skeyes nice to guide you

Ostend airport

RUNWAY PERFORMANCE REPORT 2019

member of FABEC

www.skeyes.be

EXECUTIVE SUMMARY

The considerable rise in passenger numbers from the past few years has continued at Ostend airport, with 2019 being the best year since 1966 in terms of passenger numbers. A total of 457,423 passengers made their way through the Ostend airport, a rise of 8.9% from 2018. This is the result of an increase in both commercial and business aviation activities that is reflected in the number of movements recorded by skeyes which are also steadily increasing in the past three years, with 26,387 movements in 2019. VFR movements also increased, explained by the better weather conditions observed in 2019.

Some disruptions in air navigation services in the en-route centre of skeyes occurred in 2019. All of these occurred during the night, therefore having a minimum impact on Ostend traffic. The airspace closures due to industrial actions however did impact Ostend, with the 13th March figuring in the 10 days with the least traffic recorded in 2019, though only in 6th place.

As there is mostly VFR traffic in Ostend airport, it is no surprise that over the past four years, traffic has been considerably higher in summer than in winter season.

IFR and VFR movements have kept similar averages throughout the times of day. Looking at the distribution of traffic per runway, more variation is to be seen over the year. Whereas 2018 was a year with more north-easterly winds recorded at all Belgian airports, implying a more frequent use of RWY 08 than in previous years, 2019 has seen a return to the RWY use distribution of 2016 and 2017. One exception was the month of April where more easterly winds were registered and the use of RWY 26 dropped to 20% (being on average at 64% for the whole year).

Air Traffic Management (ATM) Performance is driven by four Key Performance Areas (KPAs): safety, capacity, environment and cost-efficiency. This report focuses on skeyes' operations at Ostend airport (ICAO code EBOS). Its aim is to provide our main stakeholders with traffic figures for 2019 and relevant data on the performance of our operations at EBOS, namely on three of the four KPA's: safety, capacity and environment.

Safety

Two types of occurrences are analysed in this report, both giving a view on airport safety performance: missed approaches and runway incursions. Regarding missed approaches, Ostend has seen an increase in the rate of missed approaches per 1,000 arrivals overall, though the rate decomposes in a large increase on RWY 26 and a decrease on RWY 08. Weather conditions and unstable approaches are the main reasons accounting for 61.3% of the missed approaches at Ostend airport.

There was an increase in runway incursions compared to 2018, with two runway incursions with ATM contribution. These however had no immediate safety consequence.

Environment

The preferential runway system in place at night at Ostend was used as often as in 2018, and seemingly not too influenced by the change in wind patterns from 2018 to 2019 where a return of south-westerly winds were recorded.

Capacity and Punctuality

At Ostend airport, the declared IFR & "M" VFR capacity (heavier VFR) was exceeded on 10 days during the year, with an average of three movements. However, at the peak hour of those days, almost only VFR flights – 89% on average - were recorded. On average in 2019, the traffic at peak hours was 17.7 movements below the declared IFR & "M" VFR capacity.

New to this edition of the RWY Performance report are the details of the delays from the airport's point of view. Indeed, from skeyes' point of view, only two Air Traffic Flow Management (ATFM) regulations were placed on arrivals at Ostend airport in the last four years neither of which had any ANSP contribution. One regulation was placed at Ostend in 2019, but this was on departures and not arrivals. Due to industrial actions, one flight was affected with a registered delay of 45 minutes. From a passenger or airport perspective however, delays are observed much more frequently than this, as every departure or arrival can be affected by ATFM regulations placed in other parts of the Belgian airspace or, higher proportion, by other countries that the flight has to cross over. In 2019, flights departing from Ostend experienced a total of 12,051 minutes of ATFM delay (31% due to skeyes regulations). Flights arriving at EBOS totalled 11,034 minutes of ATFM delay. 38.8% of the delay was due to skeyes regulations and the remaining 61.2% due to regulations placed by other ANSPs.

SAMENVATTING

De aanzienlijke stijging van de passagiersaantallen in de afgelopen jaren heeft zich op de luchthaven van Oostende doorgezet, waarbij 2019 het beste jaar was sinds 1966 in termen van passagiersaantallen. In totaal hebben 457.423 passagiers gevlogen via de luchthaven van Oostende, wat een stijging met 8,9% betekent ten opzichte van 2018.
Dat is het resultaat van een toename van zowel de commerciële luchtvaart als de zakenluchtvaart, wat tot uiting komt in het aantal bewegingen dat door skeyes is opgetekend, dat de afgelopen drie jaar ook gestaag is toegenomen, tot 26.387 bewegingen in 2019. De VFR-bewegingen zaten eveneens in de lift, wat kan worden verklaard door de betere weersomstandigheden in 2019.

De luchtvaartnavigatiedienstverlening werd in 2019 enkele maken verstoord in het en-routelucht-verkeersleidingscentrum van skeyes. Dat alles gebeurde 's nachts en had dus een minimale impact op het Oostendse luchtverkeer. De herhaalde sluiting van het luchtruim als gevolg van werkonderbrekingen heeft echter wel een impact gehad op Oostende, waarbij 13 maart in de top 10 stond van dagen met het minste verkeer in 2019, zij het slechts op de 6e plaats.

Aangezien er op de luchthaven van Oostende vooral VFR-verkeer is, is het niet verwonderlijk dat het verkeersvolume de voorbije 4 jaar aanzienlijk hoger lag in de zomer dan in de winter. IFR- en VFR-bewegingen hebben gedurende de hele dag een gelijkaardig gemiddelde aangehouden. Als we kijken naar de spreiding van het verkeer per baan, is er meer variatie te zien over het jaar. Terwijl 2018 een jaar was met meer noordoostenwinden op alle Belgische luchthavens, wat een frequenter gebruik van baan 08 impliceerde dan de jaren daarvoor, zag de spreiding van het baangebruik in 2019 er weer uit zoals dat in 2016 en 2017. Een uitzondering was de maand april, waar meer oostenwinden werden geregistreerd en het gebruik van baan 26 daalde tot 20% (gemiddeld 64% voor het hele jaar).

Air Traffic Management-prestaties (ATM) worden gedreven door vier kernprestatiegebieden (Key Performance Areas of KPA's): veiligheid, capaciteit, milieu en kostenefficiëntie. Dit verslag richt zich op de luchthaven van Oostende (ICAO-code: EBOS). Het doel is om onze belangrijkste stakeholders de verkeerscijfers voor 2019 en relevante gegevens over de prestaties van onze activiteiten op EBOS te verschaffen, namelijk over drie van de vier KPA's: veiligheid, milieu en capaciteit.

Veiligheid

In dit verslag worden twee soorten voorvallen geanalyseerd, die beide een beeld geven van de veiligheidsprestaties op de luchthaven: afgebroken naderingen en runway incursions. Het aantal afgebroken naderingen per 1.000 aankomende vluchten is in het algemeen gestegen, hoewel het zich uitsplitst in een fors stijgende component op baan 26 en een dalende op baan 08. Weersomstandigheden en onstabiele naderingen zijn de belangrijkste redenen voor 61,3% van de afgebroken naderingen op de luchthaven van Oostende.

Er was een toename van het aantal runway incursions in vergelijking met 2018, met twee runway incursions waarbij ATM een deel van de verantwoordelijkheid droeg. Die hadden echter geen onmiddellijk gevolg voor de veiligheid.

Milieu

Het systeem voor preferentieel baangebruik (Preferential Runway System, PRS) dat 's nachts in Oostende van kracht is, werd net als vorig jaar gevolgd. Schijnbaar werd het PRS niet al te zeer beïnvloed door de veranderende windpatronen – met een terugkeer van de zuidwestenwinden - in 2019 t.o.v. 2018.

Capaciteit en stiptheid

In Oostende werd de opgegeven IFR & "M" VFR-capaciteit (zwaardere VFR) op 10 dagen overschreden in 2019, met een gemiddelde van 3 bewegingen. Op het piekuur van die dagen werden echter bijna enkel VFR-vluchten - gemiddeld 89% - geregistreerd. In 2019 lag het verkeer tijdens de piekuren gemiddeld 17,7 bewegingen onder de opgegeven IFR & "M" VFR-capaciteit.

Nieuw in deze editie van het RWY Performance-verslag zijn de details van de vertragingen vanuit het oogpunt van de luchthaven. Vanuit het standpunt van skeyes werden de laatste vier jaar immers slechts twee ATFM-reguleringen (Air Traffic Flow Management) voor aankomende vluchten op de luchthaven van Oostende ingevoerd, waarbij geen van beide een ANSP-bijdrage hadden. Eén regulering werd in 2019 in Oostende ingevoerd, maar ze had betrekking op vertrekkende vluchten, niet op aankomende. Als gevolg van werkonderbrekingen werd één vlucht getroffen met een geregistreerde vertraging van 45 minuten. Vanuit een passagiers- of luchthavenperspectief worden er echter veel vaker vertragingen vastgesteld, aangezien elk vertrek of elke aankomst kan worden beïnvloed door ATFM-reguleringen die in andere delen van het Belgische luchtruim ingevoerd worden, of, in grotere mate, door andere landen die het vliegtuig moet overvliegen. In 2019 hadden vluchten met vertrek uit Oostende in totaal 12.051 minuten ATFM-vertraging (31% als gevolg van skeyes-reguleringen). Aankomende vluchten op EBOS hadden in totaal 11.034 minuten ATFM-vertraging. 38,8% van de vertraging was te wijten aan skeyes-reguleringen, de overige 61,2% aan de reguleringen van andere ANSP's.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

ACFT : Aircraft
AIP : Aeronautical Information Publication
AMS : Airport Movement System
ANSP : Air Navigation Service Provider
ARR : Arrival
ATC : Air Traffic Control
ATCO : Air Traffic Control Officer
ATFM : Air Traffic Flow Management
ATM : Air Traffic Management
ATS : Air Traffic Service
BCAA : Belgian Civil Aviation Authority
CDO : Continuous Descent Operation
CRSTMP : C-Capacity, R-Routing, S-Staffing, T- Equipment, M- Airspace Management, P- Special Event
CTOT : Calculated Take-Off Time
CTR : Control Zone of an Airport
DEP : Departure
EBAW : Antwerp airport ICAO Code
EBBR : Brussels airport ICAO Code
EBCI : Charleroi airport ICAO Code
EBKT : Kortrijk airport ICAO Code
EBLG : Liège airport ICAO Code
EBOS : Ostend airport ICAO Code
ETOT : Estimated Take-Off Time
EU : European Union
FABEC : Functional Airspace Block Europe Central
FL : Flight Level
FOD : Foreign Object Debris
ICAO : International Civil Aviation Organization
IFR : Instrument Flight Rules
KPA : Key Performance Area
KPI : Key Performance Indicator
LVO : Low Visibility Operations
M/A : Missed Approach
MCT : Maximum Throughput Capacity
MVT : Mixed Volume Traffic
NM : Nautical Mile
NM : Directorate Network Manager (EUROCONTROL)
NOTAM : Notice to Airmen
PRS : Preferential Runway System
PRU : Performance Review Unit
RAT : Risk Analysis Tool
ROTA : Runway Occupancy Time for Arrival
RWY : Runway
VFR : Visual Flight Rules

1. TRAFFIC

In this chapter, the traffic at Ostend airport is presented, as recorded by the Airport Movement System (AMS) developed by skeyes. The AMS records the movements at an aerodrome and within its Control Zone (CTR) which are defined as an aircraft either crossing the CTR, landing or taking off at the aerodrome.

