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Notice

Traffic and Delay Comparisons: All traffic and delay comparisons are between the reporting year (2015) and the previous year, unless otherwise stated.

NM Area: All figures presented in this report are for the geographical area that is within Network Manager's responsibility (NM area) unless otherwise stated.

Regulation Reason Groupings The table below shows the colour coding used in the report charts.

(dark red)	EN-ROUTE CAPACITY (ATC)	(navy)	AIRPORT CAPACITY (ATC)
(red)	EN-ROUTE STAFFING (ATC)	(blue)	AIRPORT STAFFING (ATC)
(orange-red)	EN-ROUTE DISRUPTIONS (ATC)	(steel blue)	AIRPORT DISRUPTIONS (ATC)
(orange)	EN-ROUTE CAPACITY	(teal)	AIRPORT CAPACITY
(light orange)	EN-ROUTE DISRUPTIONS	(green-cyan)	AIRPORT DISRUPTIONS
(amber)	EN-ROUTE EVENTS	(cyan)	AIRPORT EVENTS
(yellow)	EN-ROUTE WEATHER	(light blue)	AIRPORT WEATHER

Reporting Assumptions and Descriptions: For further information on the NM Area and the regulation reason groupings, go to the Reporting Assumptions and Descriptions document available on the EUROCONTROL website at http://www.eurocontrol.int/articles/network-operations-monitoring-and-reporting.

Abbreviations: Abbreviations and acronyms used in this document are available in the EUROCONTROL Air Navigation Inter-site Acronym List (AIRIAL) which may be found here: http://www.eurocontrol.int/airial/definitionListInit.do?skipLogon=true&glossaryUid=AIRIAL

1 EXECUTIVE SUMMARY

There were 9,889,310 flights in 2015 in the NM area. Traffic increased in line with the network forecast (1.5%) with economic growth having returned, but only weakly. The biggest contributors to the European arrival-departure growth were Turkey, UK and Spain. In addition, Germany, Greece, Italy and Lisbon FIR saw significant local growth. ACCs in general had adapted capacities during 2015 to Ukraine traffic flow changes of 2014. On the other hand, some ACCs struggled to provide capacity for increased traffic that was avoiding higher German navigation charges.

The en-route ATFM delay was 0.73 minute/flight and the 0.5 minute/flight SES target for 2015 was missed. However, there is significantly less delay in 2015 compared to 2007 (0.73 minute v 1.3 minute) which had similar traffic levels.

All transport delays were higher than 2014 with an increase from 9.7 minute/flight to 10.5 minute/flight. ATFM airport delay (+23%) was the main contributor to the increase in primary delay with strong increases at both Istanbul airports. However, some airlines were able to absorb part of these ATFM departure delays leading to on-time arrival at stand.

En-route ATFM delays were higher mainly due to ATC capacity and staffing issues over summer. There was also more delay due to en-route weather over summer. ATC disruptions (industrial action and technical failures) caused fewer delays than in 2014.

Brest ACC did not deliver sectors as declared in the NOP for the summer period. Lack of sectors was felt either side of the 0800-1200 period where delays were notably high. The capacity shortage before 0800 affected the Ireland/UK-Spain/Portugal traffic flow and reactionary delays were noticeably high at certain airports.

Brest ACC started to implement its ERATO system in November. Sector capacity reductions were higher than anticipated and the FMP regulation strategy did not follow ATFCM best practice in NM's view. Delays were high (over 600,000 minutes in 2015) and continued into the New Year with the Ireland/UK-Spain/Portugal traffic flow heavily impacted.

Nicosia ACC also failed to deliver sectors as declared in the NOP.

Greek ACCs provided more sectors than expected over summer 2015 but capacity was still insufficient. The Brussels sectors at MUAC and Reims ACC had high ATFM delays. Both operated full sector configurations but traffic levels were high at specific times of the week/day.

Zagreb and Lisbon (due to high traffic increase) ACC's performances were not as good as expected, and the level of delay too high to meet the network target. Again, the availability of capacity at specific periods was the root cause of ATFM delays. Lisbon is constrained by labour laws (number of hours); Zagreb faced social issues/contract negotiations over a limited period during summer.

Airport ATFM delays increased by 66% in 2015. Aerodrome capacity at Istanbul airports continued to be the dominant issue and accounted for 17% of total ATFM delays. NM is finalising an action plan with Turkish authorities to tackle this and other operational issues.

NM worked with Greek authorities to manage summer delays at holiday destinations with infrastructure problems and insufficient departure/arrival capacities. NM also started a trial with Zurich airport, Swiss and Skyguide to resolve first rotation ATFM delays.

The network improved its mitigation of the impact of strikes and weather. There were fewer strikes in 2015 and the French ATC strike of April accounted for 70% of the overall 600,000(+) minutes delay recorder in 2015 due to industrial action. NM developed recovery processes from major disruptions with NATS/Belgocontrol and the Weather Workshop in October created better awareness of the weather management trial. NM was ready for potential crises over 2015 and was fully involved in managing traffic at the Turkey/Syria border.

NM proposed re-routeing options to AOs on a daily basis, offering route savings of 2457 nautical miles per day. However, the acceptance rate was 16% and NM is analysing the reasons for this. The traffic flow disruption caused by the Ukraine crisis continued to affect the results with the flight efficiency (FPL) indicator trend being off track for the NM area, but close to the target for SES area.

NM delivered absolute delay savings in line with its commitment in the NPP (10.2%). However, NM needs to improve savings at airports to achieve the NM objective for airports, despite delivering 5% more airport delay savings than 2014.

RP2 is proving to be more challenging for the network. There is higher traffic requiring extra capacity in order to achieve both capacity and incentive targets whilst delivering cost efficiency targets. European social, economic and political issues continue in 2016. This is affecting flight operations and meeting flight efficiency targets is challenging. ANSPs need to be more responsive to adapt capacity to changing traffic flows as aircraft operators avoid conflict zones and high cost areas.

Delivering sectors as declared in the NOP is a key success factor for network performance. ACCs will need to be flexible and the NOP should detail clearly the weekend/first rotation capacity requirements for specific ANSP/ACCs.

NM will focus on ensuring that network challenges are mitigated as far as possible and its performance maximised. It will strive to achieve network targets and support FABs, ANSPs and airports to achieve their own performance targets. The main performance actions are.

- Address first rotation delays impacting airline schedules through:
- Providing extra sectors at Brest ACC in the first rotation period;
- Improving capacity usage, e.g. Zurich and Greek islands;
- Confirming capacity improvement plans for MUAC and Reims;
- Resolving capacity in Greece/Nicosia through supporting restructuring initiatives;
- Working with Turkish authorities to execute the agreed action plan and improve Istanbul airports operations.

NM will continue:

- Integrating airports into the network through A-CDM, including “Advanced Towers”;
- Its weather management trial;
- Proposing efficient routes to aircraft operators and increasing acceptance;
- Improving network disruption (crisis) processes as new operational, social, economic and political issues arise.

2 INTRODUCTION & SCOPE

The purpose of this document is to provide an overview of the European ATM network performance in 2015 in the areas of traffic evolution, capacity offered by the Air Navigation Service Providers, delays and flight efficiency. Airspace users' opinion on the network performance is also included.

The report analyses the annual results in light of the main events that took place in the course of the year.

The document structure is as follows:

Section 1: Executive Summary.

Section 2: Introduction & Scope.

Section 3: Network Overview contains the annual performance of the European ATM network: traffic, capacity, delays and flight efficiency.

Section 4: Traffic in Detail is a detailed analysis of traffic growth in the NM area and adjacent regions.

Section 5: En-Route Performance Analysis is an analysis of network en-route performance: events and disruptions; capacity and ACC performance.

Section 6: Airports is an analysis of the performance of airport operations.

Section 7: Flight Efficiency is an analysis of network flight efficiency.

Section 8: Network Manager contribution to achieved performance results.

Section 9: ATFM Compliance to the ATFM Implementing Rule.

Section 10: References.

Annex I: Airspace Users View on how the network performed in 2015.

Annex II: ACC contains a traffic and capacity evolution of each ACC in 2015.

Annex III: Airports contains capacity, delay, arrival/departure punctuality status and a NM performance assessment of each of the significant airports in 2015.

3 NETWORK OVERVIEW

3.1 2015 BY MONTH

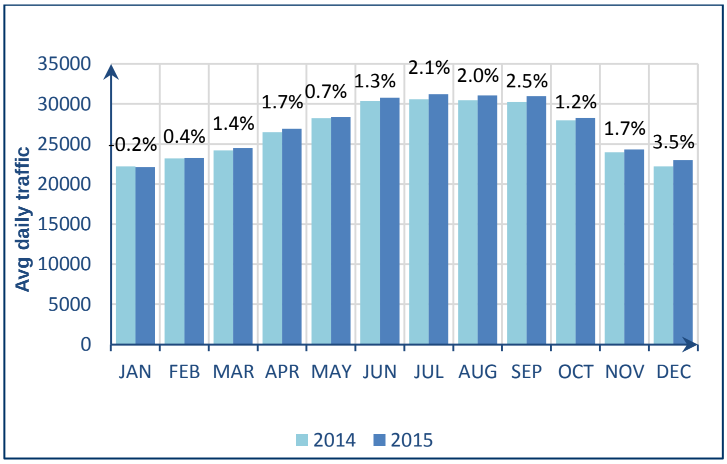


Figure 1: Average daily traffic in 2015

2015 started with a traffic decrease in January of 0.2% with traffic avoiding Ukrainian airspace and other disruptions (Syria, Libya, parts of the Black Sea). This happened together with a significant fall in business traffic. As a result, traditional traffic flows were distorted and some ACCs experienced high traffic growth or a traffic decrease. En-route ATFM delays decreased by 72.8% but airport ATFM delays increased by 131%. Airport weather accounted for 59.6% of the overall ATFM delay and particularly impacted operations at Amsterdam/Schiphol, London/Heathrow and Istanbul/Ataturk airports. Venice airport implemented full A-CDM operations on 20 January.

Traffic in February 2015 increased by 0.4% compared to February 2014. The reorientation of the traffic observed in January continued to affect the traffic flows on the south-east axis. En-route ATFM delays decreased by 51.1% but weather affected airport operations resulting in an increase of 92.1% in airport ATFM delays. Weather was over half of the airport ATFM delays in February 2015 and particularly impacted operations at Istanbul/Ataturk, London/Heathrow, Istanbul/Sabiha Gökcen, Geneva and Munich airports. Industrial action at Paris Charles de Gaulle airport on 12 and 13 February and in Italy on 17 February also generated high airport ATFM delay and resulted in flight cancellations.

Traffic in March 2015 increased by 1.4% compared to March 2014. Traffic avoiding Ukrainian airspace and other areas (Syria, Libya, parts of the Black Sea) continued to distort traditional traffic flows with some ACCs experiencing either high or low traffic variations. En-route ATFM delays decreased by 42.9%, but ATFM delays due to airport weather increased by 157.2% and accounted for almost 40% of airport delays, with Amsterdam/Schiphol and London/Heathrow airports particularly impacted. En-route ATC capacity/staffing, especially in Nicosia ACC, and airport capacity issues (at Istanbul/Ataturk and Istanbul/Sabiha Gökcen airports) also contributed to the overall delay. ATM system implementations, upgrades and/or training at Amsterdam/Schiphol airport and in Brest, Nicosia and Zurich ACCs also generated delays. Industrial action at both Lufthansa and Norwegian Air Shuttle resulted in the cancellation of a number of flights. Free Route Airspace (FRA) above FL275 was implemented in the Ukraine FIR on 5 March.

The start of airline summer schedules at the end of March contributed to a traffic increase of 1.7% in April 2015 compared to April 2014. The disrupted traffic flows continued but traffic to Egypt increased by 17% and generated additional demand on the south-east axis. En-route ATFM delays increased by 117% and airport ATFM delays increased by 74%. The increase in en-route ATC disruption delays was mainly due to French ATC industrial action (8-10 April) as they accounted for 34% of ATFM delays in April and resulted in over 3,000[ix] flights being cancelled.

