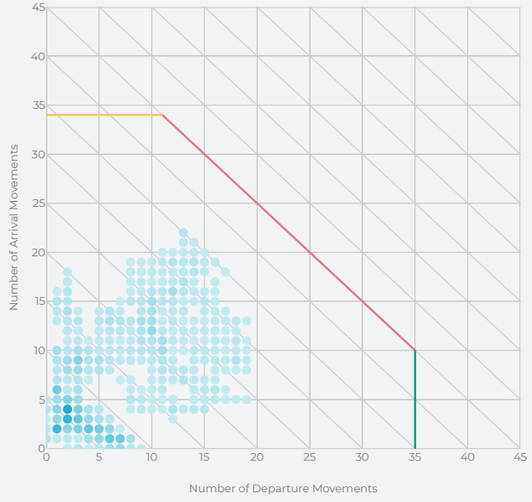


Figure 3.3: *Hourly movements for configuration 07L,07R–01*

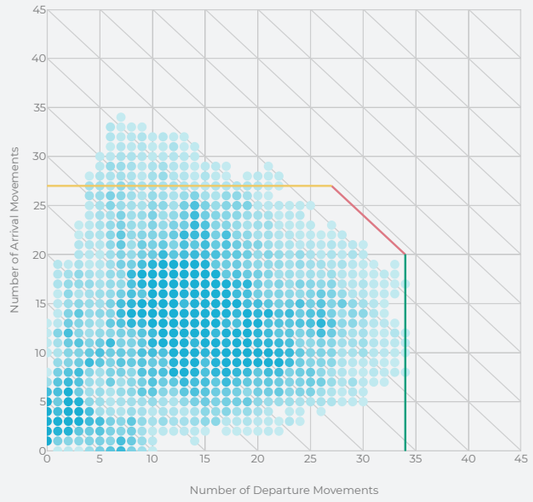
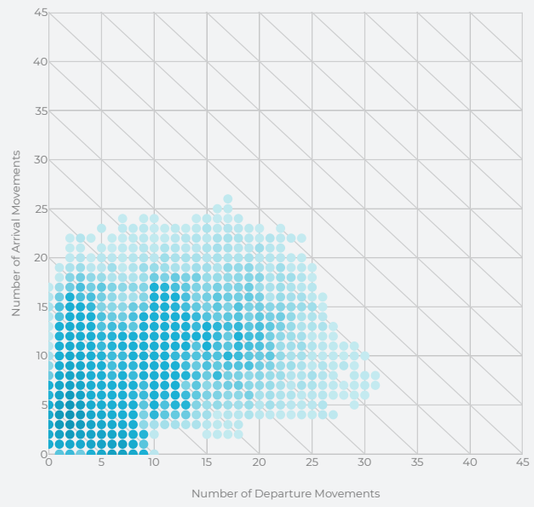


Figure 3.4: *Hourly movements for configuration 19,25R–25L,25R*



The runway configuration 25R – 25L,25R is the most commonly used runway configuration at Brussels Airport and it also has the highest declared capacity with 75 movements per hour for mixed fleet. As seen in ***Figure 3.1***, in 2024, this capacity was never exceeded. In fact, the maximum of 58 movements per hour stayed below the declared capacity by 17 movements, just like in 2023. 58 was also the highest amount of movements per hour throughout the year. The capacity for arrivals only (68 movements per hour) is not visible in the figure as it fell out of the scale.

The second most common runway configuration (19,25R–25R) is shown in ***Figure 3.2***. For this configuration, the declared capacity of 45 movements was never exceeded in 2024, reaching a maximum of 35 movements per hour. As shown in ***Figure 3.3***, the maximum of 52 movements per hour for runway configuration 07L,07R – 01 in 2024 is only two movements below the declared capacity. This was the same trend in 2023 as well. For the runway configuration 19,25R – 25L,25R the capacity is not declared. As seen in ***Figure 3.4***, the maximum number of movements per hour observed in 2024 was 46.

Figure 3.5: *Hourly movements for configuration 25R–25R*

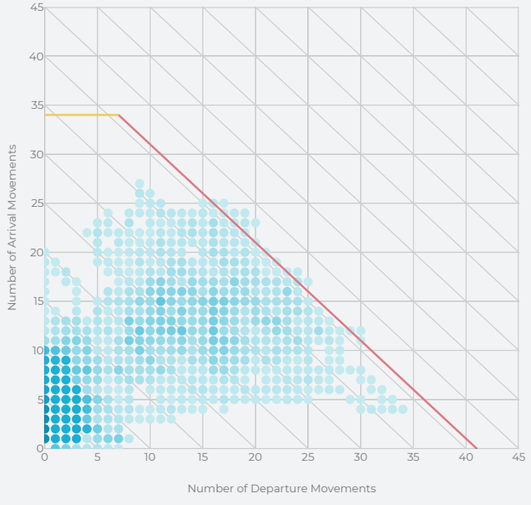
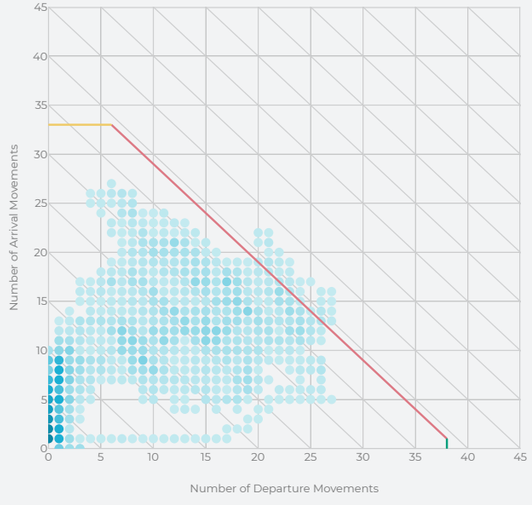


Figure 3.6: *Hourly movements for configuration 19-19*



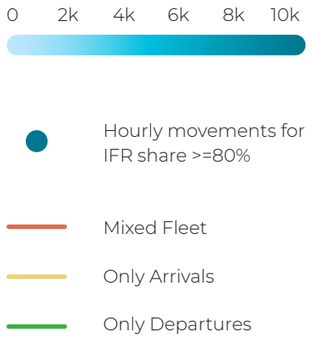


Figure 3.7: *Hourly movements for configuration 01-01*

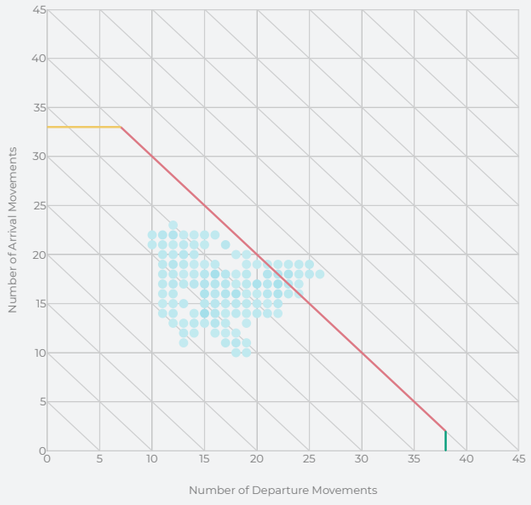
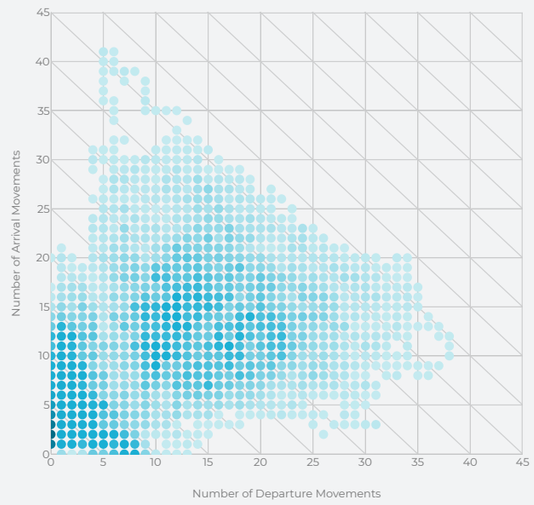


Figure 3.8: *Hourly movements for configuration Other*



As seen in ***Figure 3.5***, several hours with more than the declared 41 movements per hour were observed for runway configuration 25R–25R in 2024. Throughout the year, the declared capacity was exceeded by a maximum of two movements per hour. The capacity only for departures (41 movements per hour) was never exceeded. On the chart, it is barely visible in the bottom right corner, in green. Also for runway configuration 19-19, the declared capacity (39 movements per hour) was exceeded for a few hours in 2024, by a maximum of three movements, as seen in ***Figure 3.6***.

For runway configuration 01-01, all of the hours exceeding the declared capacity (40 movements per hour) had a rather balanced share of arrivals and departures, as seen in ***Figure 3.7***. The maximum of 44 movements per hour for this configuration exceeds the declared capacity by four movements. Last, but not least, ***Figure 3.8*** summarizes the distribution of movements per hour for any other than the previously mentioned runway configurations in 2024, visualising that there were a maximum of 54 movements per hour.

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

Runway Configuration		Date	Maximum	% of IFR	% of Departures
Departures	Arrivals	of Occurrence	Extra Movements	at Occurrence	at Occurrence
01	01	Sep. 15	4	100%	59%
19	19	Feb. 17	2	100%	63%
		Mar. 9	4	100%	63%
		Apr. 28	1	100%	52%
		May. 25	1	100%	57%
		Sep. 15	4	100%	49%
25R	25R	Aug. 24	1	100%	57%
		Aug. 25	2	100%	44%
		Oct. 30	1	100%	71%

As seen in ***Table 3.2***, there were a total of nine days in 2024 when the declared capacity was exceeded, while all the traffic was 100% IFR. For the configuration 01-01, there were four extra movements on September 15th, for the configuration 19-19, there were a maximum of four extra movements on five days in 2024, and for the configuration 25R-25R, there were a maximum of two extra movements on three days in 2024.

Table 3.3 provides insights regarding the maximum movements per hour recorded per each runway configuration and the duration above capacity, expressed in percentage of hours when the configuration was in use in 2024.

Table 3.3: *Capacity statistics*

Runway Configuration		Maximum	Declared	% of Hours
Departures	Arrivals	Movements/hour	Capacity	above Capacity
01	01	44	40	6.23%
07L,07R	01	52	54	0%
19	19	43	39	0.44%
19,25R	25L,25R	46	-	-
19,25R	25R	35	45	0%
25R	25L,25R	58	75	0%
25R	25R	43	41	0.09%
Other	Other	54	-	-

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:[28]

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.