The figures presented throughout the report consider a movement as a take-off or landing of all traffic (VFR and IFR, helicopters and airplanes, commercial and general aviation). As this report considers runway performance, movements such as crossings of CTRs are not considered. As such[1] *:*

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

[1] As per BCAA's aerodrome movement definition

Increasing traffic

The number of aircraft movements for the past four years are as followed:

- 2016: 24,921 (8,640 IFR; 16,281 VFR)
- 2017: 23,331 (8,757 IFR; 14,574 VFR)
- 2018: 24,837 (8,393 IFR; 16,444 VFR)
- 2019: 26,387 (8,782 IFR; 17,605 VFR).

The amount of movements continues to increase compared to 2018 and 2017, with both IFR and VFR traffic growing.

The highest traffic in 2019 was observed in May with 2,815 movements, the third busiest month since 2016 (Figure 1-1).

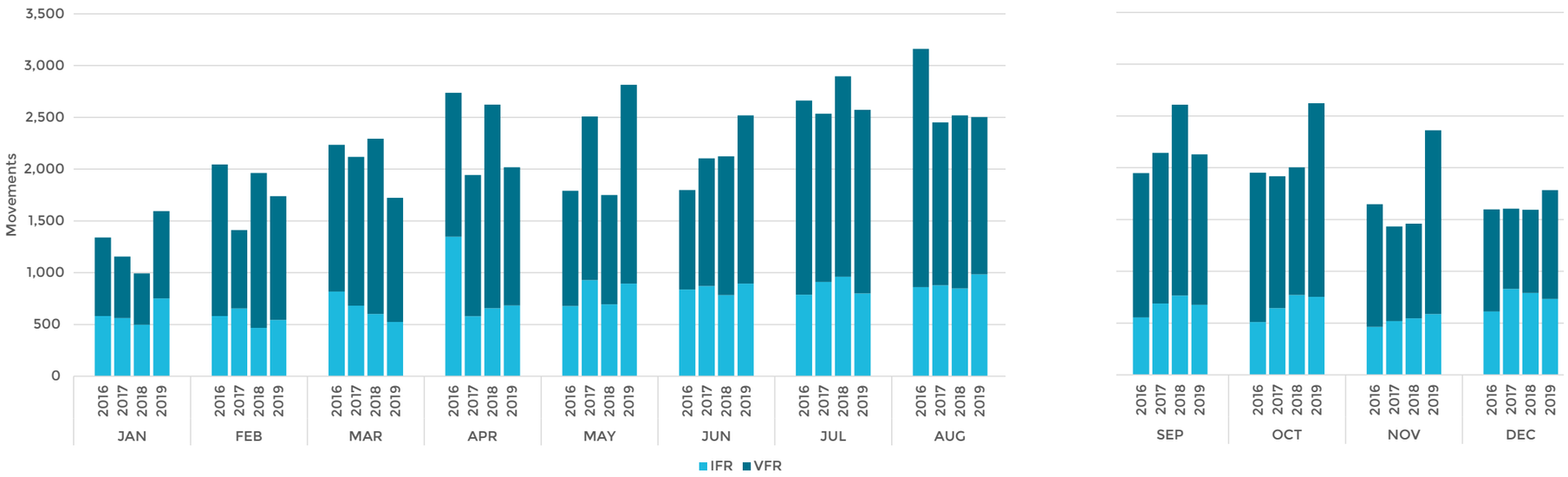


Figure 1-1: Total monthly movements per year

Table 1-1: Total monthly movements per year

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
IFR	**2016**	582	582	819	1,348	679	838	788	861	555	511	465	612	8,640
	2017	562	656	682	581	929	872	911	880	689	645	520	830	8,757
	2018	498	467	602	658	695	785	962	849	766	772	547	792	8,393
	2019	752	545	525	684	896	896	800	985	677	754	587	734	8,835
VFR	**2016**	758	1,463	1,417	1,389	1,112	961	1,875	2,300	1,394	1,442	1,184	986	16,281
	2017	594	757	1,437	1,363	1,579	1,232	1,624	1,571	1,454	1,273	914	776	14,574
	2018	496	1,496	1,693	1,966	1,056	1,339	1,935	1,670	1,843	1,233	914	803	16,444
	2019	842	1,194	1,199	1,335	1,919	1,623	1,774	1,519	1,452	1,869	1,775	1,051	17,552
Total	**2016**	1,340	2,045	2,236	2,737	1,791	1,799	2,663	3,161	1,949	1,953	1,649	1,598	24,921
	2017	1,156	1,413	2,119	1,944	2,508	2,104	2,535	2,451	2,143	1,918	1,434	1,606	23,331
	2018	994	1,963	2,295	2,624	1,751	2,124	2,897	2,519	2,609	2,005	1,461	1,595	24,837
	2019	1,594	1,739	1,724	2,019	2,815	2,519	2,574	2,504	2,129	2,623	2,362	1,785	26,387

As can be observed in Figure 1-1, VFR traffic increased especially during the second half of the year. This can be explained by better meteorological conditions in 2019 than in previous years, in particular less rain. In fact, a link between VFR traffic and Low Visibility Operations (LVO) in Ostend airport can be drawn. LVO are put in place when the visual range at the airport falls below 550 meters or if the cloud base drops below 200 ft, in order to ensure safe operations. Figure 1-2 shows the number of days where Ostend airport experienced LVOs and their duration. It is clear that there was a decrease of LVOs in 2019 as well in duration as in the number of days, compared to the previous years.

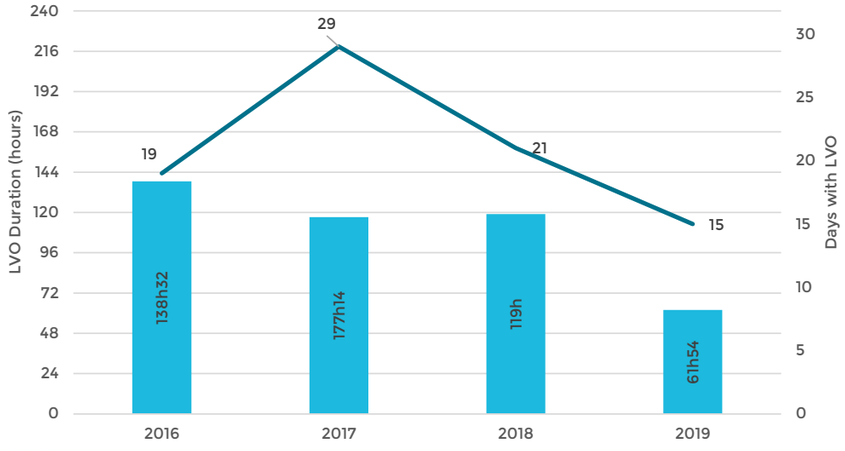


Figure 1-2: Low visibility operations per year

Another way of describing traffic is to look at the number of arrivals and departures at an airport. Table 1-2 below shows the details for each year. As the overall traffic in Ostend airport increased in 2019, so did the arrival and departure rates.

Table 1-2: Monthly arrival and departure movements per year

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ARR	**2016**	670	1,022	1,121	1,369	896	900	1,330	1,579	974	975	822	799	12,457
	2017	576	708	1,058	974	1,249	1,052	1,267	1,224	1,071	961	716	803	11,659
	2018	495	979	1,148	1,312	875	1,060	1,447	1,260	1,274	966	700	759	12,275
	2019	797	869	863	1,010	1,403	1,259	1,289	1,253	1,061	1,307	1,180	891	13,182
DEP	**2016**	670	1,023	1,115	1,368	895	899	1,333	1,582	975	978	827	799	12,464
	2017	580	705	1,061	970	1,259	1,052	1,268	1,227	1,072	957	718	803	11,672
	2018	499	984	1,147	1,312	876	1,064	1,450	1,259	1,335	1,039	761	836	12,562
	2019	797	870	861	1,009	1,412	1,260	1,285	1,251	1,068	1,316	1,182	894	13,205

Busy days

The ten busiest days of 2019 for Ostend airport are depicted in Figure 1-3 below.

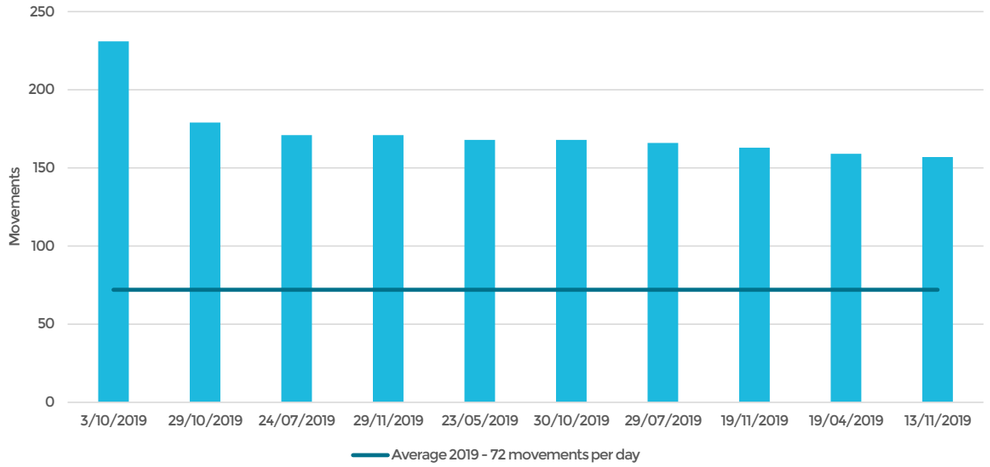


Figure 1-3: Ten days with highest amount of traffic in 2019

The busiest days in 2019 occurred mostly in October and November. The 3rd of October saw the highest amount of traffic, with 231 movements, while the average movements in Ostend airport in 2019 was 72 per day.

Although the total number of movements is higher than in previous years, there is only one day of 2019 making it to the top ten busiest days of the past four years, as shown in Figure 1-4.