Traffic in May 2015 increased by 0.7% compared to May 2014. En-route ATFM delays increased by 3.4% and airport ATFM delays increased by 66.7% mainly due to en-route ATC and airport capacity respectively. Airport weather particularly impacted operations at London/Heathrow, Amsterdam/Schiphol, Zurich and Barcelona airports and a fire in terminal 3 at Rome/Fiumicino severely impacted operations until July. New ATM system implementations or training generated delays in Brest, Bordeaux and Munich ACCs and there were technical issues in Rome and Brussels ACCs. Time Based Separation (TBS) operations at London/Heathrow airport became fully operational on 1 May and a new runway at Katowice/Pyrzowice became operational on 28 May.

Traffic in June 2015 increased by 1.3% compared to June 2014. Traffic avoiding Ukrainian airspace continued to distort traditional traffic flows with increased traffic for all ACCs on the south-east axis. There was also increased traffic in Reykjavik and Santa Maria ACCs due to a shift of transatlantic traffic flows. Total ATFM delays increased in June 2015 by 2.4%. En-route ATFM delays decreased by 16.1% but airport ATFM delays increased by 54%, mainly due to recurrent airport capacity problems (Istanbul/Ataturk and Istanbul/Sabiha Gökcen airports), airport weather (London/Heathrow, Amsterdam/Schiphol, Zurich and Barcelona airports). Training for the implementation of ERATO Electronic Environment in Brest (with some delays in Bordeaux ACCs) was a high contributor to en-route ATFM delays. Technical issues in Lisbon and Reims ACCs, and at Istanbul/Ataturk and Istanbul/Sabiha Gökcen airports, also generated ATFM delays. Airport capacity and flight reduction measures remained in effect at Rome/Fiumicino airport due to the fire in Terminal 3 in May.

Traffic in July 2015 increased by 2.1% compared to July 2014 with increased traffic in Budapest, Bratislava, Belgrade, Athens and Nicosia ACCs mainly due to traffic avoiding Ukrainian airspace. Traffic to/from Tunisia reduced by 33% following the terrorist attack on 26 June, and remained lower for the remainder of the year. Total ATFM delays increased in July 2015 by 37.1%. En-route ATFM delays increased by 29.8% and airport ATFM delays increased by 51.4%. En-route ATC capacity issues in Brest ACC and en-route ATC capacity/staffing problems in Athens, Nicosia and Makedonia ACCs, as well as industrial action in Spain and in Bucharest ACC all resulted in ATFM delays, with additional delays in Belgrade ACC due to the Bucharest ACC industrial action. Recurrent capacity problems at Istanbul/Sabiha Gökcen and Istanbul/Ataturk airports accounted for 12.8% of the total ATFM delays in July. Airport weather (winds and thunderstorms) impacted operations at Zurich, London/Heathrow, Amsterdam/Schiphol and Frankfurt/Main airports and unscheduled runway/taxiway maintenance caused ATFM delays at Antalya airport. Airport capacity issues and flight reduction measures remained in effect at Rome/Fiumicino airport until 18 July due to the fire in Terminal 3 in May.

Traffic in August 2015 increased by 2% compared to August 2014 with significantly increased traffic in Ankara, Nicosia, Istanbul, Malta, Prague and Belgrade ACCs. Total ATFM delays increased in August 2015 by 47.7%. En-route ATFM delays increased by 39.5% and airport ATFM delays increased by 61.5%. ATC capacity/staffing delays continued in Athens, Brest and Nicosia ACCs; the application of temporary measures by NM in cooperation with the concerned ACCs in BlueMed FAB alleviated some of the capacity issues and ATFM delay in Athens ACC but shifted some of the traffic to more southerly flows in the region. Continuing airport capacity problems at Istanbul/Sabiha Gökcen and Istanbul/Ataturk airports generated 41.1% of airport ATFM delays. ATFM restrictions on point ODERO in Ankara ACC resulted in limited en-route ATC capacity delays given the high traffic increase in the area; the restrictions were relaxed towards end of August. Several technical issues impacted ATC operations, notably FDPS problems in Bucharest ACC. Seasonal weather impacted operations at Palma de Mallorca, London/Heathrow and London/Gatwick airports, with London/Gatwick airport particularly affected by thunderstorms on 24 August 2015, which resulted in a reduction in airport capacity due to a lack of aircraft parking stands.

Traffic increased by 2.5% in September 2015 compared to September 2014 when a lengthy industrial action in France caused relatively low levels of traffic. Total ATFM delays increased by 44.8% in September 2015 but were well below the level of August 2015 with significantly fewer en-route ATFM delays. Compared to September 2014, en-route ATFM delays increased by 24.8% and airport ATFM delays increased by 64.4%. En-route ATC capacity/staffing delays continued in Barcelona, Brest, Nicosia and Athens ACCs. Recurrent airport capacity problems continued at Istanbul/Sabiha Gökcen and Istanbul/Ataturk (34% of airport ATFM delays). Seasonal weather impacted flight operations in Barcelona, Paris, Maastricht, London, Langen and Karlsruhe ACCs as well as Istanbul/Sabiha Gökcen, Istanbul/Ataturk, Zurich, Amsterdam/Schiphol, Palma de Mallorca and Rome/Fiumicino airports. Implementation of new ATM systems generated delays in Nicosia (TOPSKY) and Brest (training for the implementation of ERATO Electronic Environment) ACCs, and ATC industrial action in Spain on 26 September had some impact on the network. Prague airport fully implemented A-CDM on 2 September.

Traffic in October 2015 increased by 1.2% compared to October 2014 and was the highest for the month of October since NM traffic records began. Total ATFM delays increased in October 2015 by 24.9%. En-route ATFM delays increased by 41.2% and airport ATFM delays increased by 13.7%. ATFM delays due to airport capacity and airport weather accounted for 49% of all ATFM delays in October. French ATC industrial action on 8 October resulted in over 84,000 minutes of ATFM delay in the French ACCs and Madrid, Maastricht and Karlsruhe ACCs. Recurrent capacity problems at Istanbul/Sabiha Gökcen and Istanbul/Ataturk airports remained significant accounting for 17.9% of the total ATFM delays in October, with seasonal weather also generating additional delays. Weather also generated delays at Amsterdam/Schiphol and Brussels/National airports and Maastricht and Lisbon ACCs. Some technical issues affected operations notably in Prestwick ACC and Istanbul/Sabiha Gökcen airport. Implementation of new ATM systems (training for the implementation of ERATO Electronic Environment) continued at Brest ACC until 18 October generating en-route ATFM delay. Barcelona airport implemented A-CDM on 20 October.

Traffic in November 2015 increased by 1.7% compared to November 2014 but was 14% lower than October 2015 due to the start of the winter 2015/16 schedules. European traffic flows to/from Russian Federation remained 20% below November 2014 levels and traffic to/from Tunisia remained adversely affected by the June terrorist attack. Industrial action also affected Lufthansa operations and resulted in a significant number of flight cancellations. Total ATFM delays increased in November 2015 by 82.1%; en-route ATFM delays increased by 11.4% and airport ATFM delays increased by 138.4%. ATFM delays due to airport seasonal weather accounted for half of all ATFM delays in November, with low visibility on 1 and 2 November generating 43% of total airport weather delays. ATC industrial action in Reims ACC between 23 and 27 November generated over 70,000 minutes of ATFM delay for Reims, Maastricht and Karlsruhe ACCs. Training for the implementation of ERATO Electronic Environment generated delays in Brest ACC. Northern European Free Route Airspace (NEFRA) was implemented in Tampere ACC causing some en-route ATFM delays.

Sustained growth rates recorded during the year-end holiday period resulted in December 2015 being the highest monthly traffic growth rate in 2015 (3.5%). The apparent high increase was also related to the industrial action in December 2014 that generated a significant number of cancellations. Traffic increased in Shannon and Shanwick ACCs due to traffic avoiding Brest ACC and distorted transatlantic traffic flows due to strong jetstreams during the middle of the month. The adoption of more southerly routes by airspace users routing to/from Turkey resulted in increased traffic in Malta and Tunis ACCs, but traffic to/from Tunisia remained lower following the terrorist attack on 26 June. Total ATFM delays increased in December 2015 by 116%. En-route ATFM delays increased by 316% and airport ATFM delays increased by 34.6%. The main reason for the increase in en-route ATFM delay was the transition period for ERATO system implementation in Brest ACC that continued throughout the entire month of December. It generated 480,639 minutes of ATFM delay with additional delay in Paris, Madrid, Seville and, to a lesser extent, Canarias ACCs. Seasonal weather affected a number of airports with 30% of December's airport weather delays generated between 27 and 31 December. Airport capacity delays at Istanbul/Sabiha Gökcen and Istanbul/Ataturk airports decreased compared to November 2015, but remained significantly higher than December 2014. Technical issues impacted operations in Brussels and Langen ACCs (also impacting Frankfurt/Main airport) and Geneva airport.

3.2 TRAFFIC 2015

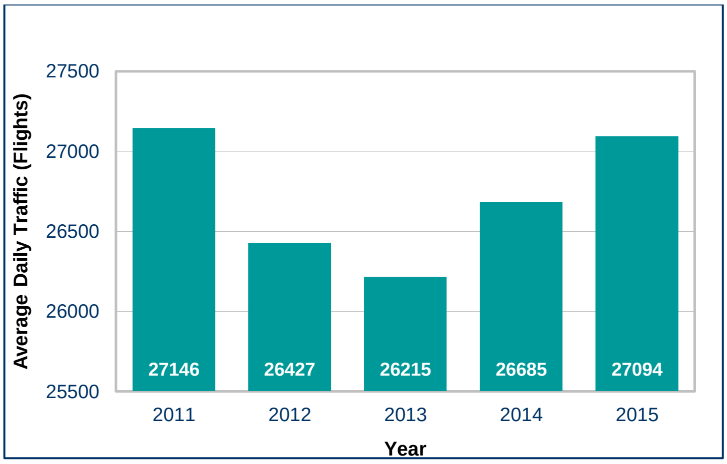


Figure 2: Average daily traffic per year

The number of flights in the NM area increased in 2015 by 1.5%. There was sustained growth of almost 2% throughout the summer driven mainly by the low-cost sector, which grew at a rate of 5%. The traditional scheduled sector, which makes up the majority of European airline traffic, just achieved a small, positive growth for the year. This growth matched the forecast published for Europe in February 2015[i].

During 2015, several events caused significant changes to the distribution of traffic flows, affecting overflight growth in several States. The effects of some of these events continued from 2014, such as (lengthy) airspace closures in Ukraine and Libya. Others were more recent, such as the unit rate increase in Germany. Outside Europe, the USA overtook Russia as the busiest non-European destination, as Russian traffic contracted.

3.3 CAPACITY

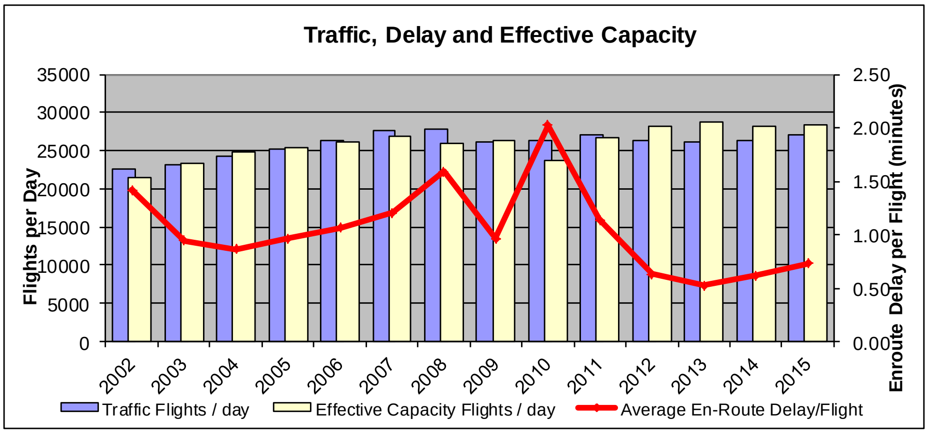


Figure 3: Traffic, Delay and Effective capacity

In 2015 the effective capacity indicator decreased by 1% over the whole European ATM network (a decrease of 0.4% for the summer season), when compared to the corresponding period of 2014.