This section addresses the regulated traffic at Brussels Airport where the first part considers the key performance indicator: arrival delay. The Airport Arrival ATFM Delay is an indicator of ATFM delays on the ground due to constraints at the destination airport. In addition, this section gives an overview of the influence of ATFM measures on departing traffic followed by an overview of the influence of ATFM measures on arriving traffic.

AIRPORT ARRIVAL ATFM DELAY

As of the 1st of January, 2015, skeyes is subject to an annual target regarding ATFM arrival delay. ATFM arrival delay is the delay of a flight attributable to the 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.[29]

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 (RP2), 2016-2019, the national target was 0.10 minutes/flight, and Brussels Airport and Liège Airport were considered as contributing airport. The target for Brussels Airport on CRSTMP arrival delay was 0.11 minutes/flight. For reference period 3 (RP3), 2020-2024, only Brussels Airport was considered as contributing airport. Initially the national target was planned to be 1.82 minutes/flight for all causes and 0.17 minutes/flight for CRSTMP causes. 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 per flight for 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.

28. A common FABEC Performance plan https://www.fabec.eu/who-we-are/optimised-performance/a-common-fabec-performance-plan (URL retrieved on 25/02/2025)

29. EUROCONTROL, "SES Performance Scheme Reference Period 3 (2020-2024), 2022, https://www.eurocontrol.int/prudata/dashboard/metadata/rp3/ (URL retrieved on 19/04/2023)

For this performance indicator, a comparison is made over 2019, 2022, 2023, and 2024. ***Table 3.4*** gives the amount of arrival delay of Brussels tower and the total number of arrivals per year. Note that the number of arrivals in this section and the arrival delay for each flight is calculated by the Network Manager and has been provided by the Performance Review Unit and EUROCONTROL (PRU / EUROCONTROL).[30]

In 2024, the capacity at Brussels Airport was impacted by a multitude of causes. This is reflected in the total ATFM arrival delay as a total of 27,145 minutes of arrival delay was registered. The main reasons for the delay was adverse weather conditions (17,253 minutes). Delay attributed to the CRSTMP category which represents the causes with skeyes contribution was 2,386 minutes of delay in 2024, which is a decrease of 29% compared to 2023.

Table 3.4: *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	7,276	76,310	19,721	103,307	114,643
2022	1,714	7,423	483	9,620	87,118
2023	3,382	17,755	19,254	40,391	93,796
2024	2,386	17,253	7,506	27,145	96,735

As mentioned before, the Key Performance Indicator (KPI) is the average CRSTMP arrival delay per arrival at the airport. Translated into the key performance indicator delay per arrival, this results in a total arrival delay of 0.28 minutes per arrival in 2024 and a CRSTMP arrival delay of 0.02 minutes per arrival. This can be seen in ***Figure 3.9***, which shows the arrival delay rates for 2019, 2022, 2023, and 2024.

30. Hence the difference with figures in Chapter 1, where movements are counted using the AMS and the BCAA criteria. EUROCONTROL only account for flights with a registered flight plan.

Figure 3.9: *Yearly target and actual rate of ATFM delay per IFR arrival*

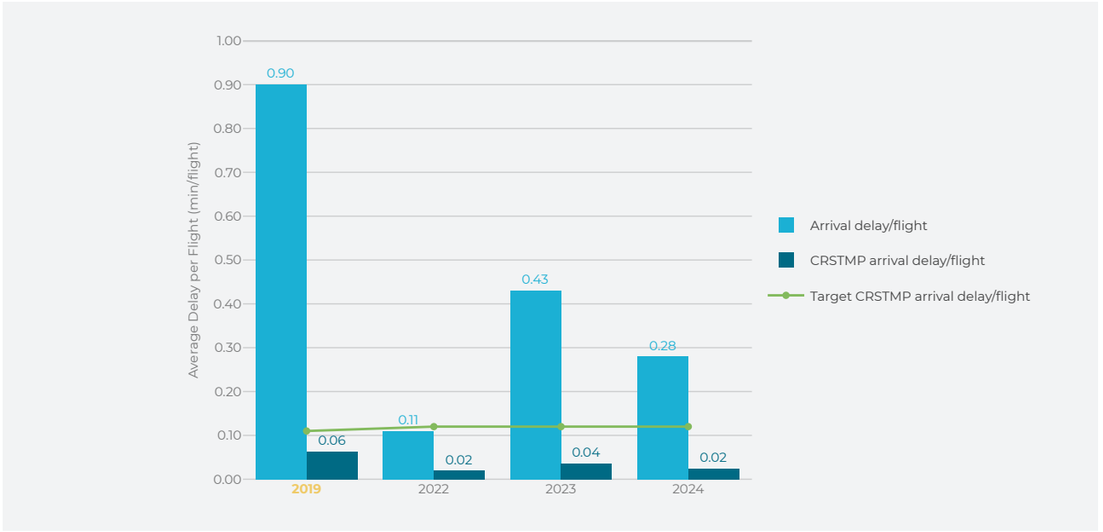


Table 3.5 shows the impact of the regulations placed at Brussels Airport on each IFR arrival to the airport grouped by no delay, delay up to 15 minutes and delay more than 15 minutes. When comparing 2024 to 2023, even with the runway 01/19 renovation works during the summer, IFR arrivals delay amounts have reduced both for the category of up to 15 minutes (-30%) and more than 15 minutes (-34%) , while the category of no delay increased (+5%).

Table 3.5: *Delayed IFR arrivals per category of delayed time*

	No delay	Delay up to 15 min	Delay more than 15 min	Total
2019	109,558	2,369	2,712	**114,639**
2022	86,444	440	235	**87,119**
2023	90,978	1,871	950	**93,799**
2024	95,113	1,311	629	**97,053**
2024 *vs* 2019	-13%	-45%	-77%	-15%
2024 *vs* 2023	+5%	-30%	-34%	+3%

ALL ATFM IMPACT ON TRAFFIC AT BRUSSELS AIRPORT

Flights departing from and arriving at an airport can be delayed by ATFM measures in any of the sectors they cross on their route. Besides being delayed by Brussels tower, flights to or from Brussels Airport can therefore also be delayed by ATFM measures in any ATC sector along their flight route; i.e. en-route or at the other departure or arrival airport.

Figure 3.10 and ***Figure 3.11*** show the delay on departing and arriving traffic for 2019, 2022, 2023, and 2024. In 2024, departing flights from Brussels Airport were delayed by 370,590 minutes. 3% (9,210 minutes) of that delay is attributable to skeyes while 97% had a delay of 277,679 minutes of ATFM delay. Thereof, 13% (35,077 minutes) is attributable to skeyes while 87% (242,602 minutes) is attributable to ATFM measures placed by other ANSPs.

To be noted: ***Figure 3.10*** and ***Figure 3.11*** present an overview of the ATFM delay on arriving and departing flights at Brussels Airport over the past three years, including the reference year 2019. The delay is attributed to the regulation originating it. For the flights with Brussels 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 Brussels Airport twice.

Figure 3.10: *ATFM delay for IFR departures per year and delay origin*

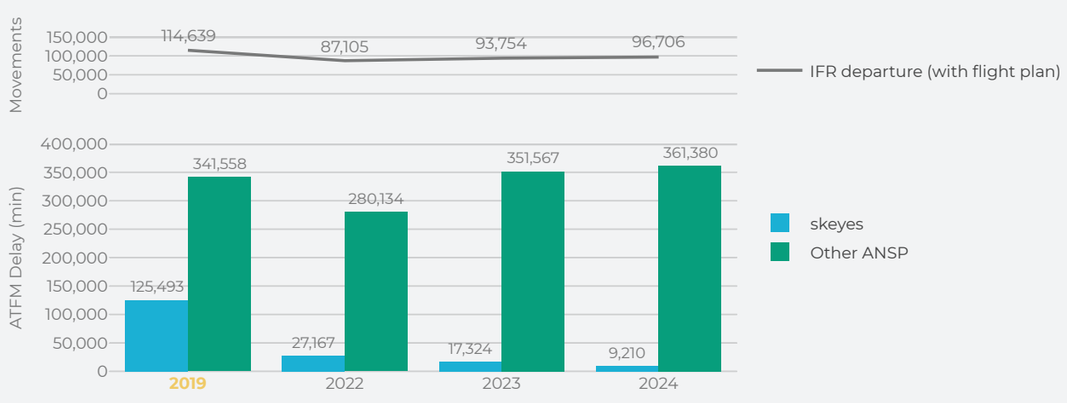
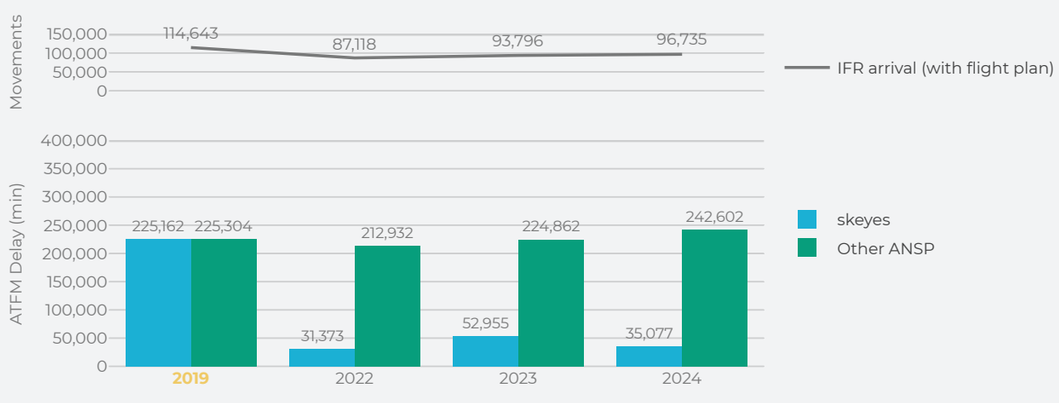