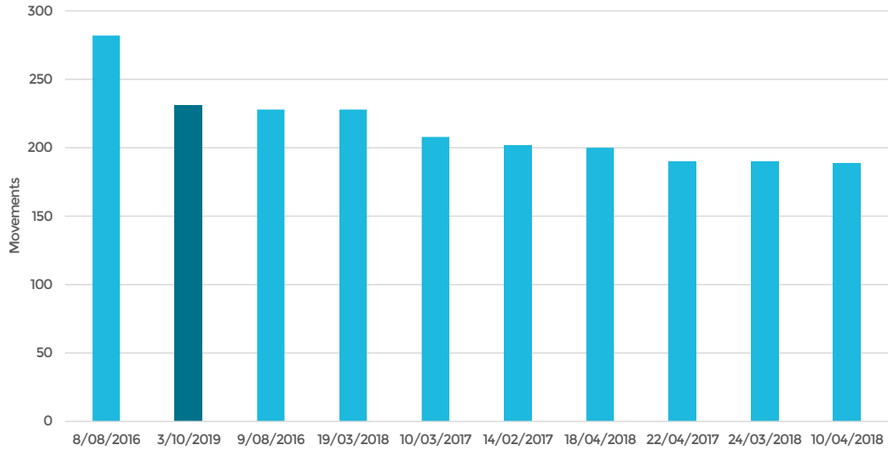


Figure 1-4: Ten days with highest amount of traffic since 2016

Quiet days

Most of the days with lowest traffic rates in 2019 happened in March. The calmest days were the 10th of March and 5th of December, recording each six movements. See Figure 1-5 below.

Figure 1-5: Ten days with lowest amount of traffic in 2019

Traffic patterns

Figure 1-6 shows the average IFR and VFR traffic throughout the hours of the day, in local time, over the period 2016 to 2019. A small peak in IFR traffic can be seen at 06:00 as well as a constant slightly higher rate between 11:00 and 16:00. VFR traffic is more significant with its peak hour happening around 15:00 local time.

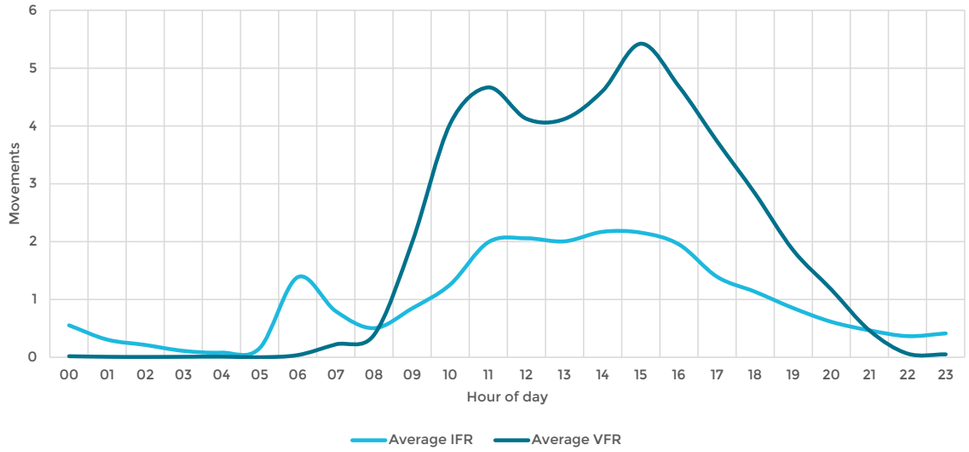


Figure 1-6: Average hourly IFR and VFR movements for the period 2016-2019 (local time)

As there is mostly VFR traffic in Ostend airport, it is no surprise that traffic is higher in summer than in winter period.

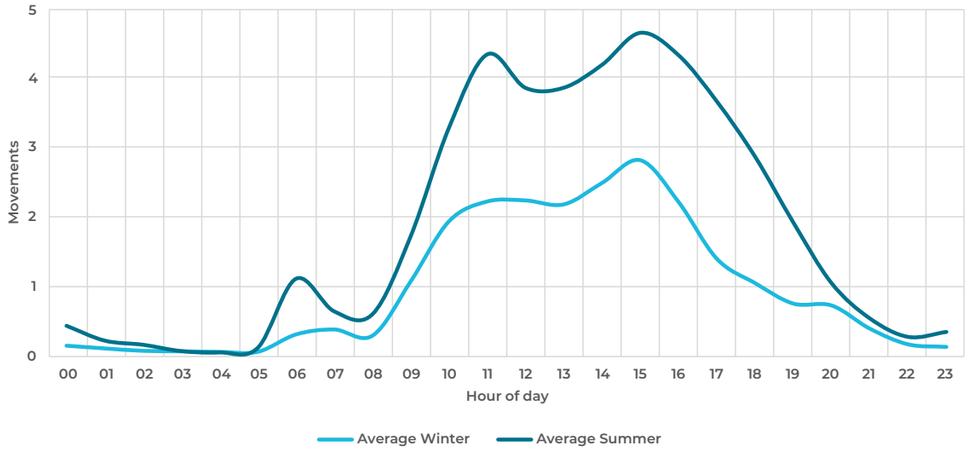
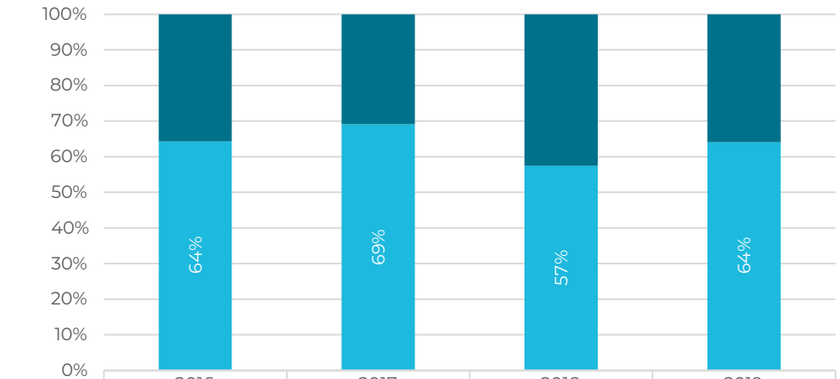


Figure 1-7: Average hourly movements in winter and summer for the period 2016-2019 (local time)

Runway use

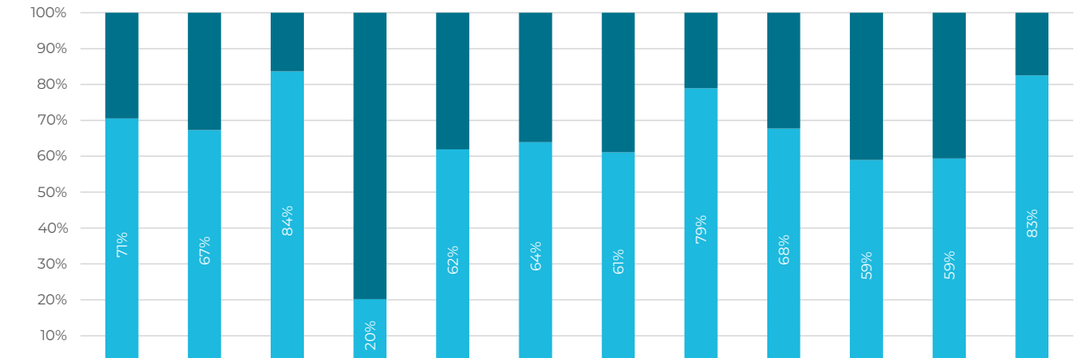
The use of one runway configuration over another depends on several factors that have to be taken into account, such as wind direction and proximity to densely populated areas. Figure 1-8 shows the runway use in Ostend since 2016. The trend in 2019 follows those of 2016 and 2017. In 2018, more easterly winds than usual were recorded, which explains the greater use of runway 08 that year.



	2016	2017	2018	2019
RWY 08	8,900	7,201	10,562	9,477
RWY 26	16,021	16,130	14,275	16,910

Figure 1-8: Runway use per year

Figure 1-9 below shows the runway use per month of 2019. Runway 26 is overall the most used runway, except in April 2019, where strong north-easterly winds were recorded, in Ostend as in all of the Belgian airports. This explains the increased usage of runway 08. More details about winds can be found in Figure 4-2 and Figure 4-3 of the fourth chapter of this report.



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
RWY 08	470	569	282	1,612	1,071	909	1,001	528	687	1,076	960	312
RWY 26	1,124	1,170	1,442	407	1,744	1,610	1,573	1,976	1,442	1,547	1,402	1,473

Figure 1-9: Runway use per month in 2019

2. SAFETY

This section highlights two topics: runway incursions and missed approaches. The runway incursions is a lagging runway safety indicator and is mandatory to be reported. Missed approaches are not mandatory to be reported, and are reported on a voluntary basis. As such the quality and accuracy of the available information is commensurate with the level of reporting.

Missed approaches do not represent safety incidents. 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. One could argue that missed approaches are a hybrid leading indicator, and that by analysing the reasons leading to this type of procedure, we can 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.

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 Ostend airport is monitored on a weekly basis. This report gives a yearly overview and a comparison over four years for each runway. In 2019 there were 19 missed approaches. Figure 2-1 shows the number of missed approaches per cause. Weather conditions and unstable approaches are the main reasons accounting for 78.9% of the missed approaches at Ostend airport.

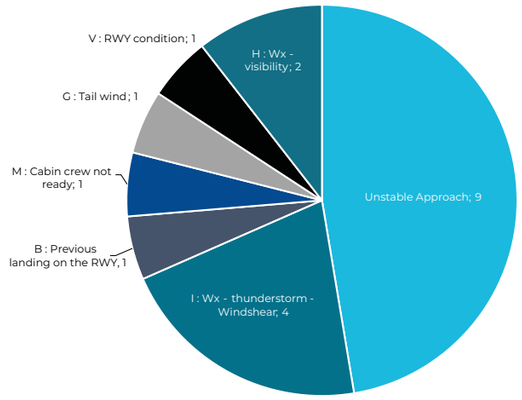


Figure 2-1: Missed approaches in 2019 per reason

Figure 2-2 shows the amount of missed approaches per 1,000 arrivals at Ostend airport, per runway, and the overall rate of missed approaches. The graph shows an overall increase of the rate. While the number of arrivals on RWY 26 increased by 10% compared to 2018, the number of missed approaches almost tripled in the previous year. However, both arrivals and rate of missed approaches on RWY 08 decreased in 2019 compared to 2018.