The capacity at European level is quantified using the “effective capacity”[ii] indicator of the Performance Review Commission (PRC).

3.4 DELAYS

3.4.1 ALL AIR TRANSPORT DELAYS (AIRLINE VIEW)

This section presents the all air transport delay situation as seen from the airlines by using the data collected by Central Office for Delay Analysis (CODA) from the airlines. Data coverage is 68% of the commercial flights in the ECAC region for 2015. ATFM delays reported by airlines may be lower than the NM calculated ATFM delays due to difference in methods: ATFM delays of NM are the (flight) planned “delays”; the airlines report the “actual” experienced ATFM delay on departure. For instance, a flight with an ATFM delay may also have a handling delay absorbed within the ATFM delay. For the airline, a part of this delay is the ATFM delay and the rest is the handling delay.

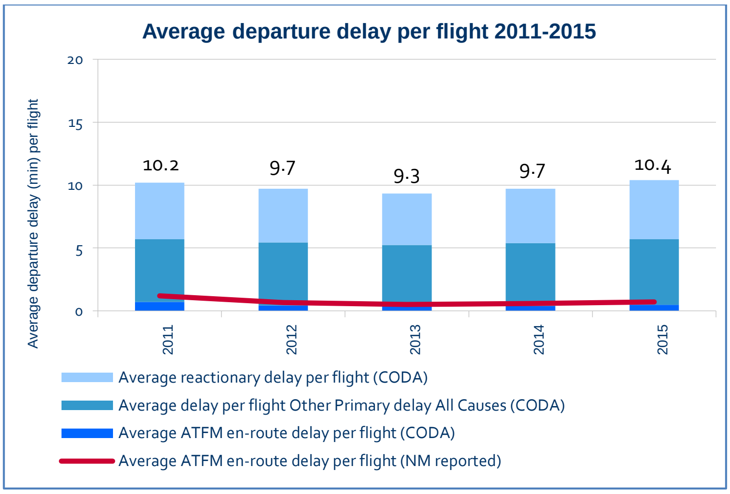


Figure 4: Average departure delay per flight 2011-2015

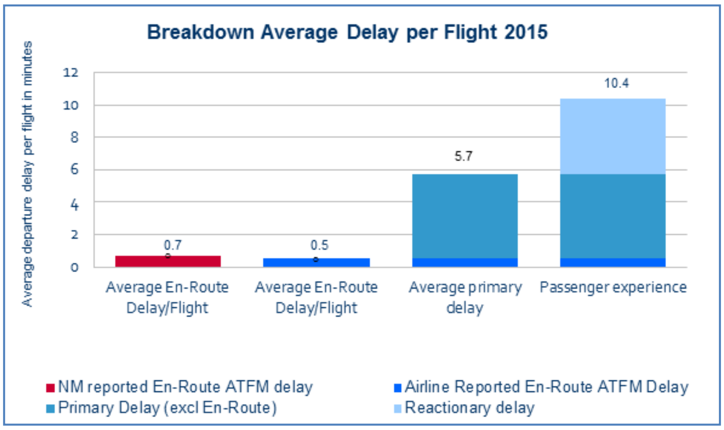


Figure 5: Breakdown average delay per flight 2015

Based on airline data, the average departure delay per flight from "All Causes" was 10.4 minutes per flight; this was an increase of 7% in comparison to 9.7 minutes per flight in 2014. Within all air transport delays, en-route ATFM delays were 0.5 minutes/flight in 2015. Primary delays counted for 55% (or 5.7 min/flt) of which 0.5 min/flight was attributed to en-route ATFM delays, with reactionary delays representing a smaller remaining share of 45% at (4.7 min/flt).

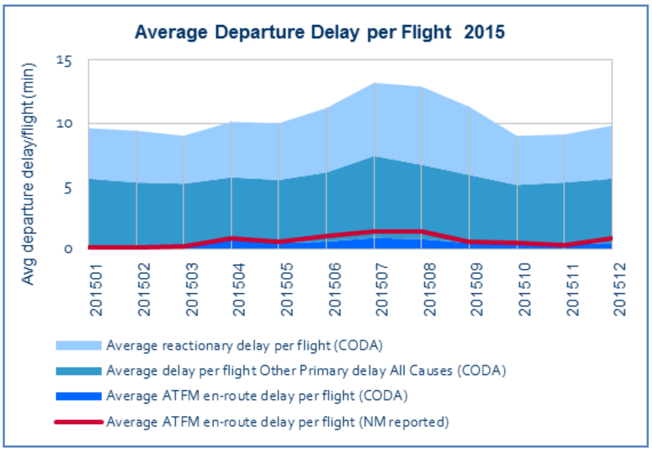


Figure 6: Average departure delay per flight 2015

Further analysis of airline data shows that the average en-route ATFM delay was 0.5 minutes per flight. This was the less than the NM reported average en-route ATFM delay of 0.73 minutes per flight.

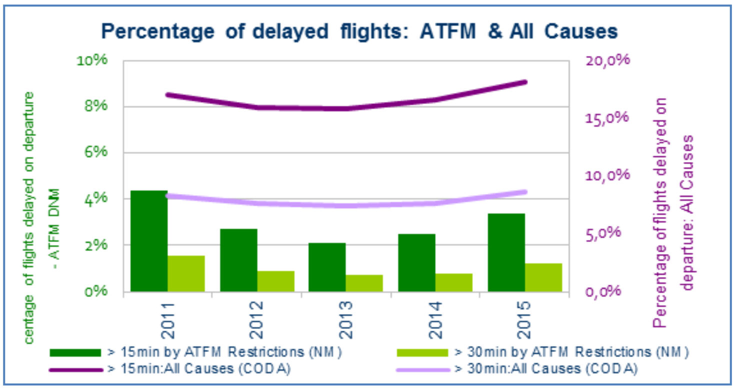


Figure 7: Percentage of delayed flights: ATFM & All Causes

The percentage of flights subject to long ATFM restrictions (those exceeding 15 & 30 minutes) increased with flights with restrictions exceeding 15 minutes at 3.4%. The percentage of flights delayed from all-causes (those exceeding 15 minutes) decreased by 1.6 percentage points to 18.2%; and those exceeding 30 minutes decreased to 8.7% in 2015.

3.4.2 ATFM DELAYS

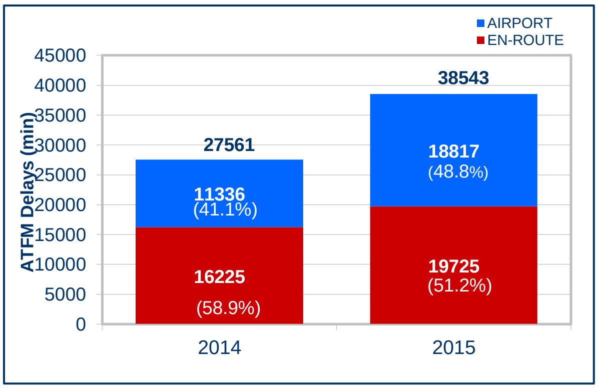
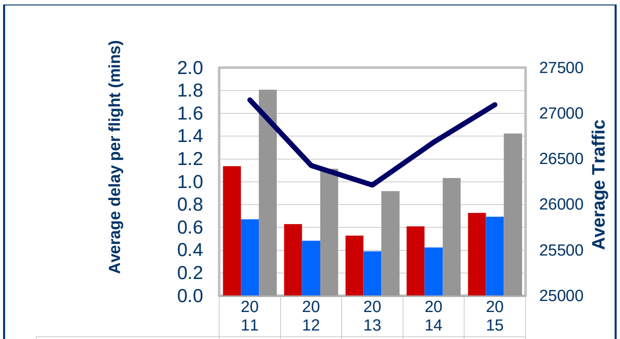


Figure 8: Average daily ATFM delays (2015 v's 2014)

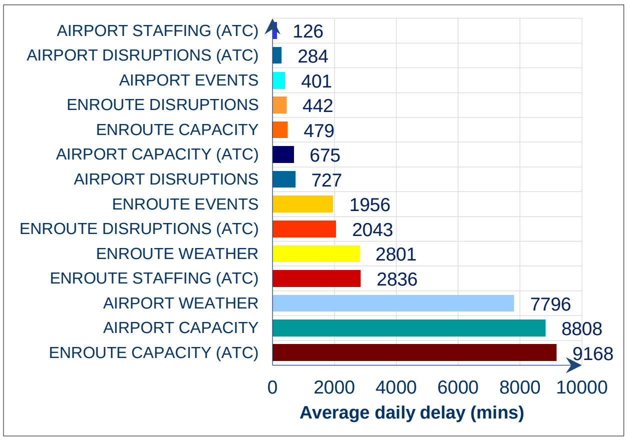
Average daily ATFM delays increased by 39.8% in 2015 compared to 2014. The average daily en-route ATFM delay increased by 21.6% and the average daily airport ATFM delay increased by 66%.



	2011	2012	2013	2014	2015
EN-ROUTE	1.14	0.63	0.53	0.61	0.73
AIRPORT	0.67	0.48	0.39	0.42	0.69
ATFM DELAYS	1.81	1.11	0.92	1.03	1.42
AVG TRAFFIC	27146	26427	26215	26685	27094

Figure 9: 2015 average daily delay per flight

The average daily ATFM delay per flight was 1.42 minutes, an increase of 37.7%. En-route ATFM delay per flight was 0.73 minutes, an increase of 19.7%; and airport ATFM delay per flight was 0.69 minutes, an increase of 63.4%.



En-route ATC capacity (23.8%), airport capacity (22.9%) and airport weather (20.2%) were the main reasons for ATFM delay in 2015.

Figure 10: ATFM delays in 2015

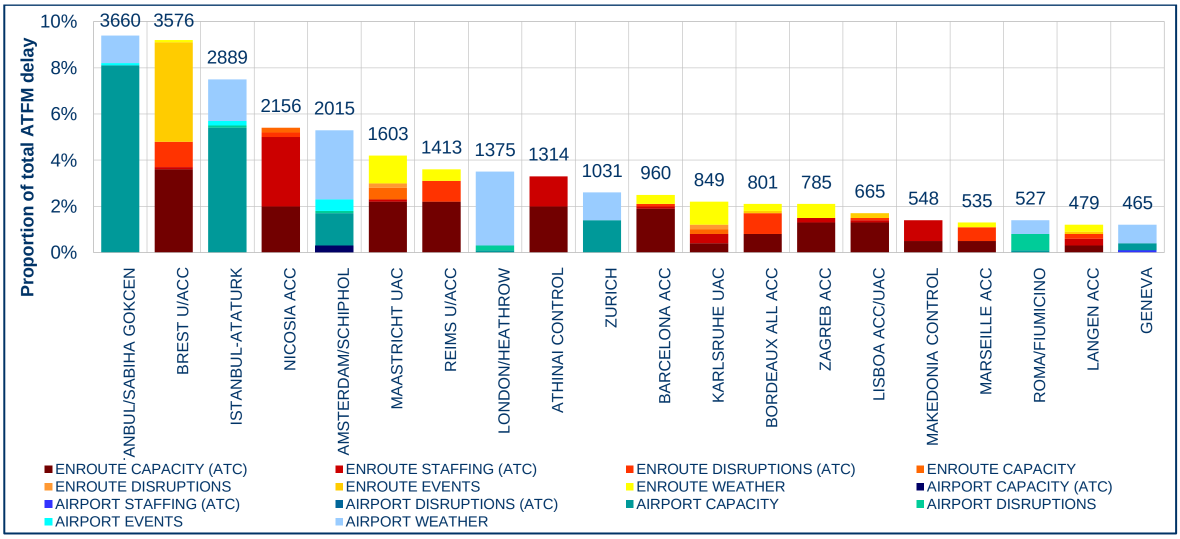


Figure 11: Top 20 locations for ATFM delays during 2015

The top 20 delay locations generated 71.1% of all ATFM delays in 2015.