Figure 3.11: *ATFM delay for IFR arrivals per year and delay origin*

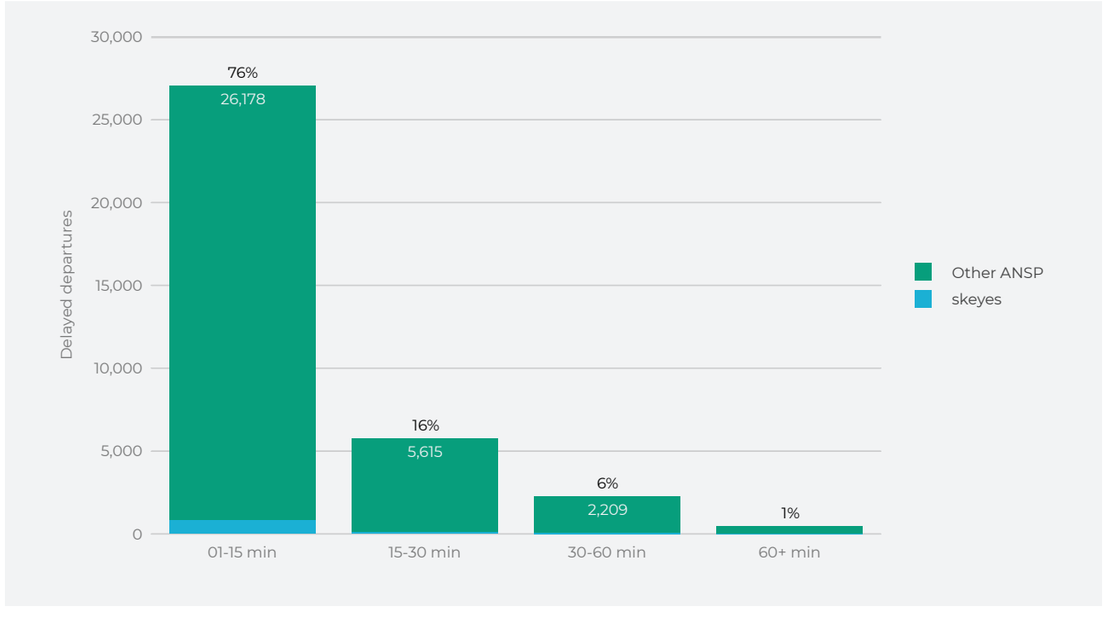


To give a view of the severity of the impact, the delayed flights can be categorised based on the length of the delay. There are four categories:

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

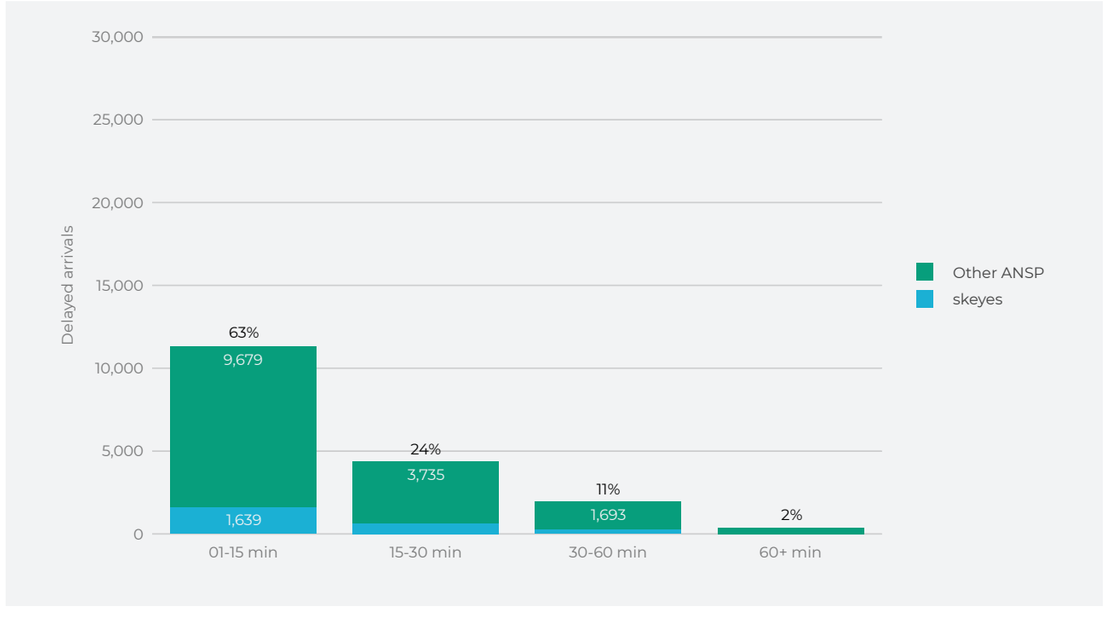
The graphs in ***Figure 3.12*** and ***Figure 3.13*** show that 76% of the delayed departures and 63% of the delayed arrivals were delayed for a maximum of 15 minutes. 1% of the departure flights in 2024 and 2% of the arrivals had a delay above one hour.

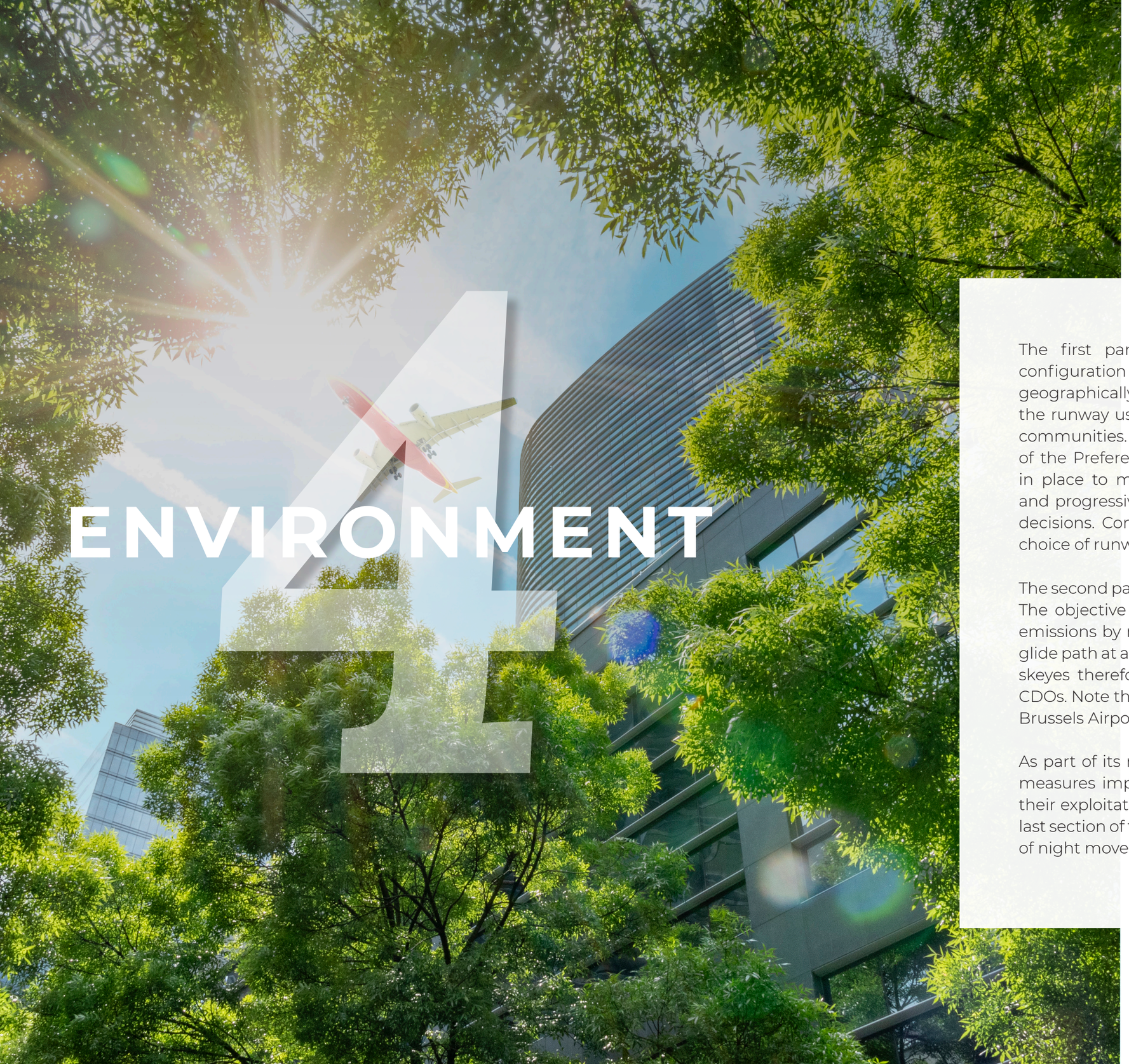
Figure 3.12: *Delayed IFR departures per category of delayed time*



A noteworthy event that impacted the punctuality in Brussels Airport was the MLU2 ATM system upgrade/ implementation in Brussels ACC from October 19th until October 22nd , that generated 29,202 minutes of ATFM delay, out of which 426 minutes of delay were generated by the regulations put in place in Brussels Airport and 10,019 minutes of delay were generated on traffic coming to or going from Brussels Airport due to the special event (MLU2) regulations in Brussels Airport and Brussels ACC.

Figure 3.13: *Delayed IFR arrivals per category of delayed time*





11 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 used at Brussels Airport. The airport is geographically located in a densely populated area, which makes the runway use information very important for the neighbouring communities. Besides the monthly and yearly overview of the use of the Preferential Runway System (PRS), ongoing processes are in place to maintain continuous dialogue with all stakeholders and progressively enhance transparency in runway configuration decisions. Considering that wind is a predominant factor in the choice of runway use, wind data is also 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 therefore puts in place indicators to monitor the use of CDOs. Note that both PRS and CDO data can also be found on the Brussels Airport Traffic Control (BATC) website: www.batc.be.

As part of its noise reduction policy, Brussels Airport implements measures imposed by the government. One of these, as part of their exploitation permit, is to limit the number of night slots. The last section of this chapter therefore provides a view on the number of night movements.

Preferential Runway System

A basic aerodynamic principle is that an airplane should take off and land against the wind direction. In addition to the speed and surface wind direction, there are much more factors to consider when choosing the runway in use, such as environmental regulations, runway length, available navigation aids for approach and landing, the weather conditions, the available instrument approach procedures, or simply the availability of runways and taxiways. For environmental reasons, a PRS is in place at Brussels Airport. This system defines the runways to be used depending on the weekday and the time of day. ***Table 4.1*** shows this runway configuration scheme as listed in the Aeronautical Information Publication (AIP). When the conditions to safely use the indicated runways in the configuration scheme are not met, skeyes may deviate from this scheme and choose a more suitable alternative runway configuration to maintain the safety of operations.