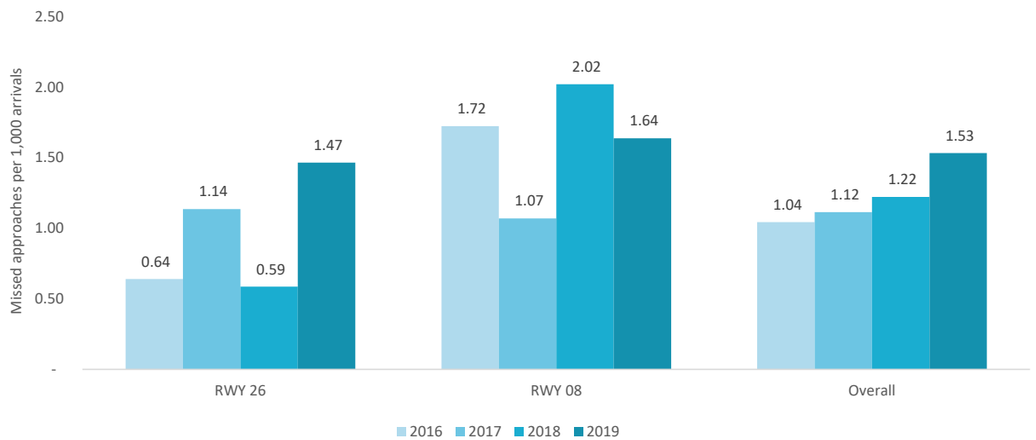


Figure 2-2: Rate of missed approaches per 1,000 arrivals, per year

Runway 26

Out of the 19 missed approaches 11 happened on runway 26. As shown in Table 2-1, this is a large increase compared to 2018 (4 missed approaches). Table 2-1 shows the causes of missed approaches ordered from the most to the least frequent in 2019.
The table also shows the number of missed approaches with these reasons in the years 2016, 2017 and 2018 and the percentage of the total missed approaches attributable to the top five causes in 2019. E.g. in 2018, 75% of the missed approaches had as cause one of the top five causes of 2019.

For runway 26, the top five causes in 2019 account for 91% of the missed approaches. There is only one missed approach that is excluded from the top five and was caused by 'H: Wx – Visibility'.

	2016	2017	2018	2019
Total missed approaches	**5**	**9**	**4**	**11**
I : Wx - thunderstorm - Windshear		1		4
Unstable Approach		1	1	3
V : RWY condition				1
B : Previous landing on the RWY		2	1	1
G : Tail wind			1	1
H : Wx - visibility	2	2	1	1
S : No radio contact	1			
A : Too close behind preceding		1		
C : Departing traffic on the RWY	1			
L : Taken out of sequence		1		
D : ACFT with technical problems	1	1		
part top 5 causes of 2019	0%	44%	75%	91%

Table 2-1: Causes of missed approaches on runway 26, per year, ordered most to least frequent in 2019

Runway 08

Eight (8) missed approaches occurred on runway 08. As shown in Table 2-2 this is a decrease compared to 2018 (11 missed approaches). Table 2-2 shows the causes of missed approaches ordered from the most to the least frequent from 2016 to 2019. Three (3) distinct causes were identified in 2019: six (6) out of eight (8) were unstable approaches, one (1) was due to the cabin crew that was not ready and another was due to weather conditions ('H: Wx – Visibility').

Total missed approaches	2016 8	2017 4	2018 11	2019 8
Unstable Approach	1	2	5	6
M : Cabin crew not ready				1
H : Wx - visibility	3	1	2	1
G : Tail wind	3	1	1	
P : FOD on the RWY			1	
T : Pilot's error			1	
C : Departing traffic on the RWY	1			
I : Wx - thunderstorm - Windshear			1	
part top five causes of 2019	88%	100%	82%	100%

Table 2-2: Causes of missed approaches on runway 08, per year, ordered most to least frequent in 2019

Runway incursions

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

It should be noted that this 'incorrect presence' may be a consequence of a failure of a pilot or vehicle driver to comply with a valid ATC clearance or their compliance with an inappropriate ATC clearance.

Runway incursions are mandatory to be reported as per EU 2015/1018. Moreover, in accordance with EU 2019/317, all RIs need to be reported using the severity classification based on the Risk Analysis Tool (RAT).

According to this scheme, RIs are classified based on their severity in the following categories:

- A – Serious Incident, a collision was narrowly avoided.
- B – Major Incident, separation decreases and there is a significant potential for collision, which may result in a time critical corrective or evasive response.
- C – Significant Incident, an incident characterized by ample time and/or distance to avoid a collision.
- D – Not Determined, an incident that meets the definition of runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.
- E – No Safety Effect
- N – No ATM contribution (i.e. no system, procedure or person involved in the provision of ATC services initiated or contributed to the incident).

This indicator includes:

- The overall number of runway incursions;
- The overall number of runway incursions in which skeyes had an ATM Ground contribution, classified according to the incident's severity from A to E as described above;
- The overall number of movements in the corresponding period. The number of movements for this KPI is provided by the AMS under the BCAA's aerodrome movement definition.

A monthly overview of the runway incursions in 2019 can be seen in Figure 2-3. Three (3) runway incursions happened during 2019. One (1), where an aircraft crossed the holding point (E1, runway 08), had no contribution from skeyes. The controller reacted in time and the aircraft vacated the runway. The other runway incursions are in category E and did not have any immediate consequences for safety. One (1) incursion happened after a misunderstanding between controller and pilot about a backtrack clearance on runway 08.
The other occurrence in category E is a clearance for a vehicle to enter the runway (taxiway A) while there was an aircraft on 3NM final. The controller instructed the aircraft to break off the approach and perform a go-around.

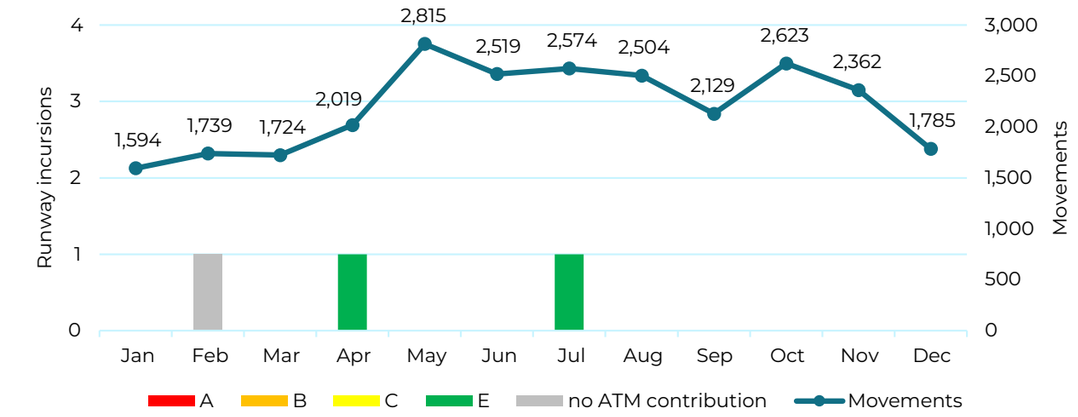


Figure 2-3: Runway incursions 2019 per month, per category

Figure 2-4 gives a yearly overview of the runway incursions for the period from 2016 until 2019. There is an increase in runway incursions compared to 2018 where no incursions with ATM contribution were registered.

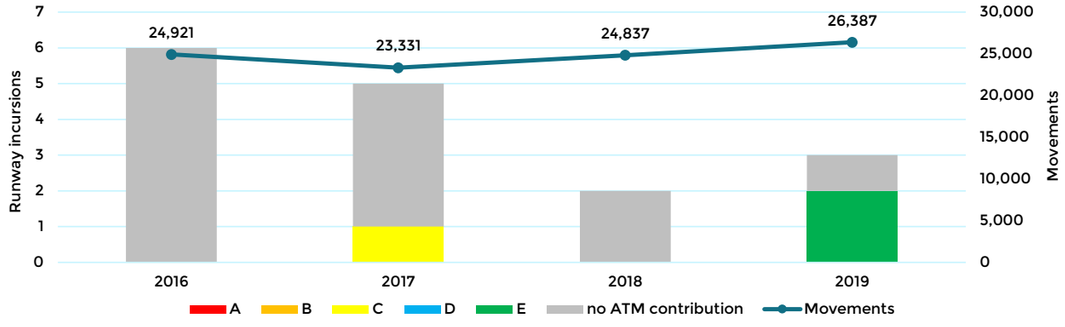
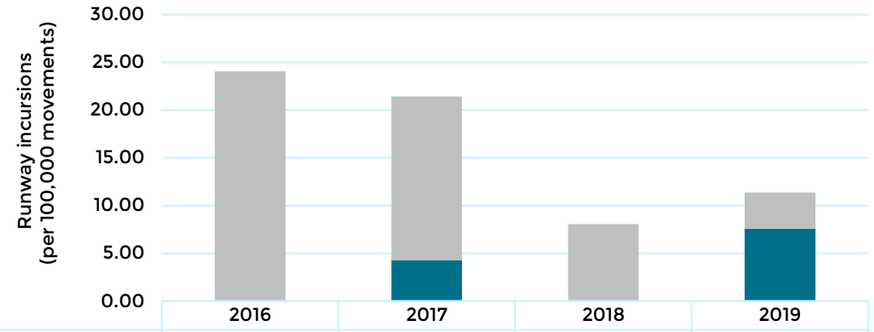


Figure 2-4: Runway incursions 2016-2019, per year, per category

Better means to compare is through the rate of runway incursions. Figure 2-5 shows the rate per 100,000 movements for Ostend airport for the period from 2016 to 2019. The same trend is seen as in the graph showing the absolute figures (Figure 2-4), however, a comparison with for example other airports is more informative based on the rate. In 2019 the rate of RI with ATM contribution in Ostend achieved, along with Antwerp, the greatest levels in the country. However, the rate of RI with no ATM contribution remained in line with other airports such as Charleroi and Liège airports.



	2016	2017	2018	2019
no ATM contribution per 100,000	24.08	17.14	8.05	3.79
ATM contribution per 100,000	0.00	4.29	0.00	7.58

Figure 2-5: Rate of runway incursions per 100,000 movements 2016-2019, per year

3. CAPACITY & PUNCTUALITY

This chapter is divided into two sections. In the first part, the airport capacity is addressed. The declared capacities for runways 08 and 26 are given and analysed, taking as reference the number of movements during peak hours in the busiest month.

In the second section, the punctuality (arrival delay) at EBOS is studied. The delay is also analysed from the airport's point of view, i.e. considering the impact caused by regulations not only at EBOS, but also in the Belgian en-route airspace and by other air navigation service providers.

Airport Capacity

A performance indicator for airports is the throughput capacity and its utilisation.
The throughput capacity of an airport is influenced by several factors, e.g. airport layout, weather, fleet mix, ATC procedures, etc.

To better understand the following section, some definitions are given first:

Capacity

Aerodrome capacity is the estimated number of total operations that a given aerodrome configuration can handle in a given period of time and under a given set of assumptions, which are fleet mix, separation minima rules, weather conditions and technological aids.

Maximum Throughput (or Saturation) Capacity

Maximum Throughput Capacity (MCT) is the fundamental measure of the runway system's capacity. MCT defines the average number of movements (arrivals and/or departures) that can be performed on the runway system in one hour.
The following assumptions are made:

- there is a continuous supply of arrivals and/or departures
- Air Traffic Control rule - no Simultaneous Runway Occupancy (SRO)
- Air Traffic Control rule - safe Wake Vortex Separation Distances between two flights
- Static fleet mix (i.e. types of aircraft do not change)
- Approach and departure procedures do not change.

As a consequence, MCT is a theoretic measure of runway capacity and is represented as an average capacity for the runway system.

Declared Capacity

Declared capacity is the capacity per hour used to determine the number of slots available for schedule coordination purposes.