ATFM delays generated by Istanbul/Sabiha Gökcen and Istanbul/Ataturk airports contributed 17% of the average daily ATFM delay in 2015. Both airports suffered from chronic airport capacity and weather issues with technical and airport related events generating additional delay.

Brest ACC generated 9.3% of the average daily ATFM delay in 2015, mainly due to the training and stepped implementation of ERATO ATM system, en-route ATC capacity issues and en-route ATC disruptions (industrial action).

In addition to Brest ACC, en-route ATC capacity and staffing issues affected mainly Nicosia, Maastricht, Reims, Athens, Barcelona, Zagreb, Lisbon and Makedonia ACCs.

Istanbul/Sabiha Gökcen, Istanbul/Ataturk, Amsterdam/Schiphol, London/Heathrow, Zurich, Rome/Fiumicino and Geneva airports, and Maastricht, Reims, Barcelona, Karlsruhe, Bordeaux, Zagreb and Marseille ACCs were all affected by weather.

ATC industrial action in April and October generated en-route ATC disruption delays in all of the French ACCs, with additional en-route ATFM delays in Maastricht, Karlsruhe and Madrid ACCs due to ATFM protective measures. ATC industrial action in Spain generated some ATFM delays in Barcelona ACC.

The Trident Juncture military exercise in October 2015 had a much lower impact on operations than expected, but generated en-route ATFM delays mainly at Lisbon ACC and, to a lesser extent, Brest and Bordeaux ACCs. This better performance came as a result of the overall coordination ensured by the Network Manager. Exercise Frisian Flag generated ATFM delays at Maastricht and Karlsruhe ACCs. Airspace restrictions due to concurrent military activity and associated airspace restrictions introduced traffic complexity and ATFM regulations to Nicosia ACC. See Planned Events and Disruptions for more information.

There were new ATM system implementation and upgrades in Brest ACC (ERATO Electronic Environment training and implementation), Barcelona, Madrid, Zurich, Vienna APP, Langen, Palma and Geneva ACCs, with significant delays being generated by Brest ACC. See Planned Events for more information.

ATM system implementation/improvements were implemented at Istanbul/Sabiha Gökcen, Amsterdam/Schiphol (trial and implementation of new Voice Communication System (VCS)), Zurich (Priority Departure (PRIDEP) trial) and Istanbul/Ataturk airports with significant delays being generated by some of the projects. See Airports for more information.

A fire in Terminal 3 at Rome/Fiumicino airport during the night of 6-7 May impacted operations with a 20% airport capacity reduction applied for the remainder of May with Airspace Users requested to make a flight reduction on all inter-European flights between end of May and mid-July. See Airports for more information.

Technical issues generated delays in Brest (frequency problems), Nicosia (system), Reims (OLDI/frequency problems), Barcelona (frequency problems) and Lisbon (radar maintenance, frequency problems) ACCs. See Disruptions for more information.

Technical issues generated delays at Istanbul/Sabiha Gökcen (communications, FDPS failure) and Amsterdam/Schiphol (voice communication and Online Data Interchange (OLDI) issues. See Airports for more information.

3.4.2.1 EN-ROUTE ATFM DELAYS

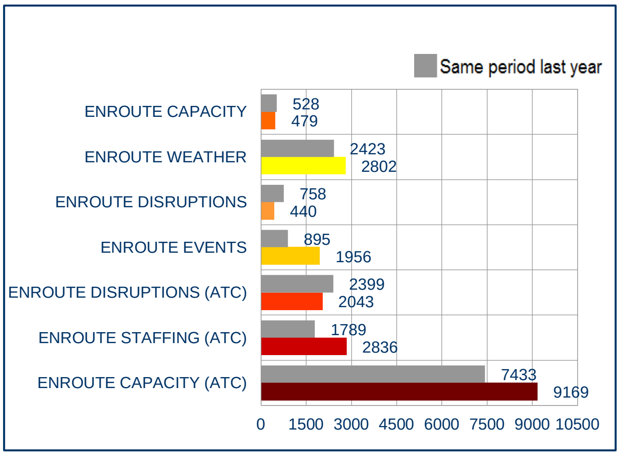


Figure 12:2015 average daily en-route delays

The 21% increase in the average daily en-route ATFM delays was mainly due to an increase in delays due to en-route ATC capacity (+23.3%), en-route ATC staffing (+58.5%), en-route weather (+15.6%) and en-route events (+118.6%).

On a positive note, fewer industrial actions and technical disruptions in 2015 resulted in decreased en-route delays due to ATC disruptions (industrial action, -14.8%), en-route disruptions (technical issues, ATFM protective measures due to industrial action, -41.9%) and en-route capacity (military activity, -9.3%).

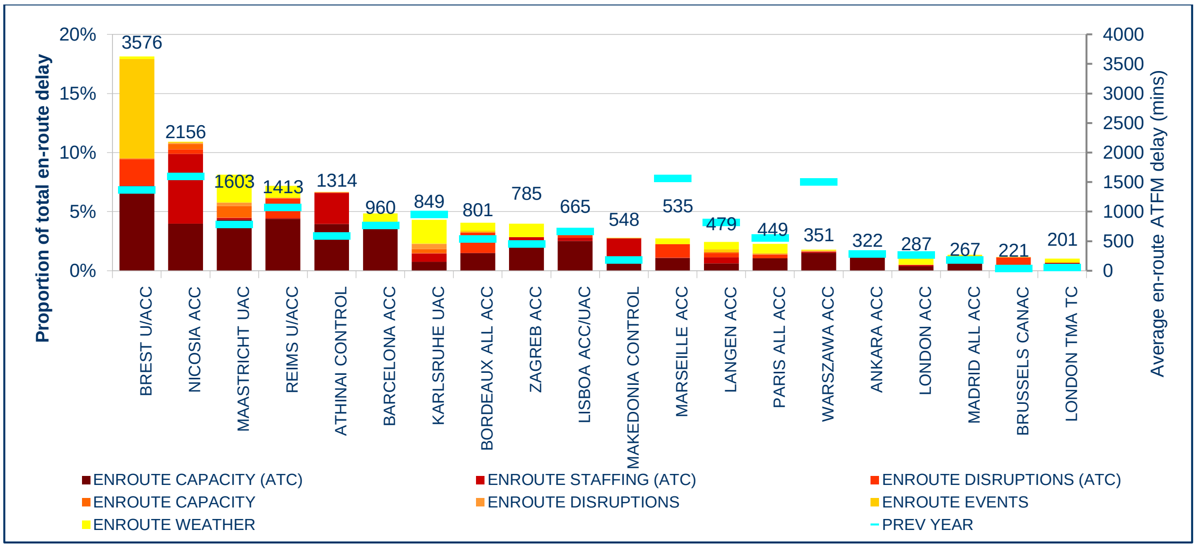


Figure 13: Top 20 en-route ATFM delay locations during 2015

Figure 13 shows the top 20 en-route delay generating locations for 2015 with respect to total ATFM delays. Figures are in minutes and they represent the average daily delays for the individual locations.

The top twenty delay locations generated 90.2% of en-route ATFM delay in 2015. The top five locations (Brest, Nicosia, Maastricht, Reims and Athens ACCs) generated 51% of all en-delay.

All five of the top ACCs had increased (average daily) en-route ATFM delay in 2015: Brest ACC (+163%), Athens (+126%), Maastricht (+108%), Nicosia ACC (+35.3%) and Reims (+33.1%).

Lisbon and London ACC maintained the same average daily en-route ATFM delay as 2014.

Figure 14 shows that two ACCs (Nicosia and Brest) had delays of more than 1 minute per flight, and a further five ACCs (Athens, Zagreb, Reims, Lisbon and Makedonia) recorded delays of between 0.5 and 1 minute per flight.

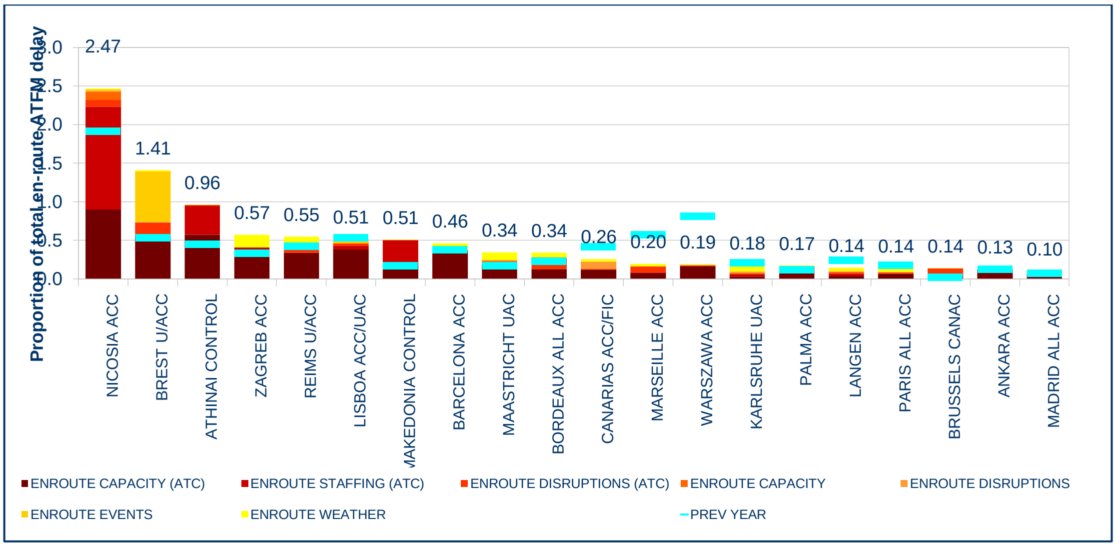


Figure 14: Top 20 en-route ATFM delay per flight locations during 2015

All the top five ACCs for the en-route delay locations had increased average en-route ATFM delay per flight in 2015.

Canaries, Marseille, Warsaw, Karlsruhe, Langen and Paris ACCs reduced the average delay per flight compared to 2014.

Of the top five delay locations, the largest increases were in Brest and Athens ACCs, followed by Zagreb, Reims and Nicosia ACCs.

En-route ATC capacity (46%) and staffing (30%) were the main reasons of en-route delay per flight for the top five ACCs.

En-route ATC capacity delays generated in excess of 50% of the average delay per flight in three of the top five ACCs (Athens (0.57 minutes/flight), Zagreb (0.36 minutes/flight) and Reims (0.34 minutes/flight), and in excess of 30% in the remaining two ACCs (Nicosia (0.9 minutes/flight) and Brest (0.54 minutes/flight).

Delays due to en-route ATC staffing generated an average of 1.33 minutes/flight in Nicosia ACC and 0.38 minutes/flight in Athens ACC.

Ankara ACC maintained the same delay per flight as 2014.

An overview and information on individual ACCs can be found in En-Route Performance Analysis and in Annex II.

3.4.2.2 AIRPORT/TMA ATFM DELAYS

Airport capacity and weather contributed 88.2% of the total airport/TMA delays in 2015. Airport capacity issues at some airports were the main reason of delays. The main contributors to the increase of the airport capacity delays were Istanbul/Sabiha Gökcen and Istanbul/Ataturk airports whose delays increased significantly compared to 2014. The average daily airport ATFM delay due to airport capacity increased from 2,879 minutes in 2014 to 8,808 minutes in 2015.