As already mentioned in previous chapters, Brussels Airport had it's runway 01/ 19 renovated from August 7th until September 1st in 2024 and were scheduled during the day between 05:00 and 23:00. That project also involved renewing the top asphalt layer, laying new cabling, and installing improved drainage gutters. During these works, runway 01/ 19 was closed. The works exceptionally continued during the night from August 23rd until the 26th. Due to the proximity of the works at the crossing with runway 25L/07R, runway 25L/07R was also closed for two days on August 24th, 25th, and until 05:30 on August 26th, as a safety precaution. By carrying out these works in the summer, the most optimal weather conditions ensured the shortest possible completion time. During the works, it was not always possible to apply the PRS, but the works were scheduled in such a way to limit the impact.[31] [32]

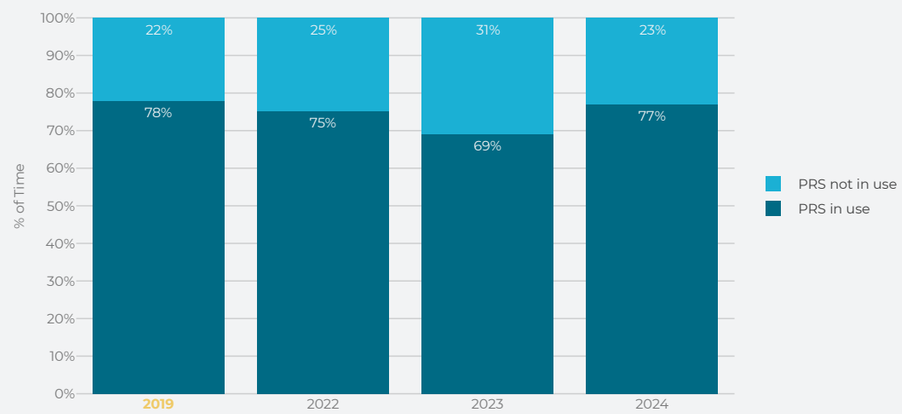
Figure 4.1 shows the percentage of time when the preferred runway configuration was in use per year in 2019, 2022, 2023, and 2024. In 2024, the PRS was in use 77% of the time, which is greater than in 2022 (75%) and 2023 (69%), yet still slightly less than in 2019 (78%).

Table 4.1: *Runway Configuration Scheme published in the Belgian AIP (Part 3, EBBR, AD 2.20, Ch. 4.2.1)*

		0500 to 1459 (0400 to 1359)	1500 to 2159 (1400 to 2059)	2200 to 0459 (2100 to 0359)
MON 0500 (0400) till TUE 0459 (0359)	TKOF	25R		25R / 19[1]
	LDG	25L / 25R		25R / 25L[2]
TUE 0500 (0400) till WED 0459 (0359)	TKOF	25R		25R / 19[1]
	LDG	25L / 25R		25R / 25L[2]
WED 0500 (0400) till THU 0459 (0359)	TKOF	25R		25R / 19[1]
	LDG	25L / 25R		25R / 25L[2]
THU 0500 (0400) till FRI 0459 (0359)	TKOF	25R		25R / 19[1]
	LDG	25L / 25R		25R / 25L[2]
FRI 0500 (0400) till SAT 0459 (0359)	TKOF	25R		25R[3]
	LDG	25L / 25R		25R
SAT 0500 (0400) till SUN 0459 (0359)	TKOF	25R	25R / 19[1]	25L[4]
	LDG	25L / 25R	25R / 25L[2]	25L
SUN 0500 (0400) till MON 0459 (0359)	TKOF	25R / 19[1]	25R	19[4]
	LDG	25R / 25L[2]	25L / 25R	19

[1] RWY 25R only for traffic via ELSIK, NIK, HELEN, DENUT, KOK and CIV / RWY 19 only for traffic via LNO, SPI, SOPOK, PITES and ROUSY; aircraft with MTOW between 80 and 200 T can use RWY 25R or 19 (at pilot discretion); aircraft with MTOW > 200 T shall use RWY 25R regardless the destination.
[2] Arrival on RWY 25L at ATC discretion only.
[3] No airport slot will be allocated for take-off between 0000 (2300) and 0500 (0400) (EBBR AD 2.20, § 1).
[4] No airport slot will be allocated for take-off between 2300 (2200) and 0500 (0400) (EBBR AD 2.20, § 1).

Figure 4.1: *Yearly PRS use*



31. https://www.aviation24.be/airports/brussels-airport-bru/brussels-airport-to-undergo-runway-01-19-renovation-from-august-7-to-september-1/ (URL retrieved on 18/02/2025)

32. https://www.brusselsairport.be/en/pressroom/news/renovation-works-on-runway-01-19 (URL retrieved on 18/02/2025)

As seen in ***Figure 4.2***, the PRS was in use the least in January, June, August, and September, while in April and July it was in use the most.

Table 4.2 also provides the figures of the total time when the PRS was not in use per reason and month, which is displayed in ***Figure 4.3***. In addition, it shows the total time the PRS was in use. Overall, in 2024, the three main reasons for not using the PRS were meteorological conditions at the airport (64%) and near the airport in the departure and/or approach path (7%) together with non-availability of the runway or taxiway (22%). The same reasons were leading in 2023 as well, which shows a trend in Brussels Airport.

Figure 4.3 visualises the overview of reasons when the PRS was not is use in 2024, measured in hours of deviation from the PRS. Although all months in 2024 consist of different reasons with different amounts of corresponding hours, meteorological conditions at the airport is the top reason in most of the months, except August. In August, non-availability of the runway and/ or taxiway (RWY/TWY) was the top reason due to the renovation works on RWY01/19 that took place from August 7th until September 1st , 2024. Due to the pavement issues throughout the year, non-availability of the RWY/TWY is the second most popular reason of deviation from the PRS, which even led to ATFM regulations at times.

Table 4.2: *PRS use in hours per month and per reason*

PRS not in use with Reasons / PRS in use	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
PRS not in use	**218:12**	**128:29**	**150:51**	**105:21**	**163:22**	**191:18**	**102:52**	**261:07**	**222:44**	**139:55**	**171:44**	**163:45**	**2019:40**
Meteorological conditions at the airport	141:48	94:49	120:47	68:27	87:37	113:27	57:51	75:14	140:36	104:48	144:33	147:46	1297:43
Non-availability RWY/TWY	50:58	18:55	16:00	18:32	40:38	21:09	12:01	173:29	54:23	04:20	20:25	12:31	443:21
Meteorological conditions near the airport in the departure and/or approach path	18:16	-	06:35	-	17:17	44:29	16:45	01:44	18:49	11:54	-	00:39	136:28
Traffic demand exceeds capacity of PRS	06:05	01:15	02:19	07:08	04:43	11:10	11:55	-	03:46	08:02	03:45	02:07	62:15
Planned maintenance of airport and/or ATC equipment	-	-	05:10	06:31	01:50	-	-	08:40	01:08	10:51	02:02	-	36:12
Special activities	-	06:09	-	-	06:02	-	04:05	-	03:47	-	00:59	-	21:02
Other	00:30	07:21	-	-	05:15	01:03	00:15	02:00	-	-	-	-	16:24
Unplanned non-availability (U/S) of airport and/or ATC equipment	00:35	-	-	04:43	-	-	-	-	00:15	-	-	00:42	06:15
PRS in use	**525:48**	**567:31**	**593:09**	**614:39**	**580:38**	**528:42**	**641:08**	**482:53**	**497:16**	**604:05**	**548:16**	**580:15**	**6764:20**

Figure 4.2: *Monthly PRS use*

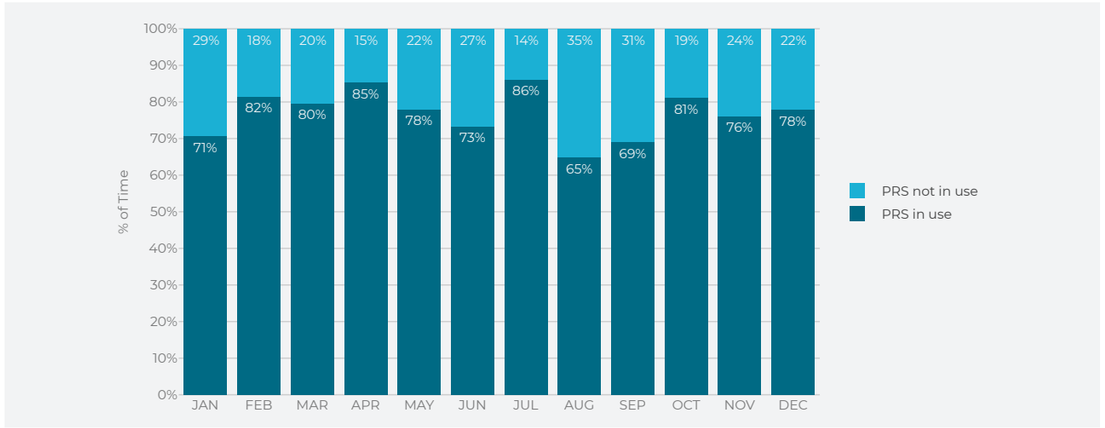
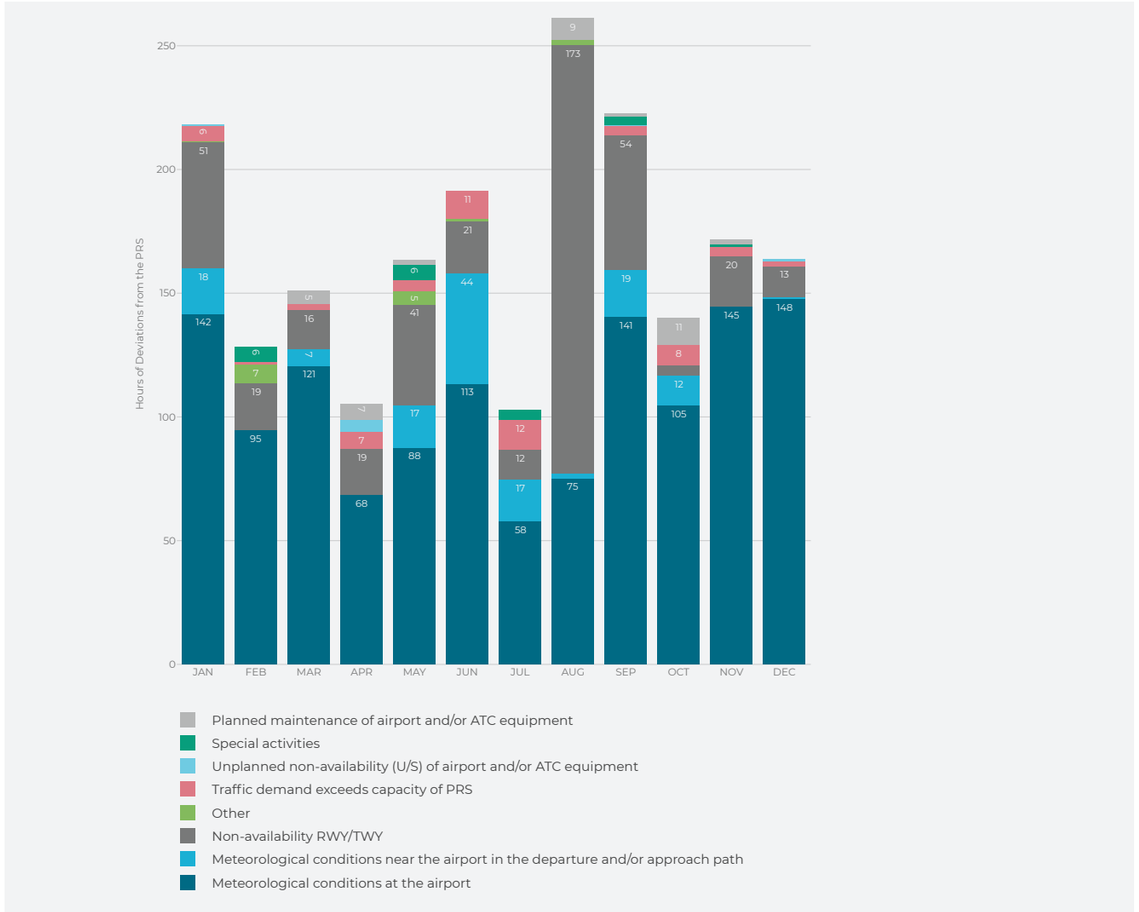