For the declared capacity of 2019, the figures of 2018 were taken, as the assumptions and conditions did not change (note that changes were made in 2018 due to the reduction of radar separation from five to three NM).

For Ostend airport, the declared capacities for each runway threshold have been calculated as being 90% of the theoretical MCT. For the calculations of the MCT, on top of the above-mentioned assumptions, the following was considered:

- The fleet mix of the busiest month in 2018 is taken as reference (IFR and "medium" VFR traffic)
- A nominal radar separation of 3NM is taken into account
- A loss factor of 15% is considered for inter arrival times
- The average runway occupancy time for arrival (ROTA) is based on assumptions
- The average approach speed is 114 knots (based on measurements)
- The average headwind differs per runway
- The inter departure time is a function of the between T/O-clearance delivery and the aircraft reaching a given altitude.

Table 3-1 shows the declared capacities that depend on the runway configuration at Ostend airport. Only IFR and VFR medium weight category traffic has been considered in the calculations, the declared capacity will therefore be referred to “declared IFR & “M” VFR capacity”.

Table 3-1: Declared IFR & “M” VFR capacity

Runway configuration	Runway		Declared Capacity		
	DEP	ARR	DEP	ARR	MVT
RW26	26	26	24	23	34
RW08	08	08	27	24	33

Details for the month of May, busiest month of the year, are presented below. In fact, Figure 3-1 shows the number of arrivals and departures, along with the runway configuration and the resulting declared IFR & “M” VFR capacity for the peak hour of each day of the month. A peak hour is determined on a 15 minutes floating basis.

The overview of the whole year can be found monthly in Annex 1.

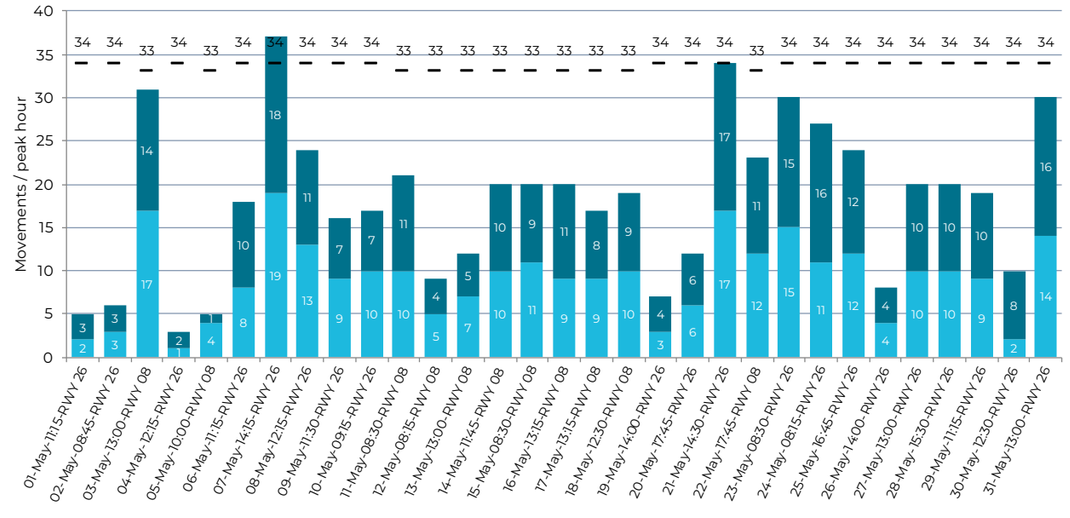


Figure 3-1: Arrivals, departures and declared capacities during peak hours in May 2019

During that month, the declared IFR & “M” VFR capacity was exceeded on the 7th of May, and reached on the 21st.

The highest traffic per peak hour of the year happened on the 19th of November, with 41 movements. In total, the declared IFR & “M” VFR capacity was exceeded on 10 days during the year, with an average of three movements.

However, at the peak hour of those days, almost only VFR flights – 89% on average - were recorded, which impacts the capacity of the airport; with VFR flights only, the capacity could be higher. On average in 2019, the traffic at peak hours was 17.7 movements below the declared IFR & “M” VFR capacity.

Punctuality

Punctuality can be seen as a service quality indicator from a passenger perspective. This section observes one of the factors that influences the punctuality: ATFM (Air Traffic Flow Management) delay. ATFM delay is defined as the time difference between estimated take-off time (ETOT) and calculated take-off time (CTOT) of the NM (Network Manager, EUROCONTROL) and is due to ATFM measures that are classified according to the respective 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.

According to the FABEC Performance Plan the causes with ANSP contribution are (in order as listed in the Performance Plan):

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

Hence, in the remainder of the report all causes with ANSP contribution are referred to as “CRSTMP” while “Other Categories” aggregates all categories but CRSTMP and W (weather).

The discussion in this subchapter starts with the key performance indicator: arrival delay, the delay of a flight due to a regulation placed by the airport of arrival. 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 per flight

As of January 1st 2015 skeyes is subject to an annual target with regard to ATFM arrival delay. The target is defined as an average arrival delay per flight, as defined in the FABEC Performance Plan, §3.1. (C). (ii), which is in accordance with the European Performance Regulation (EU) No 390/2013, Annex 1, Part 2, §3.1 (b). Targets are set on a national level and on an airport level. The national target is the aggregation of the airport targets and is 0.10 minutes/flight From 2016 until 2019. On an airport level, only targets for Brussels and Liège airports exist. However, as part of a continuous monitoring of the ANSP’s performance, skeyes registers the arrival delays for Ostend airport, as an internal performance indicator.

The arrival delay for each flight is calculated by the NM and has been provided by the Performance Review Unit (PRU / EUROCONTROL). The data of the arrival delays at Ostend airport for the period from 2016 until 2019 is given in Table 3-2. Two regulations were put in place during this period, each accountable for the delay in a different year. None of these regulations had an ANSP contribution and had a reason outside the CRSTMP reasons.

The delay in 2017 happened due to weather. All of the delay, 383 minutes, was accumulated on the 11th of December 2017, as the runway was unavailable due to snow from 10:20 until 17:40 local time.

A zero rate regulation was put in place on the 28th of November 2018 when the airport experienced a power failure, leaving the runway lighting aids unserviceable. The regulation was put in place between 08:10 and 10:00 local time under the reason E-Equipment (non-ATC). This affected only one flight and caused the 47 minutes of delay in 2018.

In 2019, there was a delay of 45 minutes due to one regulation at the airport. This regulation was on departure traffic and the delay is therefore not an arrival delay. The regulation was put in place on the 21st of March 2019 between 07:15 and 09:15 local time under the reason I-Industrial Action (ATC) (NOTAMS A0931/19 AND A0932/19). This affected one flight and caused the total delay of 45 minutes in 2019.

Table 3-2: Arrival delay per cause at Ostend airport for 2016 until 2019

Year	Arrival delay (minutes)			
	CRSTMP	Weather	Other categories	Total
2016	0	0	0	0
2017	0	383	0	383
2018	0	0	47	47
2019	0	0	0	0

All ATFM delay affecting departures

Flights departing an airport can be delayed by ATFM measures in any of the sectors they cross on their route. In 2019, 723 departing flights from Ostend airport were delayed resulting in a total of 12,051 minutes of delay. 31.0% (3,731 minutes) of that delay is attributable to skeyes while 69% (8,320 minutes) is attributable to other ANSPs.

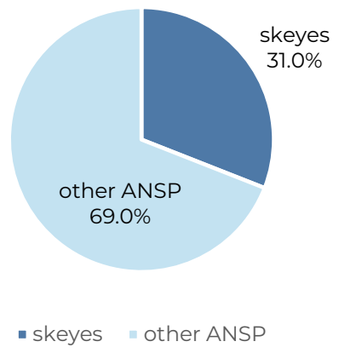


Figure 3-2: ATFM delay for departing flights attributable to skeyes and other ANSPs

Figure 3-2 shows delay due to skeyes and other ANSPs.

To give a view of the severity of the impact, the regulated flights can be categorised based on the length of the delay (Figure 3-3).
There are four categories:

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

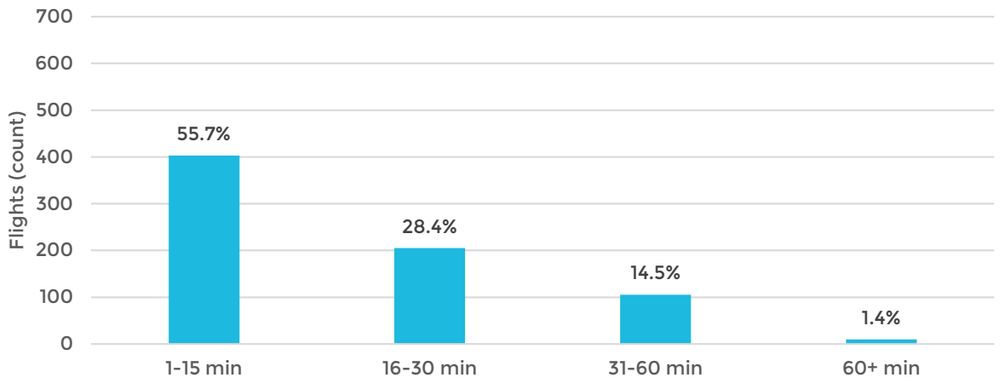


Figure 3-3: Delayed departing flights per category

The graph in Figure 3-3 shows that more than half of the delayed flights (55.7%) have a maximum delay of 15 minutes and 84.1% of the delayed flights did not have a delay that exceeded 30 minutes. Also, less than 2% is delayed more than one hour.

All ATFM delay affecting arrivals

Flights arriving to an airport can be, just like departing flights, delayed by ATFM measures in ATC sectors on the flight plan (en-route delays) and arrival delays which are caused by ATFM measures at the airport of arrival. This section observes the delay of arriving traffic at Ostend airport.

In 2019, 661 flights with destination Ostend airport were delayed and experienced a total of 11,034 minutes of delay. 38.9% (4,284 minutes) of that delay is attributable to skeyes while 61.1% (6,750 minutes) is attributable to ATFM measures by other ANSPs. Figure 3-4 shows the delay attributable to skeyes and other ANSPs.