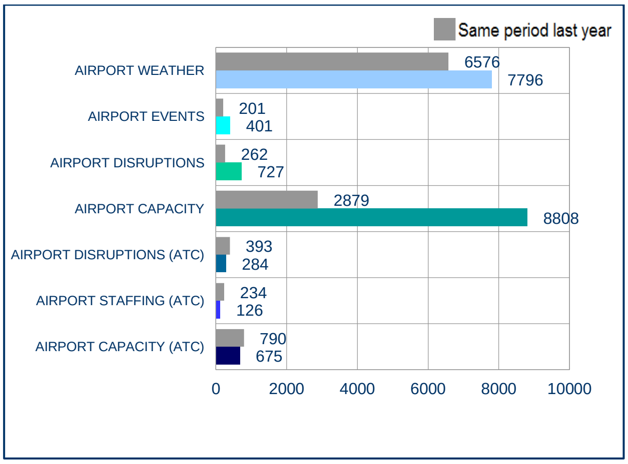


Figure 15: 2015 average daily airport/TMA delays

There was increased ATFM delays due to airport capacity (+205%), airport weather (+18.6%) as well as airport disruptions and airport events.

On a positive note, ATFM delays due to airport ATC capacity, airport ATC staffing and airport disruptions decreased.

Figure 16 shows the top 20 airport delay generating locations for 2015 with respect to total ATFM delays. Figures are the average daily delays in minutes for the individual locations.

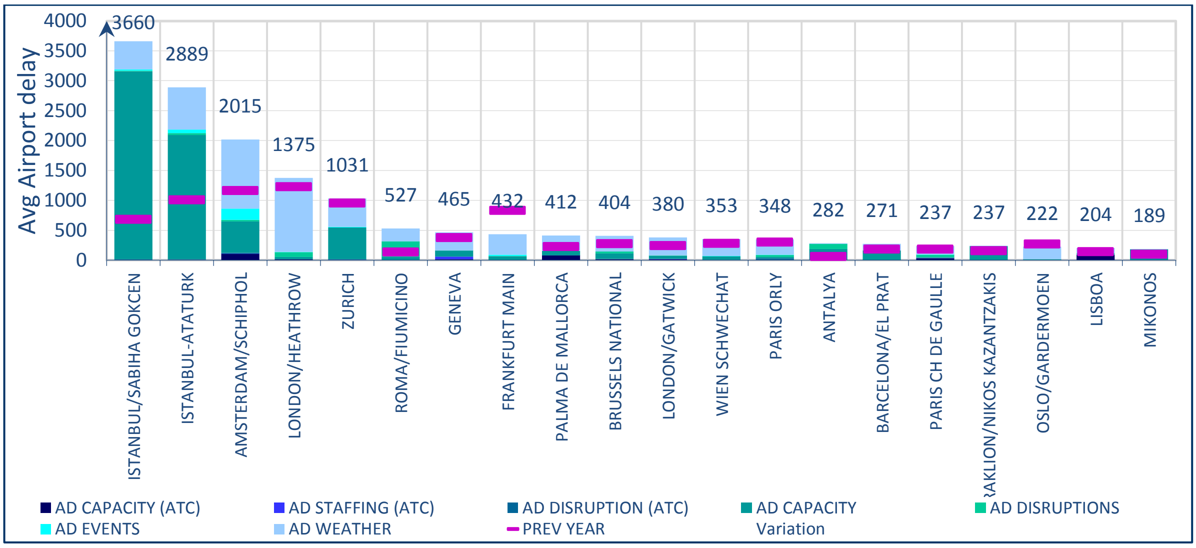


Figure 16: Top 20 Airport delay locations during 2015

The top twenty locations generated 41% of all ATFM delay in 2015.

Eight airports in the top twenty had reduced (average daily) airport ATFM delay.

Seven airports in the top twenty increased the average daily airport ATFM delay.

Istanbul/Ataturk, Amsterdam/Schiphol, London/Heathrow, Rome/Fiumicino and Brussels/National airports had ATFM delays due to airport disruptions.

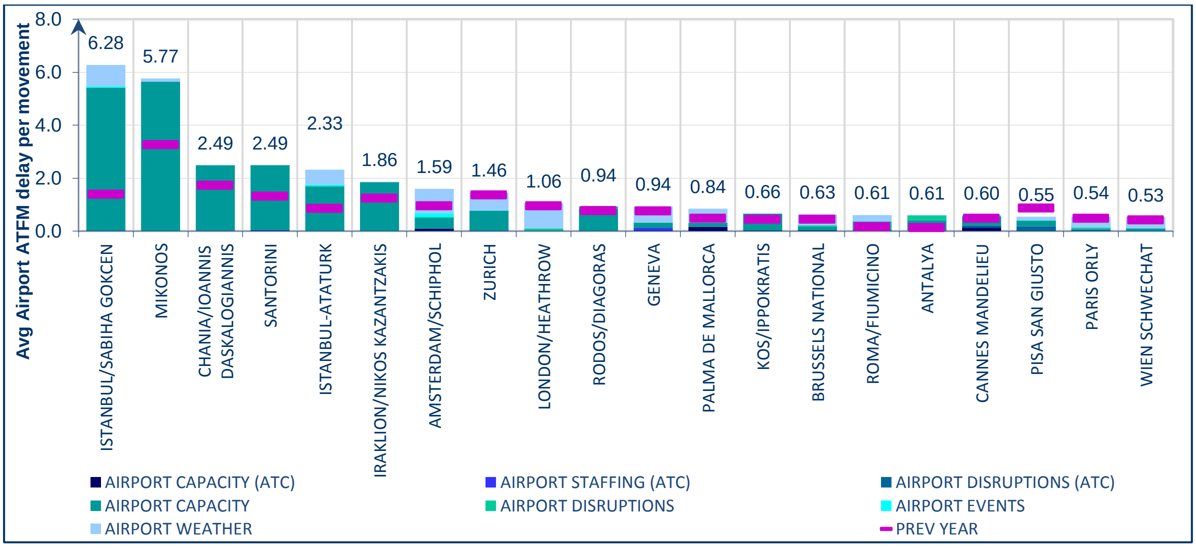


Figure 17: Top 20 airport/TMA ATFM delay per flight locations during 2015

Istanbul/Sabiha Gökcen and Mikonos airports had ATFM delays per flight of more than 5 minutes per flight, and Chania, Santorini and Istanbul/Ataturk airports had ATFM delays of more than 2 minutes per flight in 2015.

None of the top five airports managed to reduce the average airport ATFM delay per flight in 2015 compared to 2014.

There were significant increases airport ATFM delay per flight at Istanbul/Sabiha Gökcen, Istanbul/Ataturk, Santorini, Mikonos, Antalya, Rome/Fiumicino and Palme de Mallorca airports.

During 2015 NM continuously provided support and recommendations to major airports facing local capacity challenges and/or high delay levels. NM gave special attention to some regions and airports. NM focussed especially on continuous implementation of the Greek Islands Action Plan (See Greek Islands – Summer 2015).

Istanbul/Sabiha Gökcen and Istanbul/Ataturk experienced high traffic growth in 2015 (See Airports for more information). As high traffic growth was recorded at several airports in Turkey, NM is identifying actions to mitigate delays in collaboration with local stakeholders. A-CDM deployment at Istanbul/Ataturk is progressing. High-level discussions have secured agreement to improve day-to-day cooperation as well as to initiate Network related planning for both the new runway at Istanbul/Sabiha Gökcen and the new Istanbul airport.

Zurich airport maintained the same delay per flight as 2014.

An overview and information on individual airports can be found in Airports and in Annex III.

3.5 FLIGHT EFFICIENCY

A number of events in 2015 affected the network and had direct consequences on the flight efficiency evolution:

- Overall crisis situation in Ukraine that led a significant number of flights to avoid the entire Ukrainian airspace moving to neighbouring countries (Turkey, Bulgaria, Romania, Poland, Slovakia, etc.); as a result of the Ukrainian crisis adjacent ACCs/ UACs were on-loaded by Far Eastern traffic avoiding the Ukraine airspace leading to increased route extensions.
- Closure of Libyan airspace for over flights due to the security situation required procedures with impact on flight efficiency for traffic between Europe and Africa re-routed via Egypt and Tunisia (while traffic to/from Tunisia remained suppressed since the terrorist attack on 26 June 2015.)
- Avoidance of Syrian and Iraqi airspace due to the security situation impacting flight efficiency for traffic between Europe and Middle East and Asia re-routed via Iran and Turkey, with additional impacts on the flows from the Ukrainian crisis situation.
- Capacity and staffing issues in Nicosia ACC required regulations with impact on flight planning route extension.
- Implementation of ERATO system in Brest ACC.

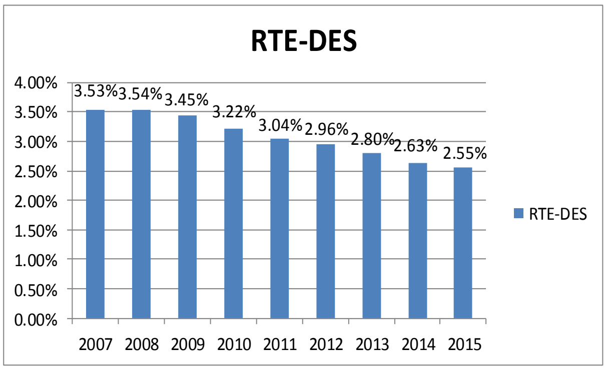


Figure 18: average route extension due to airspace design

The average route extension due to airspace design decreased from 2.63% in 2014 to 2.55% in 2015, meeting the annual target of 0.06 percentage points reduction. It reached a historically low level in December 2015 and allowed potential average savings of nearly 10,638 nautical miles per day.

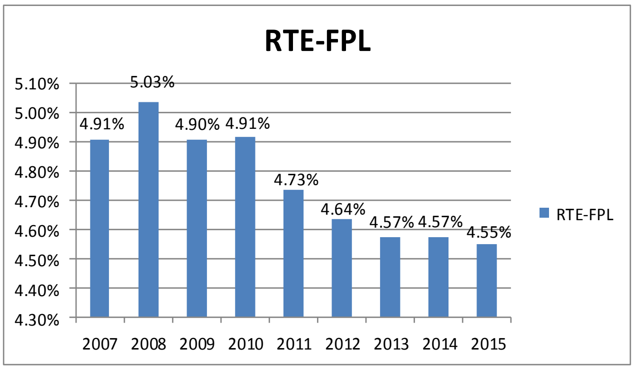


Figure 19: average route extension based on last filed flight plan

The average route extension based on the last filed flight plan decreased from 4.57% in 2014 to 4.55% in 2015. The annual target of 4.51% was missed by 0.04%. Nevertheless, as a result of theh airspace improvements made and better flight planning, savings of approximately 3413 nautical miles per day have been achieved. The lowest level ever was reached in December 2014 with 4.43%.

The 2015 route extension performance target was missed mainly due to the capacity shortfalls during the ATC strikes or airspace avoidance/closure due to crisis situations.

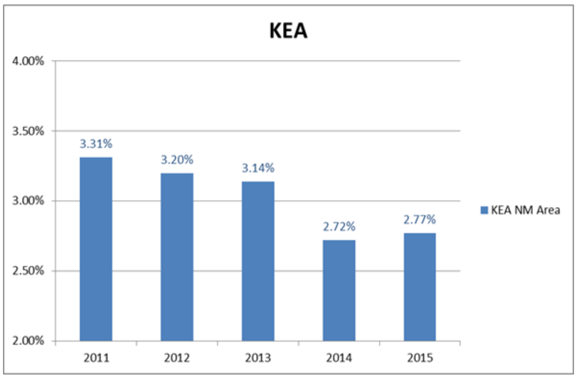


Figure 20: average route extension based on actual trajectory

The actual trajectory (KEA) targets have been met, showing that the European airspace structure offers appropriate capabilities. The Free-Route Airspace (FRA) was the major contribution towards achieving the KEA indicator.