Figure 4.3: *Overview of reasons for PRS not in use per month*



Continuous Descent Operations (CDO)

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 optimal 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.[33]

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.*

For CDO statistics, a new 'CDO flag' has been incorporated, in order to consider only 'CDO eligible' flights. The following criteria have been defined to flag a movement as CDO eligible flight:

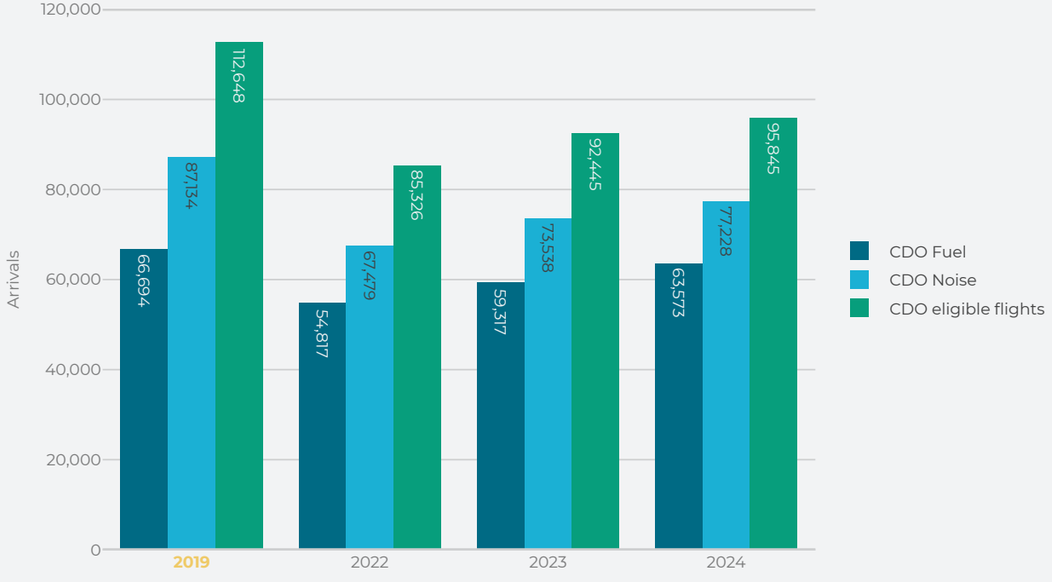
- *It is an IFR arrival;*
- *The aircraft is not categorized as "light", meaning its maximum take-off weight (MTOW) is above 7000 kg;*
- *It is not a helicopter;*
- *It is not a military flight;*
- *It is not a touch-and-go, i.e. the flight does not involve landing briefly and taking off again;*
- *The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

The total of CDO-relevant arrivals is therefore different than the number of arrivals provided in Chapter 1.

In an effort to increase data consistency, historical CDO data is being updated on an annual basis. This measure ensures that all CDO data, displayed in this report, has been calculated with the same CDO algorithm, providing more fairness and transparency in the historical evolution of CDO performance.

33. 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),

Figure 4.4: *Yearly comparison CDO indicators*



As shown in ***Figure 4.4***, there were a total of 95,845 arrivals of CDO eligible flights in 2024. Out of these, 77,228 arrivals performed a CDO Noise arrivals and 63,573 a CDO Fuel arrivals. In absolute numbers, the CDO Fuel and CDO Noise arrivals have increased along with the CDO eligible flights in the past years. In relative numbers, i.e. the percentage of arrivals with a CDO over all CDO eligible flights, the CDO Noise operations have continuously and steadily increased from 77% in 2019 to 81% in 2024, while he CDO Fuel operations have continuously and steadily increased from 59% in 2019 to 66% in 2024.

These relative numbers are further analysed per runway in ***Figure 4.5*** and ***Figure 4.6*** for CDO Noise and CDO Fuel operations over the CDO-relevant arrivals per year and runway.

An increase in CDO Noise operations can be seen on the most frequently used runways 25L and 25R. Also runway 07L, 07R and 01 witnessed an increase in the last years. Only on runway 19 the rate of CDO Noise operations decreased. The small sample size (runway 19 was in used for 5% of the all movements in 2023) is to be kept in mind.

CDO Fuel operations also increased on runway 25L and 25R, the main runways (in use for 77% of all movements in 2023). On the lesser used runways a decrease in the rate of CDO Fuel operations can be observed.