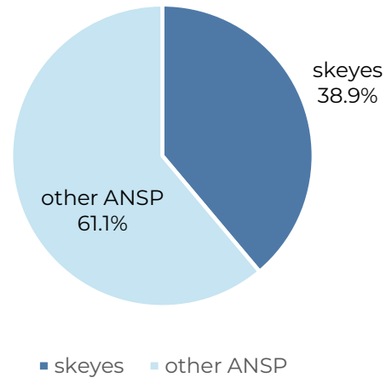


Figure 3-4: ATFM delay for arriving flights attributable to skeyes and other ANSPs

Delayed flights can be categorised based on the length of the delay, see Figure 3-5. This view can give an indication of the severity of the impact of regulations. There are four categories:

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

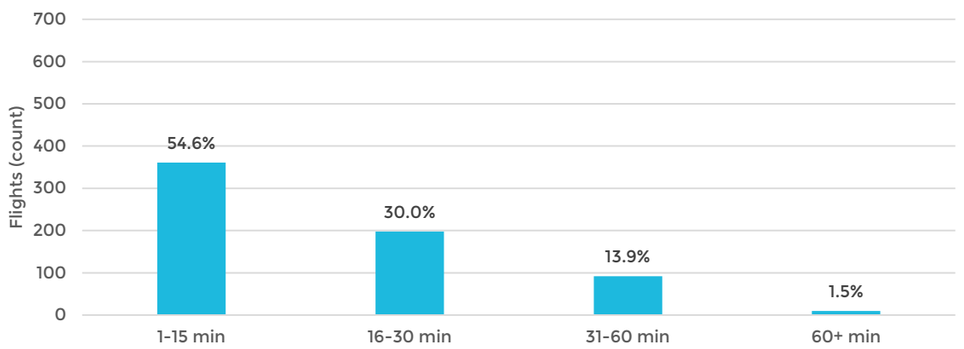


Figure 3-5: Delayed arriving flights per category

Based on the graph in Figure 3-5, 54.6% of the delayed flights had a delay less than 15 minutes and 1.5% of the delayed flights is delayed more than one hour.

4. ENVIRONMENT

Because of its geographical location close to densely populated areas, it is important to consider noise distribution around the airport. There is as such a preferential runway system in place at Ostend which is monitored in this chapter.

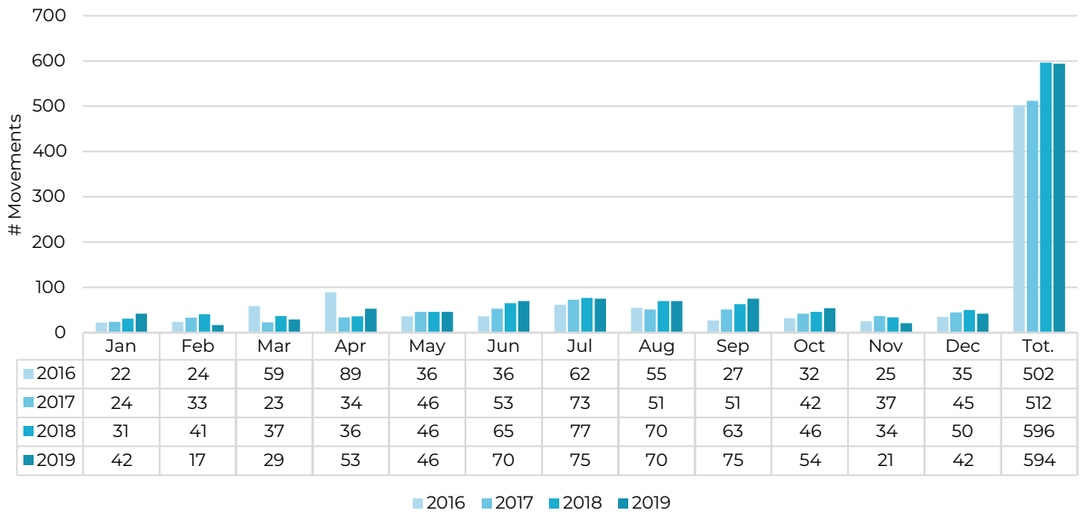
An overview of predominant winds is also provided, as wind is a leading factor in the choice of runway use.

A Preferential Runway System at night

As mentioned in the Aeronautical Information Publication (AIP) (AD 2.20, Ch 4.1), a preferential runway system (PRS) has been put in place at Ostend airport. Between 22h00 and 08h00 local time, when the crosswind component (including gusts) does not exceed 15 knots, or the tailwind component (including gusts) does not exceed five (5) knots, traffic permitting and with the approval of pilot-in-command, RWY 26 will be used for take-off and RWY 08 for landing.

For safety reasons, when wind conditions do not fall within the aforementioned limits the PRS is not followed.

In order to compare the use of the PRS with previous years, Figure 4-1 shows the sum of departures on RWY 08 and the landings on RWY 26 per month, between 22h00-08h00 LT, over the past four years.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot.
2016	22	24	59	89	36	36	62	55	27	32	25	35	502
2017	24	33	23	34	46	53	73	51	51	42	37	45	512
2018	31	41	37	36	46	65	77	70	63	46	34	50	596
2019	42	17	29	53	46	70	75	70	75	54	21	42	594

Figure 4-1: Number of flights that deviated from the PRS per month

The number of movements in which the PRS was not in use is in line with the total number of movements at the airport, which varies over the year and increases in the summer. The use of the PRS in terms of movements is similar to the 2018 figure.

Again more south westerly winds in 2019

As observed at other Belgian airports, the wind in 2019 came mainly from south west, in contrast with 2018 where there was no clear main direction of the wind. The winds coming from north east decreased in frequency in 2019. This explains the overall increase in usage of RWY 26, in comparison with 2018.

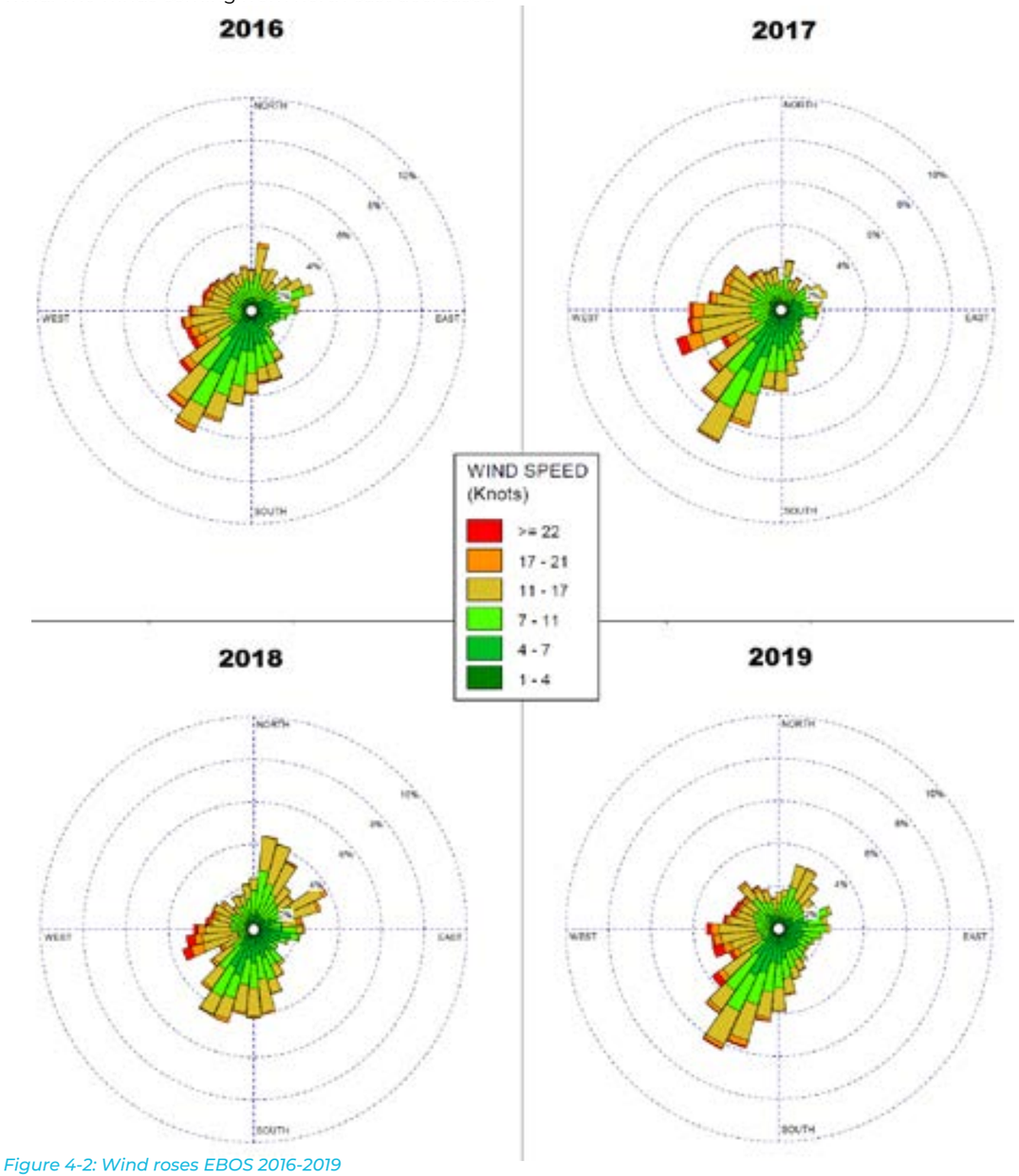


Figure 4-2: Wind roses EBOS 2016-2019

As mentioned in Chapter 1, the month of April was an exception as the RWY 08 was the most used one. That was due to the change in the main direction of the wind in that month, which came exceptionally from north east.