4 TRAFFIC IN DETAIL

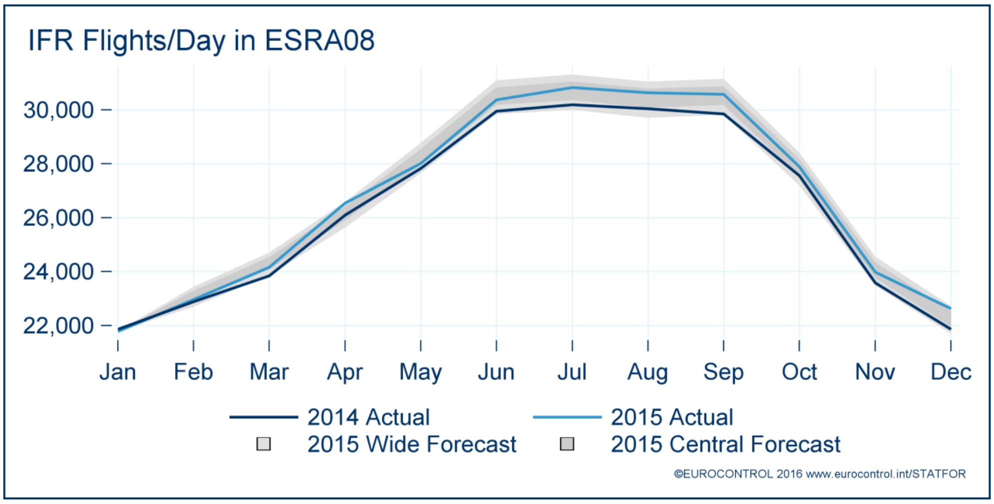


Figure 21: IFR Flights per day in ESRA08

In 2015, major European carriers managed to reduce their losses and even achieve a collective increase in operating profits compared to the same period in 2014[iii]. NM understands that nearly all major carriers showed robust passenger growth in 2015 and they benefited from lower fuel prices, even if this was limited by the strength of the US dollar.

The overall European traffic growth was limited at the start of 2015 compared to other months due to: economic recession in Nordic States, continuation of the crisis in Ukraine and industrial actions. This resulted in limited traffic growth in the first months of the year.

After the start of summer schedules, sustained growth was observed: July, August and September were, with more than 30,700 flights per day on average, the busiest on record.

With the start of the winter schedules, traffic growth reverted back to lower growth rates, between 1% and 2%, in line with the forecast published in September 2015. December traffic hit a 2015 record of 3.5% owing to sustained rates during the year-end holiday period and an artificial rebound caused by industrial action in December 2014 (Figure 22).

2015 IFR flight traffic was in line with the forecast published in February 2015.

4.1 NETWORK CONTRIBUTORS

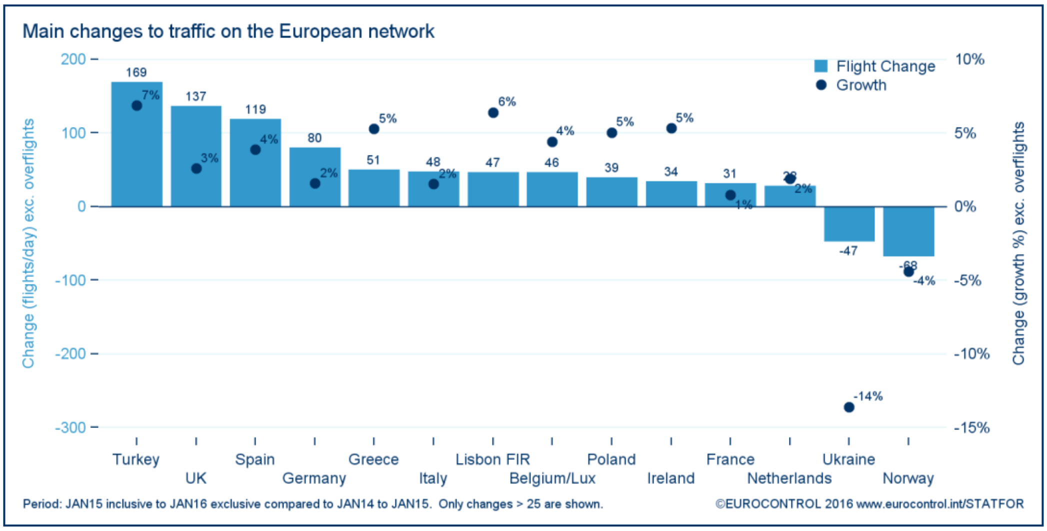


Figure 22: Main changes to traffic on the European Network

Figure 22 shows the main contributors to the network[iv] traffic growth for 2015. Turkey added some 170 daily flights and remained the main contributor to traffic growth, followed by the United Kingdom (+140 flights per day). In terms of percentage increases, Spain (+4%) and Greece (+5%) also witnessed traffic rises. Germany added 80 flights per day (excluding overflights).

Norway, hit by the oil crisis, saw fewer local flights since the beginning of the year, due to the weakness in its internal traffic and other arrival/departure major flows, amounting to a loss of around 70 daily flights from the European network. Ukraine also lost 50 local flights a day, mainly due to the continuation of the crisis that began in 2014.

4.2 ROUTING ASPECTS

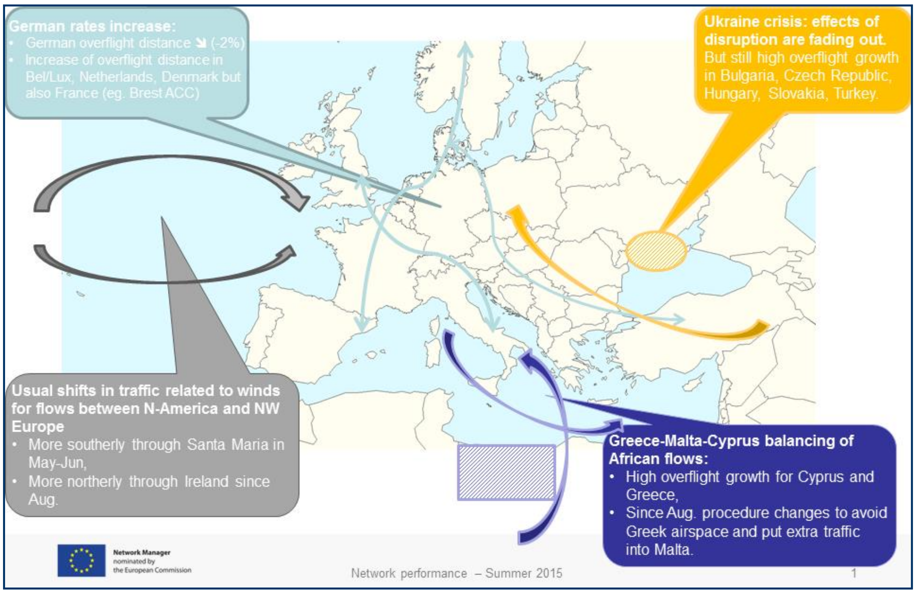


Figure 23: Several events affected overflight traffic in the summer[v] 2015

Given the continued crisis, overflights in Ukraine decreased by a further 64% compared to 2014. As a result, central and South East European States (for example, Bulgaria, Czech Republic, Hungary, Romania, Slovakia and Turkey) continued to see increases in overflights as the flows between Europe and the Middle East/Far East Asia were re-routed in a more southerly direction. While these new routings stabilised over the past year, Ukraine recorded further decreases in overflights from November 2015 following a mutual ban on flights between Russia and Ukraine, and the Ukrainian ban on overflights by Russian registered carriers.

The closure of Libyan airspace in 2014 continued to have a strong impact on Greece as the flows between Europe and Africa, which had previously crossed Maltese airspace, shifted eastwards into Greece. From August onwards some procedural changes aimed at re-balancing the flows between Malta and Greece, especially on west-east flows, took effect. Between July and September, Cyprus recorded strong increases in overflight growth, which were mainly explained by some traffic increase in flows from/to Israel (up to 25% in some cases).

In 2015 growth in overflight movements was relatively weak in Germany (below 2%) compared to the busiest north-west European States. The Netherlands recorded an increase in overflights of almost 5%. Germany recorded no change in the overflight distance flown in 2015 compared with 2014 while its neighbours to the west recorded positive changes in 2015. The unit rate increase in Germany was part of the reason behind this. Many flights avoided Germany or, if this was not possible, minimised their distance flown over the State.

4.3 EXTRA-EUROPEAN PARTNERS

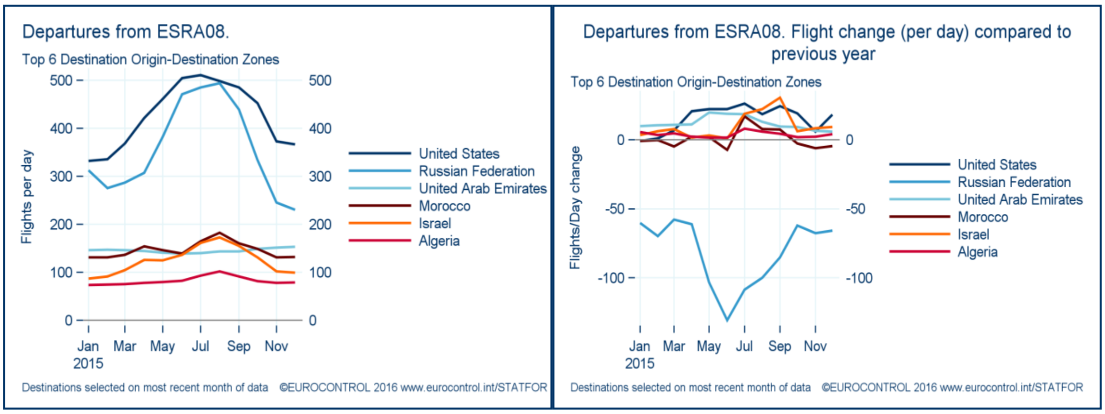


Figure 24: Daily Flight Change in 2015

In 2015, the United States overtook Russia as the non-European destination adding the most flights. There was a 19% (on average) drop in 2015 in flights from/to Russia (caused by the Russian financial crisis that started in 2014). This also led to a reduction in European overflights (notably on flows between Egypt and Russia).

Traffic flows from Europe to Tunisia recorded a substantial decline since the beginning of 2015 (a 22% drop on average compared with 2014) following terrorist attacks. It is now thirteenth rank (hence not shown in Figure 24).

4.4 AIRLINE INDUSTRY

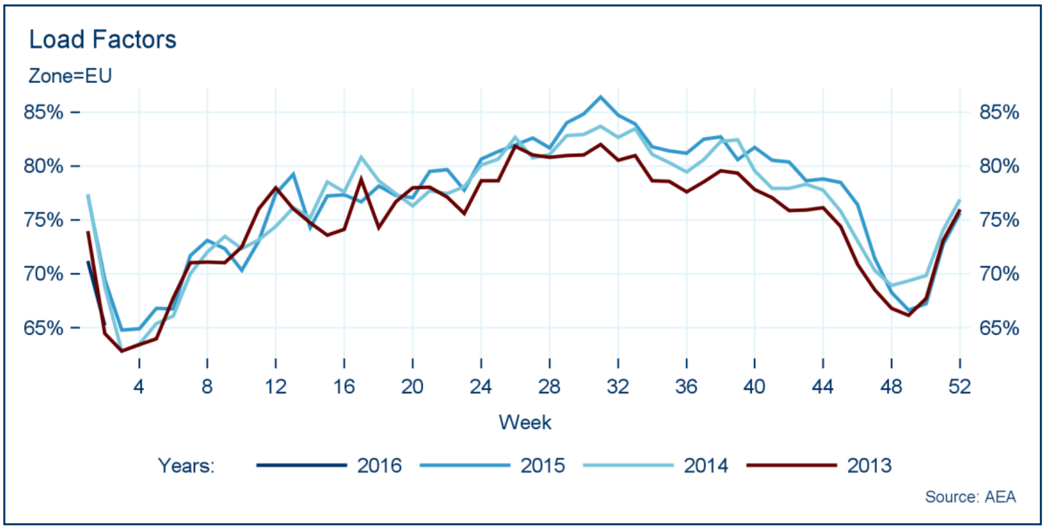


Figure 25: 2015 European load factors (Source: AEA)

In 2015, the load factors of European carriers remained in line with the 2014 (record-breaking) ones on Europe cross-border flows (see Figure 25), with a noticeable improvement on 2014 between weeks 28 and 40 (July to October). The drop around week 48 is a consequence of the November terrorist attacks in Paris. While passenger growth dipped at the end of the year in France, there was no noticeable drop in flight growth.