Figure 4.5: *Yearly CDO Noise adherence Per Runway*

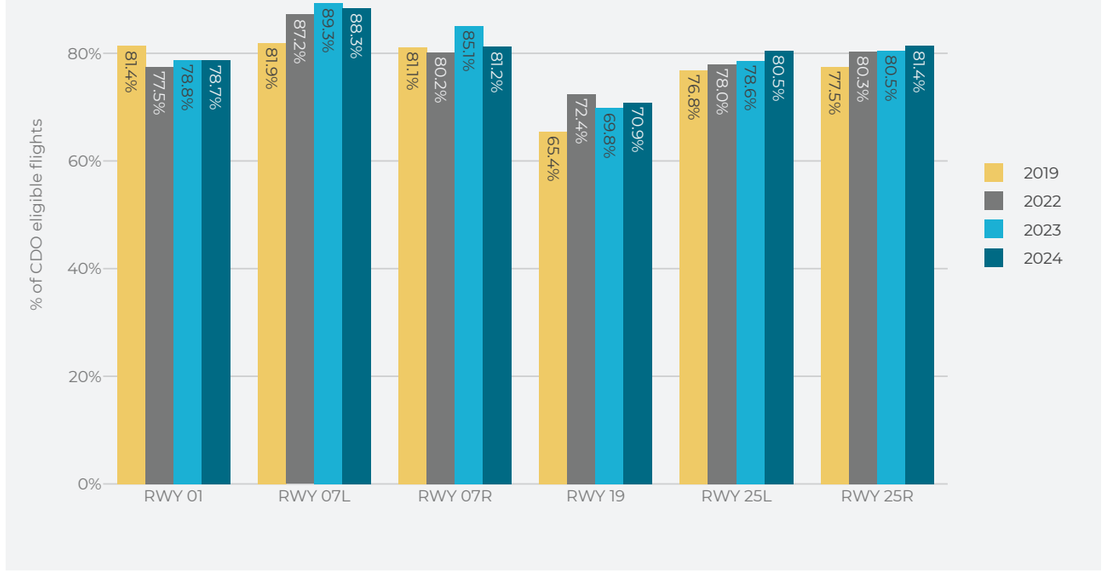


Figure 4.6: *Yearly CDO Fuel Per Runway*

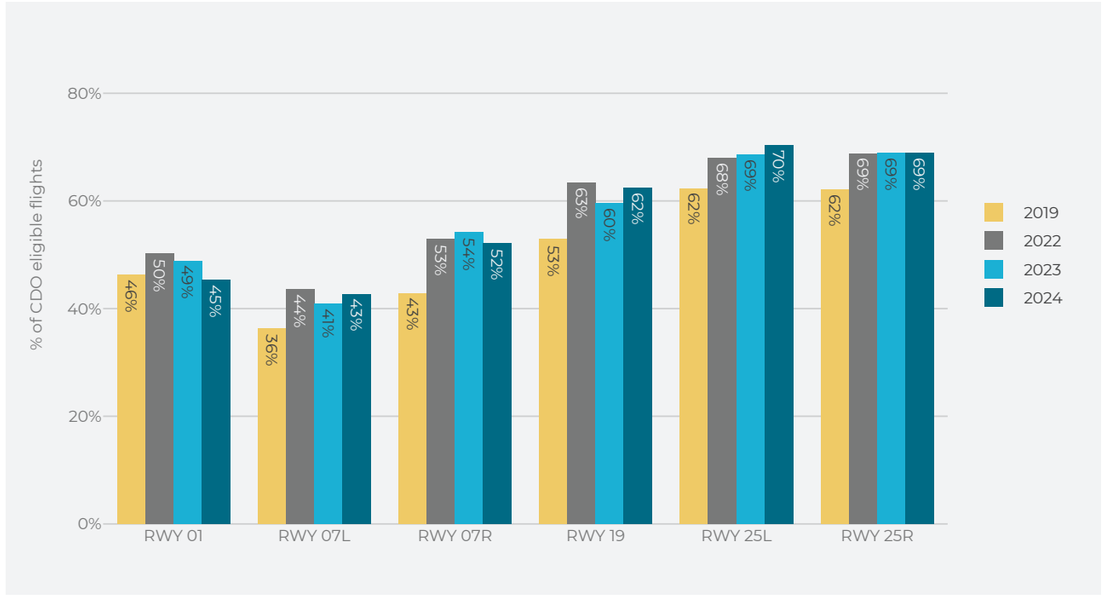
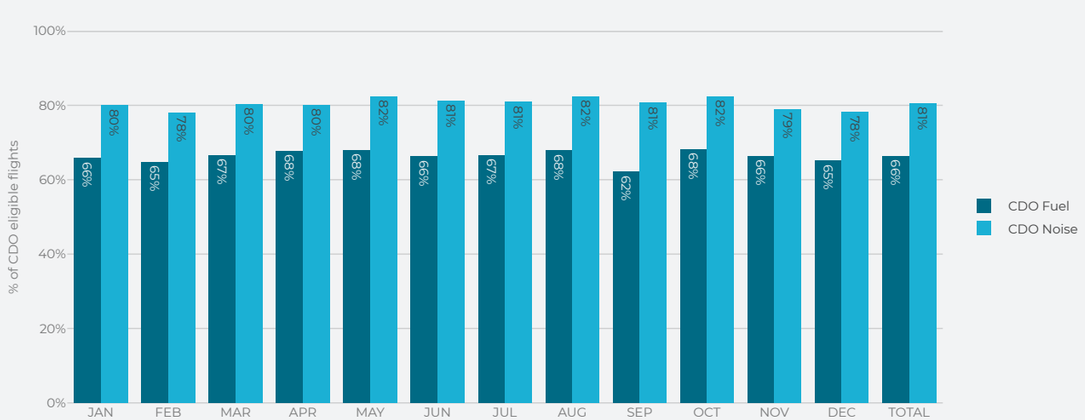


Figure 4.7 illustrates monthly CDO Fuel and Noise rates. Hereby, the CDO Noise rate ranged between 78% and 82%, fluctuating over the months. The CDO Fuel rate ranged between 65% and 68%, also fluctuating over the months, with the exception of September, that had a drop of 62%. Overall, a multitude of 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 (often linked to the time of the day).*

As a result, it is difficult to identify a single cause for an increase or decrease of the CDO statistics over a period.

Figure 4.7: *Monthly rate of CDO Fuel and CDO Noise arrivals over all CDO capable arrivals in 2023*



34. 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 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'. 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. In particular, 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 Continuous Climb Operations and Continuous Descent Operations (CCO/CDO) Action Plan and EUROCONTROL ENV Transparency Working Group, emphasizing its alignment with industry best practices and standards.[34]

Figure 4.8 visualises the monthly evolution of average level-off time per CDO eligible flights per altitude band at Brussels Airport in 2024. The baseline of CDO eligible flights is also provided as a bar chart in the same figure. Whereas the average level-off time per CDO eligible flight remains stable below 3,000 ft and also below 6,000 ft with slight fluctuations throughout the months, the altitude band from ground level to 10,000 ft shows a notable peak in September with 100 seconds per CDO eligible flights . Notably, September was the month with the highest share of movements for RWY01 (13% of the total movements that month) and for RWY07L (12%) (see Chapter 1 - Runway Use).

Figure 4.8: *Monthly Average Level-off Time*

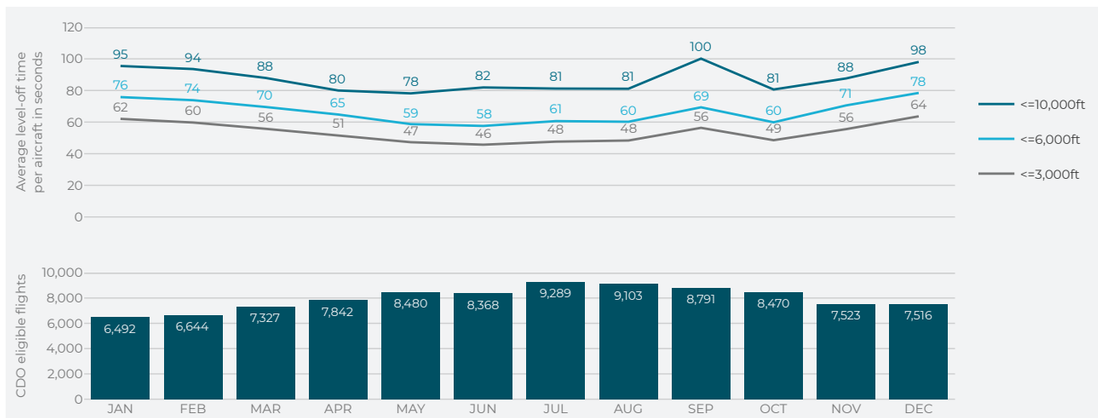
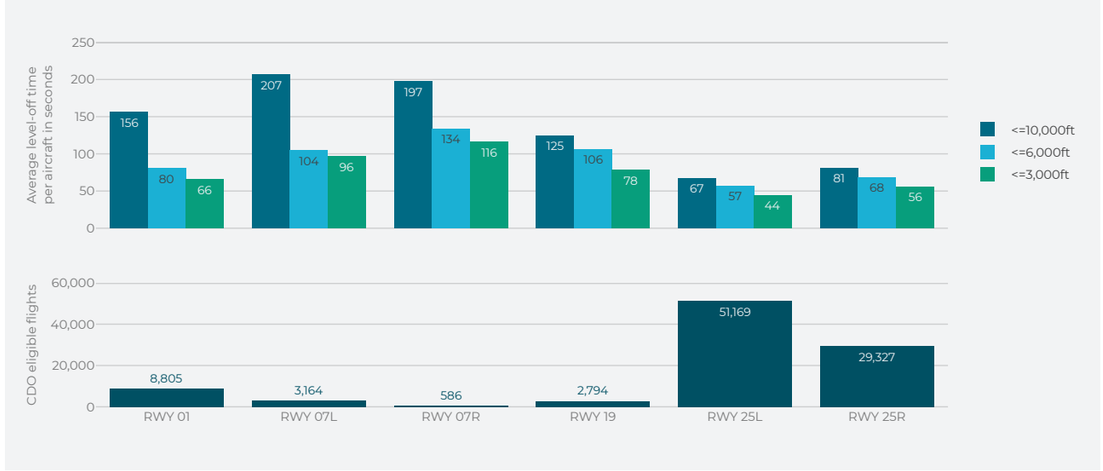


Figure 4.9, shows the yearly average of level-off times per CDO-relevant arrival per runway. The less-frequently-used runways show a higher average level-off time, especially for the highest altitude band. Arriving traffic from the East for runways such as RWY 01, 07L, 07R, and 19 have certain ATCO working methods put in place, which can lead to higher level offs (e.g. to avoid departing traffic in lower altitudes). Higher values in this new KPI are thus strongly influenced by the ATC organisation during such configurations. Which altitudes and level-off opportunities are given is furthermore always a balance between arriving and departing traffic.

Figure 4.9: *Average Level-off Time per Runway*



IMPROVEMENT MEASURES AND ACTIVITIES

Shortly after the COVID-19 pandemic started, numerous European ANSPs (including skeyes), airlines and EUROCONTROL took the initiative to collaboratively improve flight efficiency. Both air traffic controllers and pilots were and are encouraged to pro-actively facilitate and stimulate CDOs and CCOs, as well as more direct routings. To promote and facilitate the number of CDOs flown to Brussels Airport, different measures are investigated or already implemented.

From one perspective, skeyes is in contact with airlines presenting CDO statistics and communicating the phraseology. Alternatively, skeyes is increasing awareness amongst ATCOs through courses and by informing them of the current statistics and performance. In addition, as a member of FABEC, skeyes actively participates in workshops and initiatives to improve – amongst others – CDO performance.

Furthermore, skeyes and BAC maintain a cooperation agreement with Brussels Airlines, TUI Fly and DHL on undertaking joint initiatives that further reduce the environmental impact of airport operations. Additionally, the agreement on Collaborative Environmental Management (CEM) at Brussels Airport, also signed by EUROCONTROL and ACI Europe, continues to show benefits.

At Brussels Airport, the CEM initiative promotes the increased use of RNP approach procedures. This aims to familiarize flight crews and controllers with RNP operations and assess how full RNP approaches improve predictability, optimize descent, and enhance environmental performance. In December 2020, skeyes released Belgium's national PBN implementation and transition plan (2024–2030) for key aerodromes, including Brussels. This strategy involves redesigning airspace and routes independently of ground-based infrastructure, improving flight predictability, situational awareness, and vertical performance while reducing fuel consumption and noise. At Brussels Airport, the first phase of the plan will soon introduce a PBN-compliant environment, aligning with both national and European PBN transition efforts (EU regulation 2018/1048). This initiative is also part of the Brussels Airport Stargate project, supported by the European Commission and Belgian government. Following an initial 2022 assessment, there was a second evaluation (Nov 2023–Feb 2024) that showed that the predictability and the CDO performance were significantly improved. These efforts align with broader Area Navigation (RNAV) and PBN transition projects at the airport.

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 Flight Information Region (FIR) and at the aerodromes of Antwerp, Brussels, Charleroi, Kortrijk, Liège 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.

Another initiative currently ongoing in skeyes and Brussels Airport is a project called Highly Efficient Green Operations (HERON), which is a large international consortium led by Airbus. It aims to carry out a series of ambitious developments and demonstrations to reduce noise, flight delays, fuel consumption, and CO2 emissions in air transport by proposing reduction measures, including more efficient flight operations. HERON involves 26 partners from 11 countries and will be supported by 6 airlines, 8 air navigation service providers, and 5 airports across Europe. skeyes and Brussels Airport are contributing to this consortium by conducting operational flight demonstrations of green landings, that began on October 1st , in 2024.