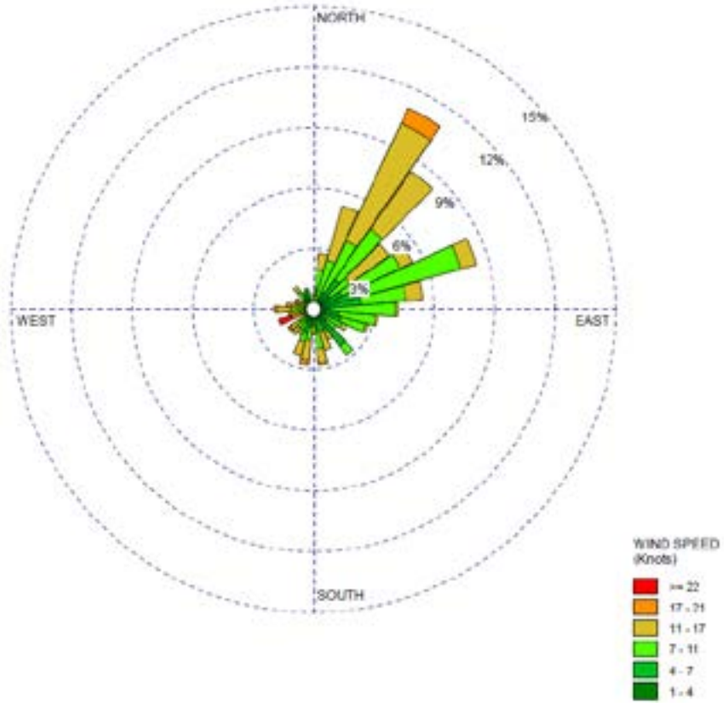


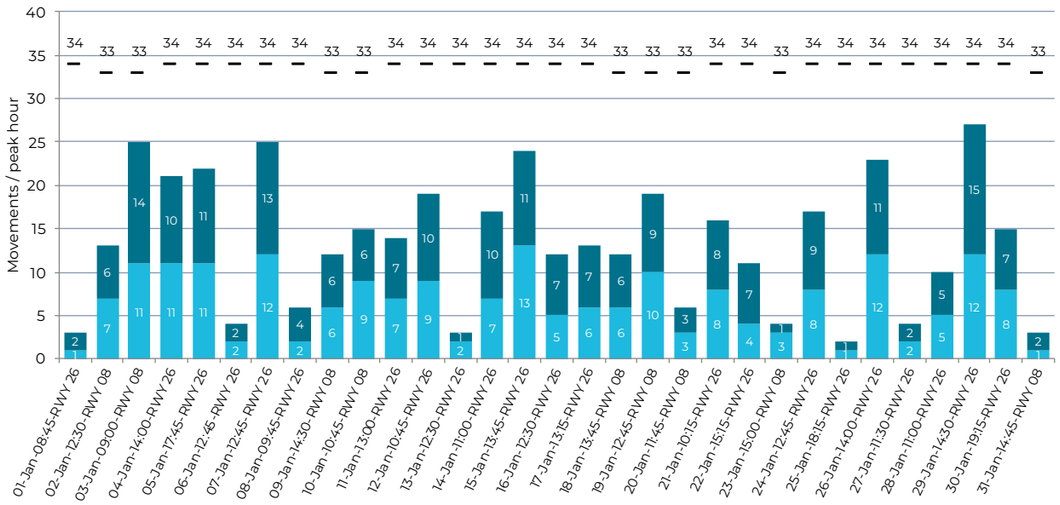
Figure 4-3: Wind rose EBOS April 2019

skeyes nice to guide you

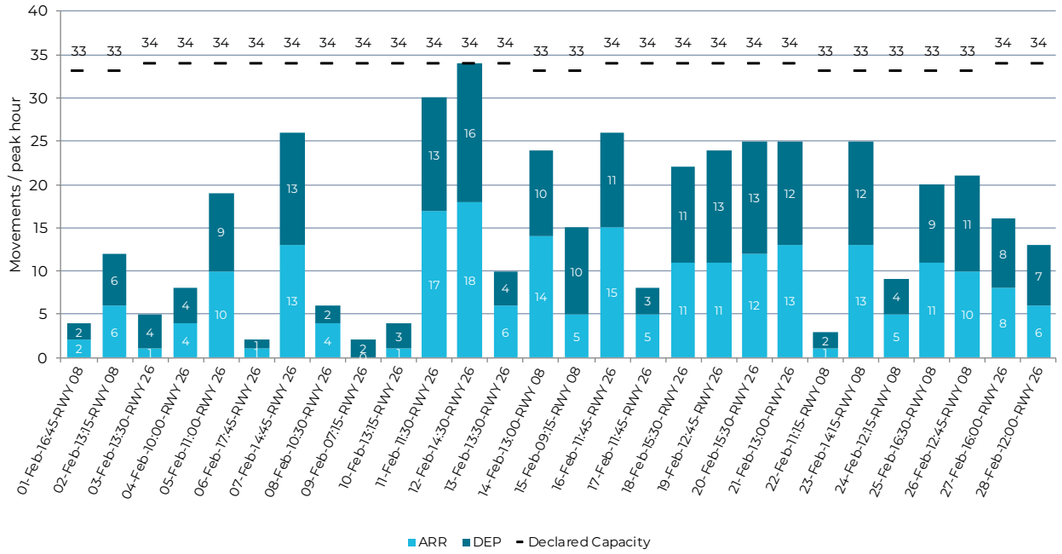
ANNEX

Annex 1: Monthly overview of arrivals and departures at peak hours

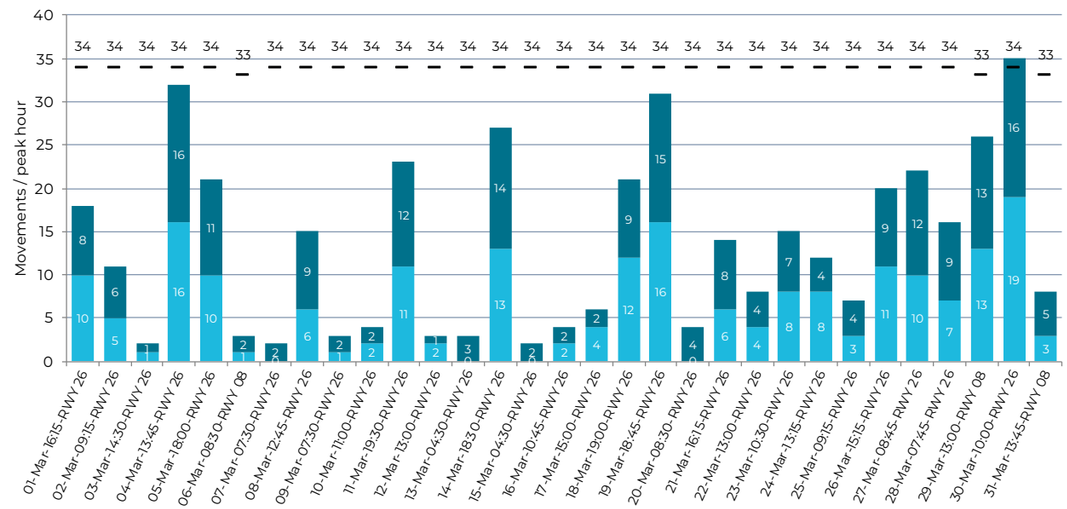
January



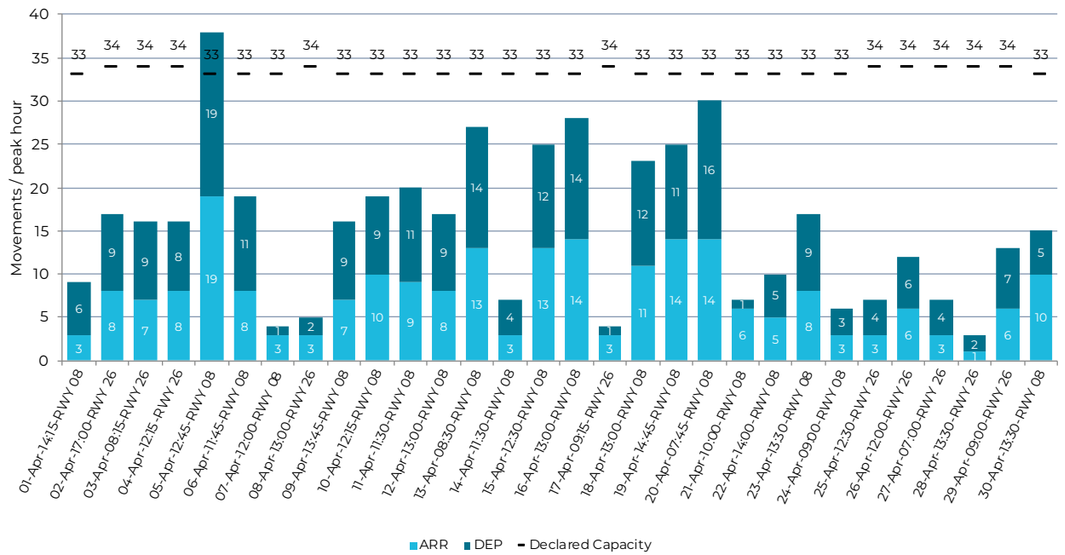
February



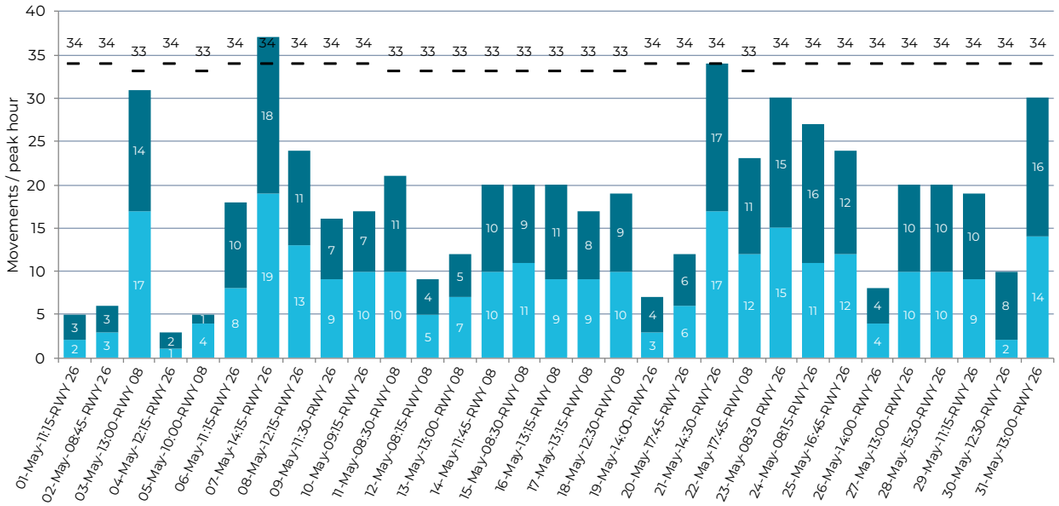
March