Figure 26 shows the traffic development per market segment. Over the January to December 2015 period, the low-cost segment maintained its dominant growth position with a rate of 5.2%. The traditional scheduled segment followed with a steady 1% growth in 2015.

Part of the low-cost segment's growth relates to the fact that some traditional carriers, as part of restructuring, have switched their short-haul business to low-cost carriers. On the growth side, the all-cargo segment posted just below 1% growth, for the second year in a row.

Business aviation recorded a decrease of 2.6%. Charter (non-scheduled) was the weakest market segment, with a fall of nearly 9% compared with last year. This was mainly due to a decline in traffic to/from Russia and Tunisia. In addition, the charter segment decrease was due to a number of aircraft operators moving to a more scheduled operation in 2015, compared with 2014.

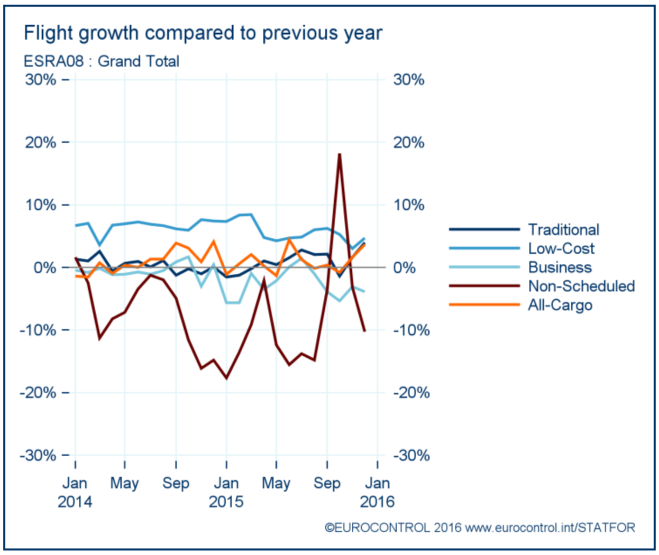


Figure 26: traffic development per market segment.

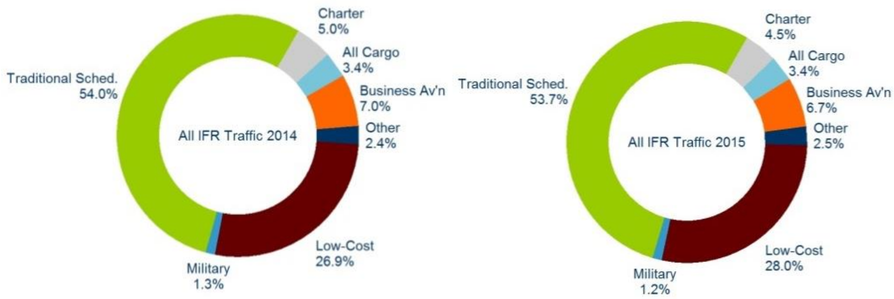


Figure 27: Market shares in 2015.

In 2015 low-cost grew their market share at the expense of traditional scheduled and charter segments (see Figure 27).

As Figure 28 shows, oil prices fell below €40 per barrel in December; levels not seen since the end of 2008 after the latest oil crisis. Overall, prices averaged out just below €50 in 2015. Fuel prices have consequently been low, with an average of €465 per tonne in 2015.

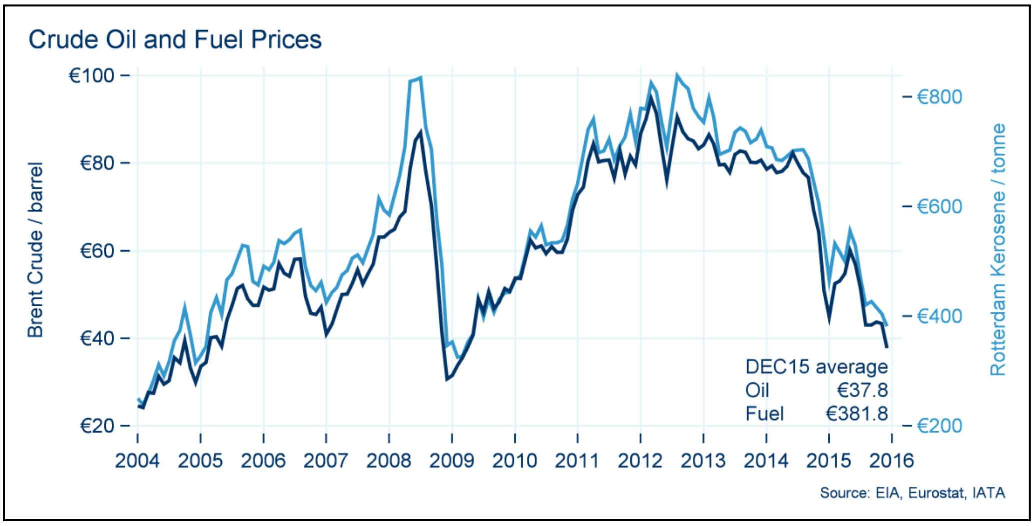


Figure 28: Crude Oil and Fuel Prices

In spite of falling fuel costs, airline ticket price growth in Europe seems to have accelerated since the beginning of 2015 (Figure 29). Ticket price inflation has stood at an average level of 1.2% in 2015. The trough in April 2015 was driven by Easter.

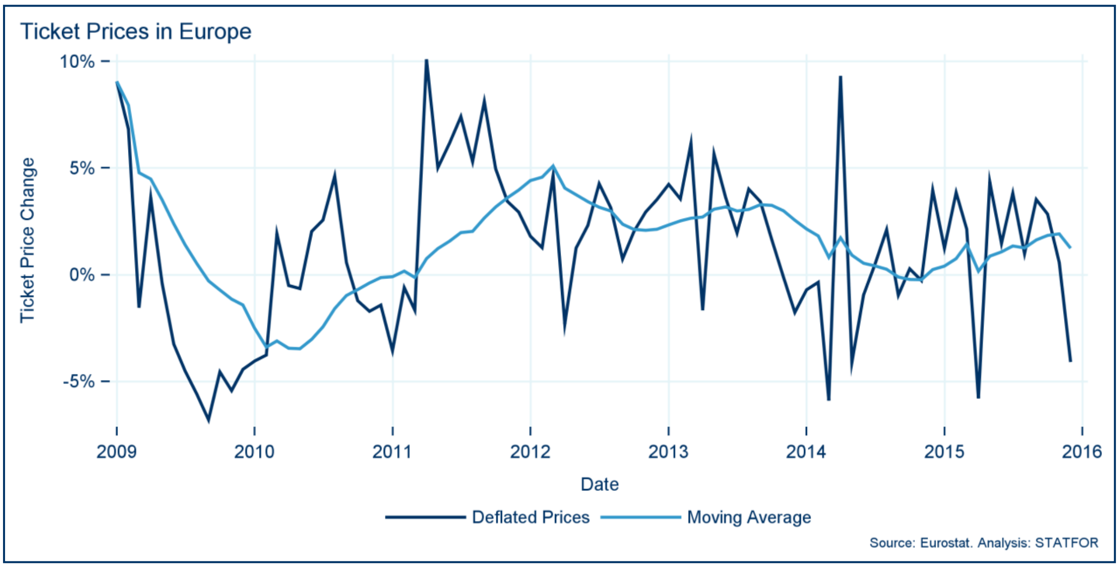


Figure 29: Ticket Price Changes in 2015

In 2015, the trend in ticket price changes (air travel) in Europe increased to nearly 2% more than the year before, on a 12-month trailing average (Figure 29[vi]).

4.5 FLIGHT REDUCTIONS IN 2015

This section uses data supplied by airports as per Annex V of EC Regulation N° 390/2013. These preliminary results are based on operational cancellation data supplied by 30 of the 50 European coordinated airports reporting to CODA under EC Regulation N° 390/2013[vii].

Like delays, operational cancellations provide an insight into the impact of network events and associated disruption; e.g. industrial action or extreme weather events.

At the beginning of 2015 winter weather affected operations at Amsterdam/Schiphol, Istanbul, London/Heathrow, Geneva and Oslo airports. There was heavy snowfall and disruption at Istanbul on the 18, 19 and 20 February. There was also industrial action by Lufthansa in March as well as two Italian industrial actions in February and March. A French industrial action from 8 until 10 April caused the cancellation of approximately 3,000 flights. There was also a pilot strike at TAP Air Portugal in May. Industrial action by cabin crew at Lufthansa (between 6 and 13 November) affected Frankfurt, Hamburg, Munich and Dusseldorf airports. Lufthansa Group press release reported that 4,700 flights were cancelled[viii].

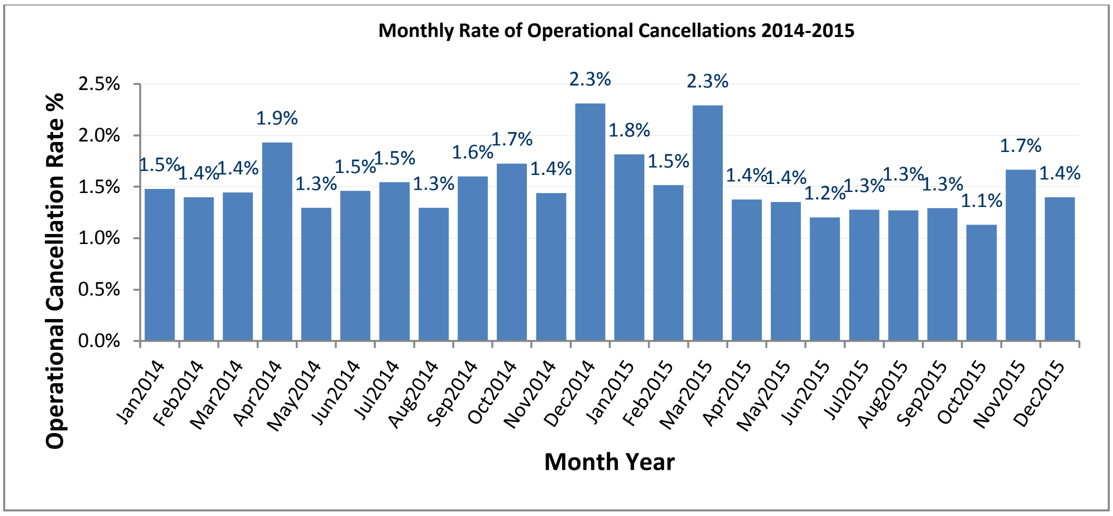


Figure 30: Monthly Rate of Operational Cancellations 2014-2015.

Date	Location	Event	Impact
28 February – 8 March	Norway	Industrial action at Norwegian Air Shuttle	110 flights per day did not operate[ix].
18, 19 and 21 March	Germany	Industrial action by Lufthansa pilots	855 flights did not operate[ix].
1-10 May	Portugal	Industrial action by TAP/Air Portugal pilots	Approximately 1,000 flight did not operate[ix]
6-13 November	Germany	Industrial action by the Independent Flight Attendant's Organization (UFO)	4,700 flights cancelled[viii]

Table 1: Flight Reductions in 2015.

5 EN-ROUTE PERFORMANCE ANALYSIS

5.1 PLANNED EVENTS AND DISRUPTIONS

En-route ATFM delays due to planned events (system upgrades/transition projects increased in 2015 when compared to 2014, but delays due to disruptions decreased (see En-Route ATFM Delays for further information). An overview appears below.