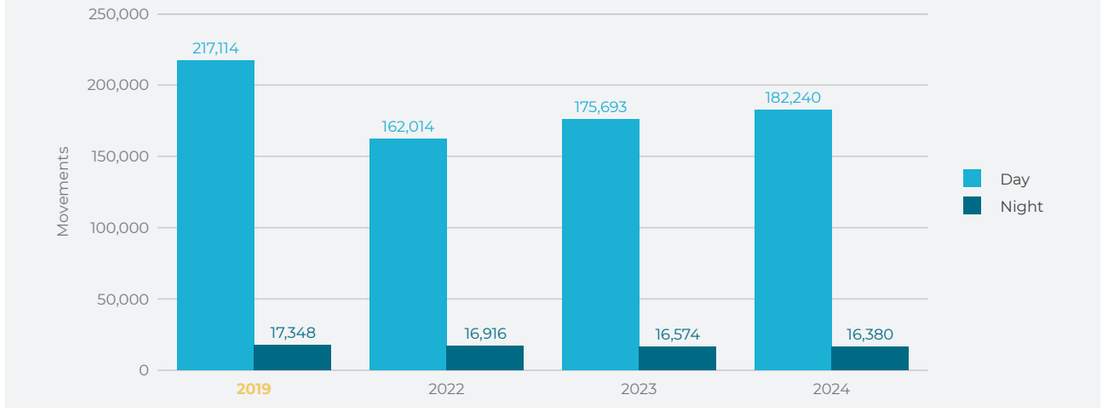
The purpose of the demonstrations is to assess the environmental impact of the Increased Second Glide Slope (ISGS) solution, which specifically aims to reduce noise disturbance during the aircraft approach phase. By initiating landings at a steeper angle, aircraft will remain at a higher altitude for a longer time and will also fly at lower speeds, resulting in reduced noise impact for surrounding residents. The ISGS solution is developed in partnership with EUROCONTROL and Airbus and is part of the SESAR program, an ambitious European initiative aimed at modernizing air traffic management. This project is supported by the European Climate, Infrastructure and Environment Executive Agency (CINEA) and is one of the flagship projects within SESAR 3 Joint Undertaking's Digital Sky Demonstrators.

Night Movements

Figure 4.10 shows the number of day and night movements at Brussels Airport per year. Hereby, the night is defined to range from 23:00 to 06:00 local time. When comparing 2022, 2023, and 2024 to pre-COVID-19 year, 2019, a decreasing trend in night traffic can be seen. In 2022, the night traffic reached 98% (16,916) of the night traffic in 2019 (17,348), 96% (16,574) in 2023 and 94% (16,380) in 2024.

It is to be pointed out that skeyes introduced a new and greener charging system in April 2023[35]: The charges that airlines need to pay for take-off are now modulated according to aircraft noise and emissions, distance flown, and the time of the day/night. To skeyes, these new charges will be revenue neutral and were put in place to foster skeyes ambitions to contribute to an environmentally friendly future of aviation. Moreover, on March 29th, the Flemish Minister of the Environment announced the granting of an indefinite operating permit to Brussels Airport, without imposing a ban on night flights, but gradually introducing the concept of silent nights on weekends. The permit requires the airport to curtail nighttime nuisances, with a phased approach starting in 2026. The permit is seen as a compromise to maintain economic growth while addressing environmental concerns. At Brussels Airport, 16,380 aircraft were using the airport between 23:00 and 06:00 in 2024, most of which are cargo flights, operated by larger and noisier aircraft.[36]

Figure 4.10: *Yearly day and night movements*



35. https://www.aviation24.be/air-traffic-control/skeyes/belgian-air-navigation-services-provider-skeyes-introduces-greener-charging-system/ (URL retrieved on 08/02/2023)

36. https://www.aviation24.be/airports/brussels-airport-bru/flemish-region-issues-new-environmental-permit-for-brussels-airport-maintains-night-flights/ (URL retrieved on 18/02/2025)

The number of night slots is limited by a regulation in the Ministerial Decree of the 21st of January 2009 in order to limit the noise impact during the night. This decree states that a maximum of 16,000 night slots per calendar year can be allocated, the night is defined as from 23:00 to 06:00 local time. The slot allocation at Brussels Airport is under the responsibility of Belgium Slot Coordination (BSC). BSC is a non-profit organization in accordance with Belgian Law. The ownership of the company is shared between the airport and airlines. Slot allocation is an instrument developed to match the demand for slots from air carriers and general aviation to the supply of airport capacity. In 2024, BSC allocated 15,866 night slots, which complies with the legal limit of maximum 16,000 night slots. 16,380 night movements were recorded at Brussels Airport by the AMS with BCAA criteria. Operational factors, such as delays or other issues, often necessitate night flights without designated night slots.

Table 4.3 and ***Figure 4.11*** show the distribution of the night movements throughout the night. Compared to 2023, night traffic in 2024 increased at 23:00, 03:00, and 04:00, but it dropped in all other hours.

Figure 4.11: *Yearly night movements per hour*

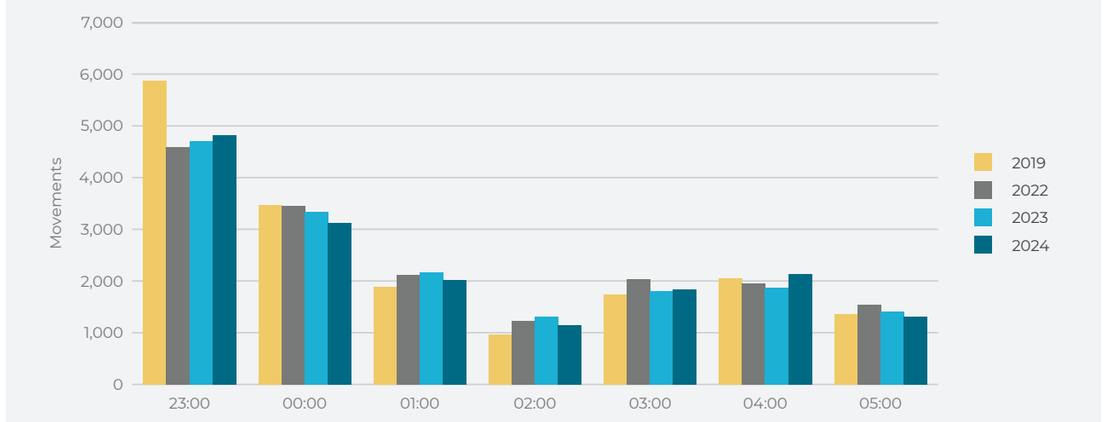


Table 4.3: *Yearly night movements per hour*

Year	23:00	00:00	01:00	02:00	03:00	04:00	05:00
2019	5,881	3,462	1,885	963	1,746	2,054	1,357
2022	4,582	3,457	2,110	1,231	2,038	1,950	1,548
2023	4,708	3,329	2,160	1,303	1,798	1,871	1,405
2024	4,814	3,126	2,015	1,146	1,831	2,137	1,311

Wind Patterns

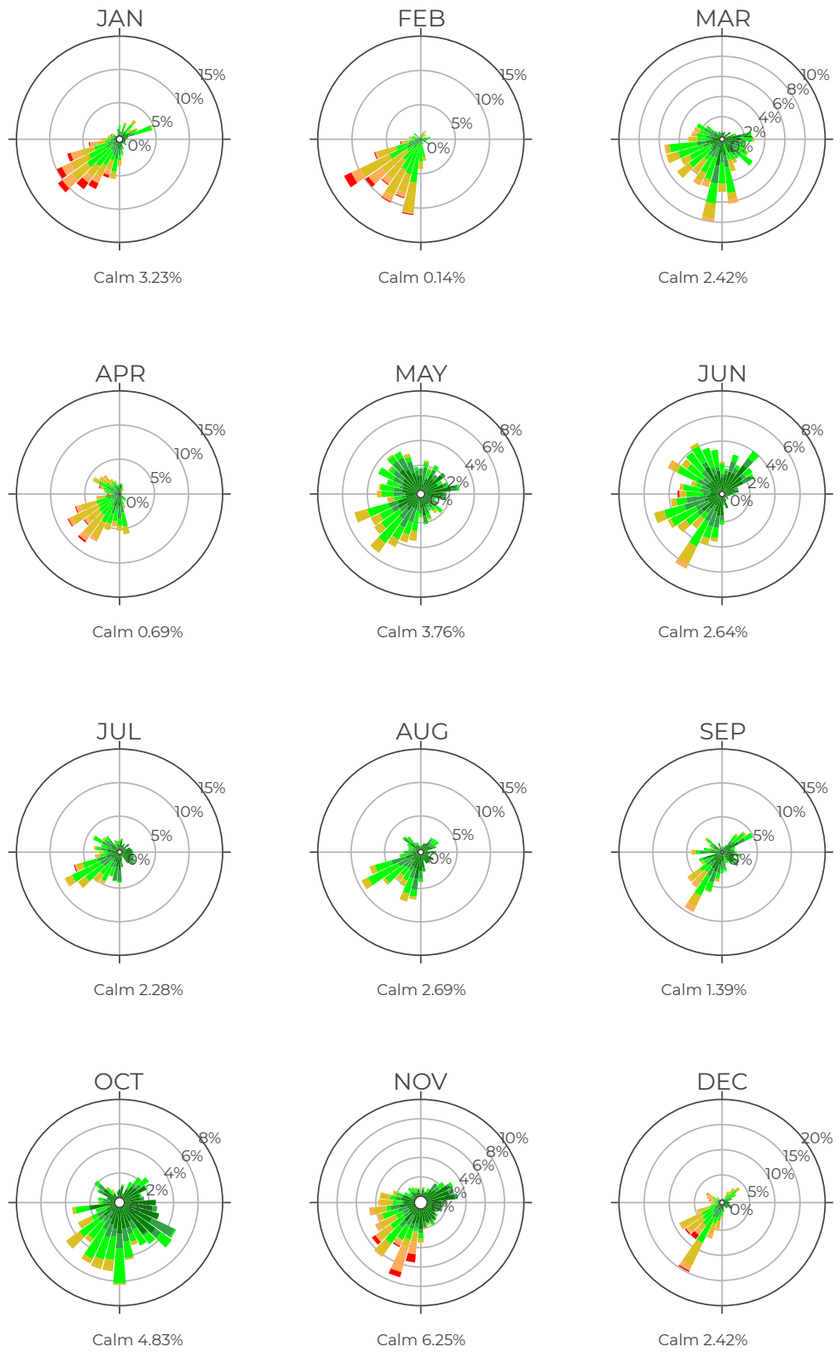
One of the factors that play a main role in the selection of the runway is the wind direction and speed. This was also confirmed previously as meteorological conditions were the most frequent reason for not using the PRS.

Figure 4.12 shows the wind roses for 2019, 2022, 2023, and 2024. Overall, the yearly pattern of 2024 shows a new trend of a reduced amount of north-easterly winds compared to 2019, 2022, and 2023.