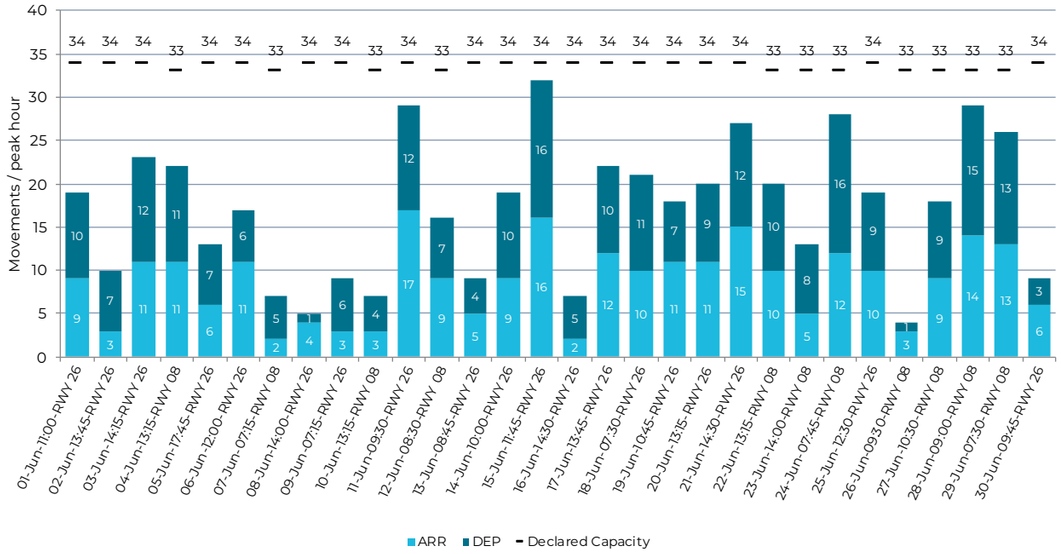
April



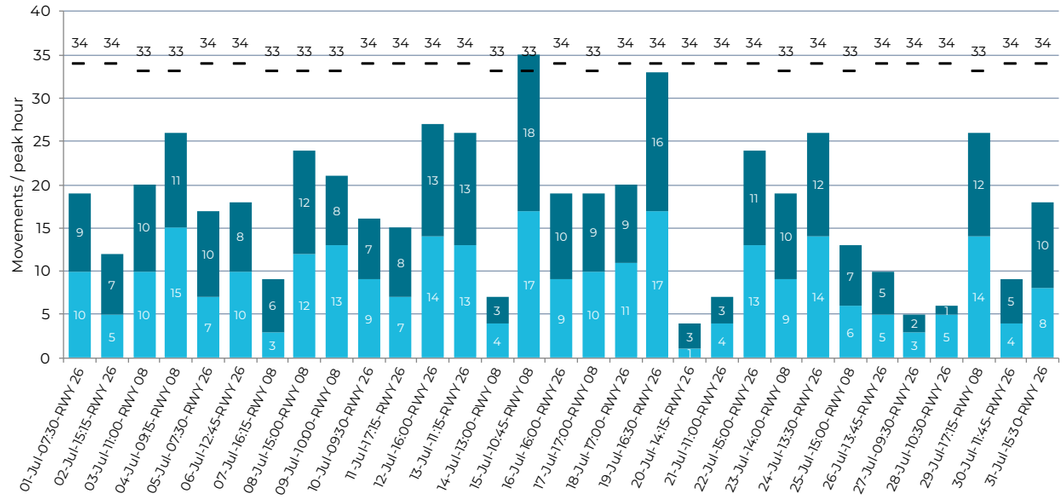
May



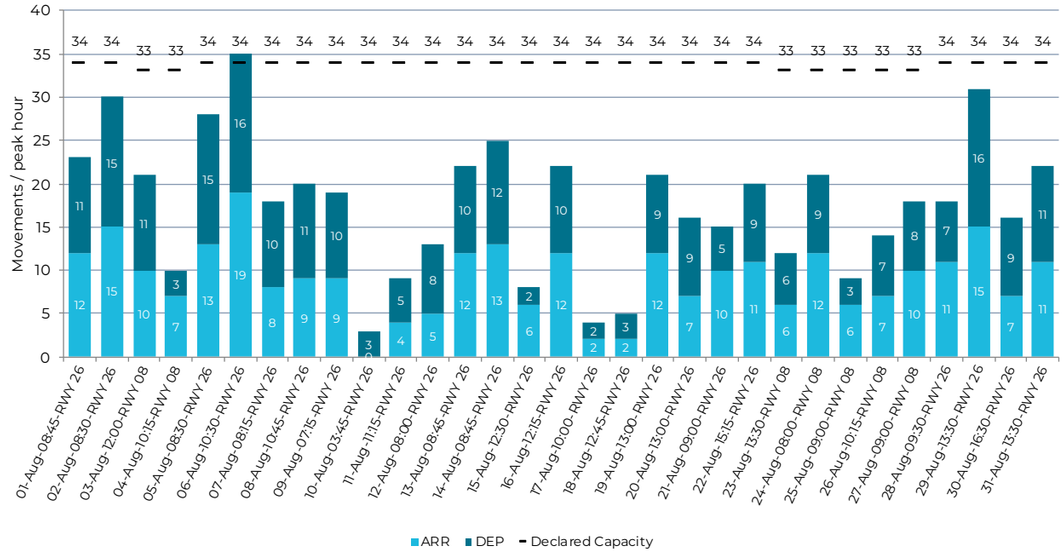
June



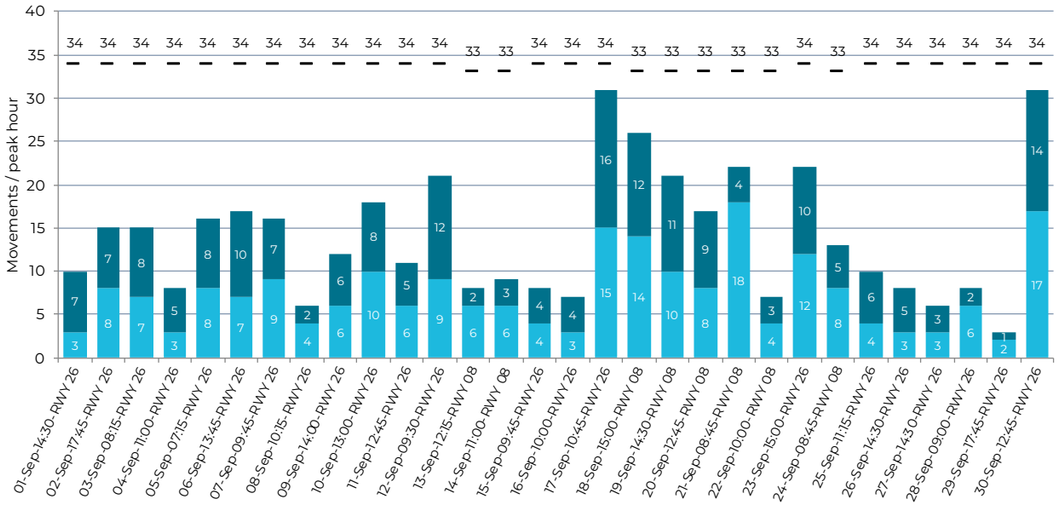
July



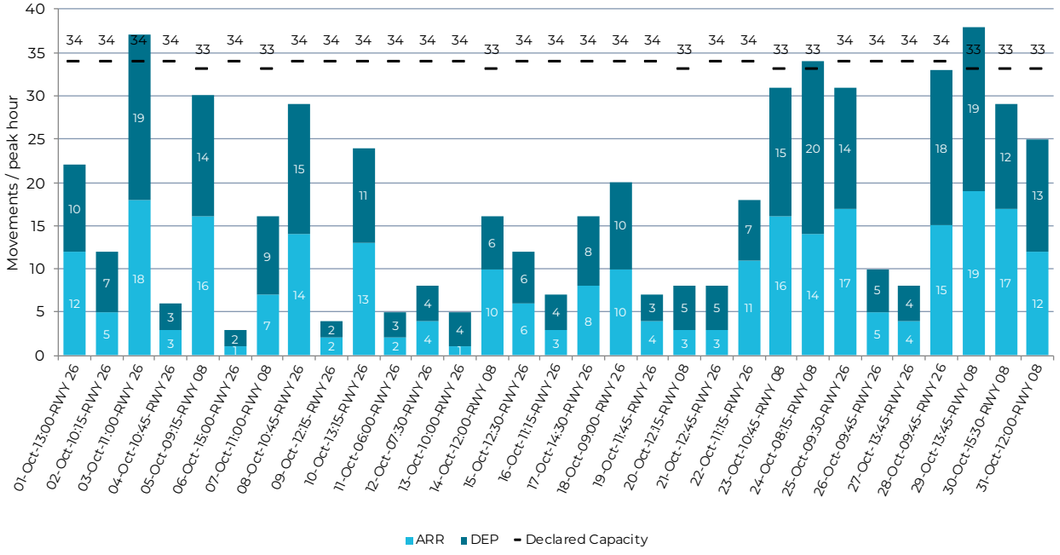
August



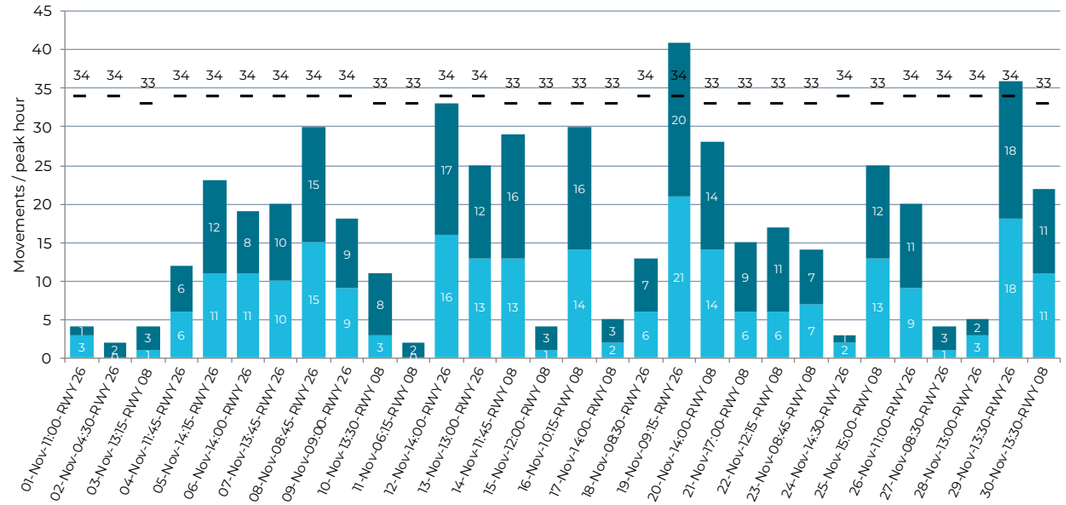
September



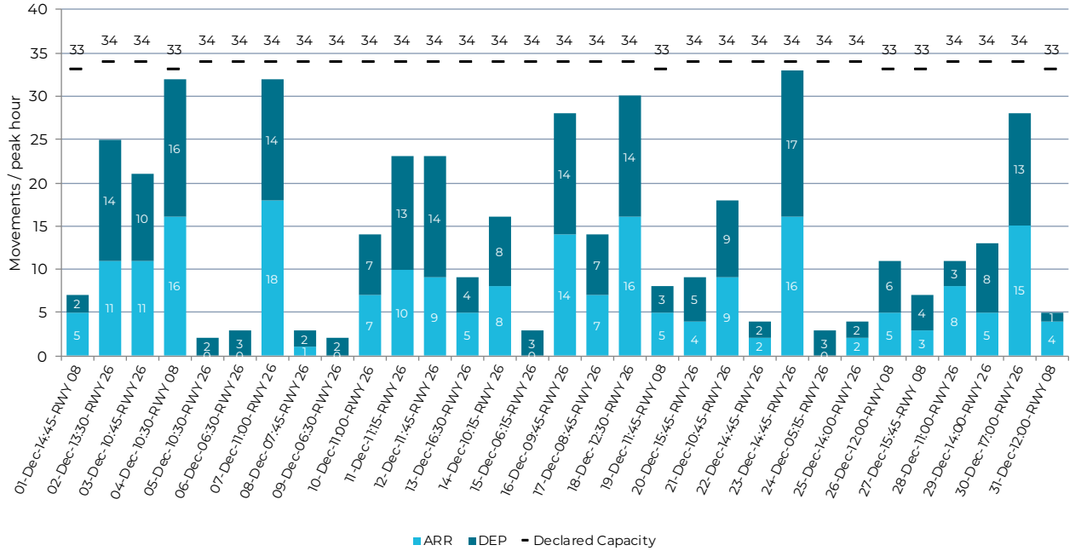
October



November



December



skeyes nice to guide you

www.skeyes.be