Wind roses for each month of 2024 are depicted in ***Figure 4.13***. In January, April, July, August, September, November, and December south-westerly winds prevailed. However, the months of March, May, June, and October had different patterns: March had mostly southerly or south-westerly winds, May had south-westerly winds and north-westerly winds, June had various winds from north-east, north-west, and south-west, while October had winds from south-east and south-west. The impact of this can also be seen in the runway use per month in ***Figure 1.19.***

Figure 4.12: *Yearly wind roses*

Figure 4.13: *Monthly wind roses in 2024*



Considerations and Improvements

Informing the residents

Since 2014, skeyes has been undertaking various actions to improve its communication and transparency about the runway use in order to better inform the stakeholders involved. In 2015, skeyes launched the website www.batc.be in collaboration with Brussels Airport to provide some dynamic information on the use of runways and the air traffic. A new version of the website was launched in 2018 with – amongst others – real-time meteorological information. Since then, continuous improvements have been made (e.g. addition of wind roses, more detailed information on runway works, etc).

Data-driven insights for sustainability

Another way skeyes demonstrates its commitment to sustainability is by continuously expanding and renewing its toolset for conducting (environmental) assessments. For this purpose, skeyesAnalyzer, a web-based radar visualisation tool, was developed and is being implemented. This tool will, amongst others, assist various skeyes teams in visualising, retrieving, and analysing aircraft track data. It will also increase transparency for the public by offering a publicly available interface.

Considerations for wind aloft

Strong tailwinds can lead to unstable approaches and go-arounds. To avoid unplanned runway changes, the tower supervisor chooses an alternative runway when the pilots communicate the presence of strong tailwinds and request other runways.

Since 2017 wind aloft data are available for display in the control tower (via the extraction of radar data and sent through Mode S). Since the end of 2020, ATC also receives wind aloft data derived using Light Detection And Ranging (LIDAR) meteorological equipment; this ground-based system allows ATC to have wind aloft data available 24/7. The LIDAR data is used by EBBR Tower and Approach to inform pilots about wind aloft. This data can help to reduce missed approaches and to assist in the runways configuration choice. Since 2022, wind aloft values are available on Automatic Terminal Information Service (ATIS) for arrivals during landing configuration 25L/25R, which is the main PRS landing RWY configuration.

Use and evaluation of forecasts

Wind measurements are often used by stakeholders to assess retrospectively whether tailwind limits were respected. However, the supervisor must choose the runway configuration based on forecasts and wind measurements. Note, a change of runway configuration cannot be carried out immediately but requires time.

As a result, weather forecasts play an important role in the choice of runways in use. Since 2018 the forecast is updated every hour (instead of three hours) to improve the accuracy.

ANNEX

Annex A: Missed Approaches

Table 0.1: *Missed approaches per category per runway (RWY 25R and RWY 07L)*

	Reasons	2019	2022	2023	2024
RWY 07L	FOD on the runway	2	-	-	-
	aircraft with technical problems	-	1	-	-
	authorized vehicle still on runway	-	-	1	-
	cabin crew not ready	-	-	-	-
	departing traffic on the runway	1	-	5	-
	no radio contact	-	-	-	-
	other	3	4	3	1
	pilot's error	-	-	-	-
	previous landing on the runway	4	3	3	-
	runway condition	-	-	1	-
	runway incursion	-	-	-	-
	tail wind	-	-	-	-
	taken out of sequence	1	1	-	-
	technical problems of ground equipment	-	-	1	-
	too close behind preceding	4	2	2	4
	training flight	-	-	1	-
	unstable approach	10	11	10	8
	weather - thunderstorm - windshear	-	-	-	-
	weather - visibility	-	-	2	-
	Total	**25**	**22**	**29**	**13**
RWY 25R	FOD on the runway	5	1	2	4
	aircraft with technical problems	1	2	6	2
	authorized vehicle still on runway	-	1	-	5
	cabin crew not ready	-	1	1	-
	departing traffic on the runway	25	12	11	24
	no radio contact	1	1	-	-
	other	10	8	12	9
	pilot's error	1	3	1	1
	previous landing on the runway	3	1	5	-
	runway condition	1	-	-	1
	runway incursion	-	1	-	-
	tail wind	5	2	-	1
	taken out of sequence	-	1	-	5
	technical problems of ground equipment	-	-	1	-
	too close behind preceding	4	3	8	5
	training flight	-	-	-	-
	unstable approach	23	20	43	37
	weather - thunderstorm - windshear	4	8	2	7

Table 0.2: *CMissed approaches per category per runway (RWY 25L and RWY 07R)*

	Reasons	2019	2022	2023	2024
RWY 07R	FOD on the runway	-	-	-	-
	aircraft with technical problems	-	-	-	-
	authorized vehicle still on runway	-	-	-	-
	cabin crew not ready	-	-	-	-
	departing traffic on the runway	-	-	-	-
	no radio contact	1	-	-	-
	other	-	-	-	-
	pilot's error	-	-	-	-
	previous landing on the runway	4	2	-	-
	runway condition	-	-	-	-
	runway incursion	-	-	-	-
	tail wind	-	-	-	-
	taken out of sequence	1	-	-	-
	technical problems of ground equipment	-	-	-	-
	too close behind preceding	1	-	-	2
	training flight	-	-	-	-
	unstable approach	1	1	2	1
	weather - thunderstorm - windshear	1	-	-	-
	weather - visibility	-	-	-	2
	Total	**9**	**3**	**2**	**5**
RWY 25L	FOD on the runway	1	2	-	2
	aircraft with technical problems	4	2	5	7
	authorized vehicle still on runway	2	-	-	-
	cabin crew not ready	2	-	1	1
	departing traffic on the runway	1	-	-	1
	no radio contact	2	-	1	3
	other	6	7	10	8
	pilot's error	3	-	-	2
	previous landing on the runway	1	1	2	10
	runway condition	-	-	2	1
	runway incursion	-	-	1	-
	tail wind	6	1	3	3
	taken out of sequence	2	4	4	-
	technical problems of ground equipment	1	-	-	2
	too close behind preceding	14	5	10	4
	training flight	1	-	-	-
	unstable approach	48	41	46	66
	weather - thunderstorm - windshear	19	18	10	12

Table 0.3: *Missed approaches per category per runway (RWY 01 and RWY 19)*

	Reasons	2019	2022	2023	2024
RWY 01	FOD on the runway	-	2	1	1
	aircraft with technical problems	1	2	2	1
	cabin crew not ready	-	-	-	-
	departing traffic on the runway	1	-	1	-
	other	-	2	1	3
	pilot's error	-	-	1	-
	previous landing on the runway	-	-	1	-
	runway condition	-	-	-	-
	runway incursion	-	1	-	-
	tail wind	1	1	-	-
	taken out of sequence	-	3	1	1
	technical problems of ground equipment	-	-	-	-
	too close behind preceding	7	5	8	2
	unstable approach	18	8	15	19
	weather - thunderstorm - windshear	-	2	1	1
	weather - visibility	-	-	-	1
	Total	**28**	**26**	**32**	**29**
RWY 19	FOD on the runway	-	-	-	1
	aircraft with technical problems	-	1	1	-
	cabin crew not ready	-	-	-	1
	departing traffic on the runway	-	1	1	2
	other	2	1	2	2
	pilot's error	-	-	-	1
	previous landing on the runway	-	2	3	4
	runway condition	2	-	-	-
	runway incursion	-	-	-	-
	tail wind	-	-	-	-
	taken out of sequence	1	-	-	1
	technical problems of ground equipment	1	-	-	-
	too close behind preceding	2	3	-	-
	unstable approach	1	3	4	2
	weather - thunderstorm - windshear	6	1	13	5
	weather - visibility	-	-	-	-
	Total	**15**	**12**	**24**	**19**

Annex B: Fact sheets

TRAFFIC

Yearly Evolution

- *3 % increase in movements in 2024 compared to 2023;*
- *2024 was at 85% of 2019 traffic.*

Movements	2019	2022	2023	2024	2024 vs 2023	2024 vs 2019
IFR	231,275	176,179	189,408	196,134	+4%	-15%
VFR	3,187	2,751	2,859	2,486	-13%	-22%
Total	234,462	178,930	192,267	198,620	+3%	-15%

Quarterly comparison

- *Q1, Q3 and Q4 increased from 80% to 84% of 2019 traffic, 82% to 85% and 83% to 87% respectively;*
- *Q2 remained at 83% of 2019 which is the same as in 2023.*

Movements	2019	2022	2023	2024	2024 vs 2023	2024 vs 2019
Q1	50,875	33,644	40,577	42,633	+5%	-16%
Q2	61,660	47,374	51,059	51,258	+0%	-17%
Q3	65,761	53,463	54,119	55,949	+3%	-15%
Q4	56,166	44,449	46,512	48,780	+5%	-13%

SAFETY

Missed Approaches

- 302 missed approaches in 2024.
- Top three causes:
  1. Unstable approach (137);
  2. Departing traffic on the runway (27);
  3. Weather – thunderstorm - windshear (25).

Safety Occurrences

- 12 Runway incursions: 1 with indirect & 11 without ATM ground contribution;
- Decrease in taxiway incursions (15 in 2024) and TWY/Apron event reports (8 in 2024);
- Decrease in deviations from ATM clearances (40 in 2024), increase in deviations from ATC procedures (50 in 2024).

CAPACITY & PUNCTUALITY

Capacity

The maximum declared IFR capacity of 75 movements/hour was never exceeded.

The declared IFR capacity was, however, exceeded for the following runway configurations:

- Declared capacity for 01 – 01 was exceeded by maximally 4 movements;
- Declared capacity for 19 – 19 was exceeded by maximally 4 movements;
- Declared capacity for 25R – 25R was exceeded by maximally 2 movements.

Punctuality

Arrival delay: Arrival Delay: 0.28 min/flight; CRSTMP delay: 0.04 min/flight.

ATFM impact:

- Departures: 370,590 minutes ATFM delay, 3% (9,210 min) due to skeyes' regulations;
- Arrivals: 277,679 minutes ATFM delay, 13% (35,077 min) due to skeyes' regulations.

ENVIRONMENT

PRS

The preferential runway system was active 77% of the time in 2024.

CDO

Percentage of CDO flights over all CDO-capable arrivals increased to 81% for CDO Noise and 66% for CDO Fuel.

Night movements

16,380 night movements (-1% vs 2023, -3% vs 2022, -6% vs 2019).

skeyes nice to guide you

Runway Performance Report **2024**

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