5.1.1 EN-ROUTE PLANNED EVENTS

There were a number of system upgrade/transition projects that imposed capacity reductions in several ACCs[x]:

Major Projects / Special Events	January - March	April - June	July -September	October - December
Austria - APPs				
COOPANS implementation				■
France - Bordeaux ACC				
Training for ERATO system upgrade	■	■		
France - Brest ACC				
Training for ERATO system upgrade	■	■		■
Implementation of ERATO system upgrade				■
Germany - Langen ACC				
Implementation of PSS system EBG06	■			
New system, P2 (Nov '15 - Jan '16)				■
Germany - Munich ACC				
Implementation of PSS system EBG APP	■	■		
Spain - Barcelona ACC				
Final step of SACTA CF2 ATM system (implementation)	■	■		■
Spain - Madrid ACC				
Final step of SACTA CF2 ATM system (implementation)	■			
Spain - Palma ACC				
Final step of SACTA CF2 ATM system (implementation)				■
Switzerland - Geneva ACC				
Stripless system CH step 4				■
Switzerland - Zurich ACC				
ATM system (stripless CH step 3)	■			
Ukraine - L'viv ACC				
New ATM system (transition to)	■	■	■	■

Table 2: System Upgrade/Transition Projects

5.1.2 EN-ROUTE DISRUPTIONS

A number of unplanned events[xi] (disruptions) imposed capacity reductions in certain ACCs:

Date	Location	Event	Traffic Impact	ATFM Delay Impact
16 January	Italy	ATC industrial action.	Not known.	Airport - 6,009 minutes. En-route - 423 minutes.
17 February	Italy	ATC industrial action.	150 flights[ix]	Airport - 3,003 minutes. En-route - 523 minutes.
20 March	Italy	ATC industrial action.	Not known.	Airport - 4,489 minutes. Minimal en-route impact.
8-10 April	France	ATC industrial action. ATFM protective measures applied in Maastricht, Karlsruhe and Madrid ACCs.	3,400 flights[ix]	French ACCs - 391,000 minutes[ix]. Maastricht, Karlsruhe and Madrid ACCs - 51,715 minutes.
15 May	Rome ACC	Radar failure.	Not known.	13,695 minutes.
27 May	Brussels ACC	En-route and airport capacity reduction due to electrical power failure at Belgocontrol.	850 fewer flights[ix] in Brussels ACC airspace than expected. Capacity reduction remained in effect until 31 May.	Power failure - 20,973 minutes, with 54,647 minutes of additional delay generated until the end of May.
22-25 June	Lisbon ACC	Frequency problems.	None	11,253 minutes.
29-30 June	Reims ACC	On-line Data Interchange (OLDI)/radio problems.	None	4,786 minutes
1, 9, 18 July	Reims ACC	On-line Data Interchange (OLDI) problems on 1 July and frequency/radar problems on 9 and 18 July.	None	6,136 minutes.
11/12, 25/26 July	Spain	ATC Industrial action.	Not known.	Barcelona ACC - 7,084 minutes. Canarias ACC - 1,432 minutes
9, 14 July	Paris ACC	Bastille Day rehearsal and celebrations.		9 July - 2,857 minutes. 14 July - 4,105 minutes.
15 July	Bucharest ACC	ATC industrial action. ATFM protective measures applied in Belgrade ACC.	Not known.	Bucharest ACC - 3,259 minutes. Belgrade ACC - 3,275 minutes.
1 August	Ankara ACC	ATFM measures due to a reduction in en-route capacity on point ODERO; increase in capacity during course of month resulted in a reduction of ATFM delays.	Not known.	65,000 minutes with an average delay per regulated flight higher than 15 minutes on 19 days during the month.
1 August	Barcelona ACC	Frequency problems.	None	5,547 minutes.
5 August	Athens, Makedonia ACCs	ATC industrial action; additional en-route ATC staffing delays generated during the recovery phase.	Not known.	Athens ACC - industrial action: 4,831 minutes, en-route ATC staffing: 2,197 minutes. Makedonia ACC - industrial action: no en-route ATFM delays, airport ATFM delays: 438 minutes, en-route ATC staffing: 5,716 minutes.
18 August	Brest ACC	Radio problems.	None	1,655 minutes
27/28 August	Lisbon ACC	Radar failure.	None	En-route - 2,264 minutes. Airport - 1,733 minutes.
31 August	Brest ACC	Radar problems.	None	3,049 minutes.
28-31 August	Bucharest ACC	FDPS problems.	Additional complexity introduced for traffic flows through Athens ACC.	15,366 minutes.
26 September	Spain	ATC industrial action.	Not known.	Barcelona ACC - 3,311 minutes. Seville ACC - 875 minutes.

Date	Location	Event	Traffic Impact	ATFM Delay Impact
29 September	Nicosia ACC	TOPSKY ATM system upgrade.	Not known.	14,268 minutes.
2 October	Nicosia ACC	ATC equipment issues.	Coordination between NM and Nicosia ACC allowed the exclusion of departing traffic from certain airports, thereby mitigating the delay.	7,453 minutes.
8 October	France	ATC Industrial action with ATFM measures applied between 1700 UTC on 7 October and 0400 UTC on 9 October. ATFM protective measures applied in Madrid, Maastricht, Karlsruhe, Tunis and Algiers ACCs.	Not known.	French ACCs - approximately 66,800 minutes[ix]. Madrid, Maastricht, Karlsruhe, Tunis and Algiers ACCs - 16,000 minutes. Additional delays at Manchester and London/Gatwick airports due to late departing aircraft creating congestion.
15 October	Munich ACC	FDPS failure.	None	5,195 minutes.
27 October	Prestwick ACC	Frequency interference issues.	None	7,406 minutes.
4/5 November	Stockholm and Malmo ACCs	Radar problems due to solar activity.	None	6,738 minutes.
17 November	Bremen ACC	Flight Data Processing System (FDPS) issues.	None	4,790 minutes
23-27 November	Reims ACC	ATC industrial action.	Not known.	Reims ACC - 65,000 minutes[ix]. Karlsruhe ACC - 1,875 minutes, Maastricht UAC - 3,543 minutes.
18 December	Brussels ACC	Computer problems prevented the switch from night- to day-time sector configuration. Coordination between NM and Amsterdam/Schiphol, Maastricht and London ACCs mitigated delays.	None	4,356 minutes
21 December	Langen ACC, Frankfurt/Main airport	Frequency and telephone problems in Langen ACC with additional delays at Frankfurt/Main airport due to lack of parking stands		Langen ACC - 24,140 minutes, Frankfurt/Main airport - 1,202 minutes.

Table 3: Unplanned Events/Disruptions

5.2 CAPACITY EVOLUTION

The capacity at European level is quantified using the "effective capacity"[ii] indicator of the Performance Review Commission (PRC) that takes into account traffic and delay evolution.

Between 1999 and 2015, flights increased by 23%, the “effective capacity” of the network increased by 59% and the average en-route ATFM delay per flight decreased by 84% (see Figure 31).

In 2015 the effective capacity indicator decreased by 1.0% over the whole European ATM network when compared to 2014. Actual delay for summer 2015 was 0.94 min per flight en-route, which is deterioration over 2014, despite improved NM and ANSP capacity planning and proactive network management.

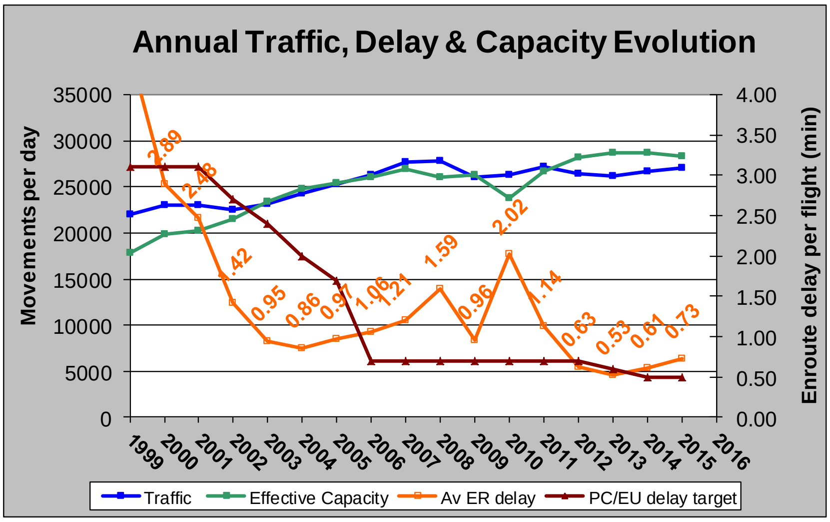
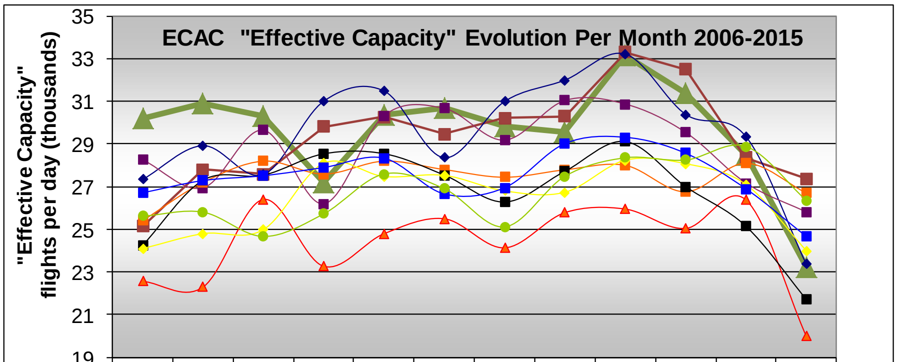


Figure 31: Annual Traffic, delay and capacity evolution.

The "effective capacity" indicator takes into account en-route ATFM delays, for all reasons, including weather, disruptions and significant events: system failures, industrial action, implementation of new ATM systems. Figure 32 shows the monthly evolution of the "effective capacity" of the European ATM system since 2006.



	1	2	3	4	5	6	7	8	9	10	11	12
2015	30	31	30	27	30	31	30	30	33	31	28	23
2014	25	28	28	30	30	29	30	30	33	33	28	27
2013	27	29	28	31	31	28	31	32	33	30	29	23
2012	28	27	30	26	30	31	29	31	31	30	27	26
2011	25	27	28	28	28	28	27	28	28	27	28	27
2010	23	22	26	23	25	25	24	26	26	25	26	20
2009	24	27	28	29	29	28	26	28	29	27	25	22
2008	24	25	25	28	27	28	27	27	28	28	27	24
2007	27	27	28	28	28	27	27	29	29	29	27	25
2006	26	26	25	26	28	27	25	27	28	28	29	26

Figure 32: ECAC 'Effective Capacity' Evolution Per Month (2006-1015).

5.3 ACC

In the European Network Operations Plan 2015 - 2019 there are two delay values for each ACC:

- The required en-route delay/flight performance to achieve annual network delay target in 2015 (0.5 min/flight). Also known as "delay breakdown".
- The forecast delay based on 2015 NOP capacity planning, excluding disruptions such as industrial action and technical failures.

An overview of the ACC performances in 2015 is in Table 4 and shows the traffic growth, capacity and delay for each ACC. The ACCs where the actual delay exceeded the breakdown delay value are highlighted in "amber" in the Actual column.

COUNTRY	ACC	ACC Code	EN-ROUTE DELAY			TRAFFIC			CAPACITY	
			Breakdown[xii]	Forecast[xiii]	Actual[xiv]	Forecast[xv]	Summer	Annual	NOP Plan	Actual
NETWORK	NETWORK	ALL_DNM	0.50	0.74	0.73	1.60%	1.60%	1.50%	2.70%	-1%
ALBANIA	TIRANA ACC	LAAAACC	0.10	0.06	0.00	10.20%	1.87%	1.82%	2.00%	0%
ARMENIA	YEREVAN ACC	UDDDACC	0.01	0.00		-5.60%			suff	0%
AUSTRIA	WIEN ACC	LOVVACC	0.21	0.12	0.09	1.70%	0.49%	1.74%	5.00%	3%
AZERBAIJAN	BAKU ACC	UBBAACC	0.01	0.00		0.50%			suff	0%
BELGIUM	BRUSSELS ACC	EBBUACC	0.05	0.03	0.14	2.10%	4.61%	5.03%	1.00%	2%
BOSNIA	SARAJEVO ACC	LQSBACC							suff	0%
BULGARIA	SOFIA ACC	LBSRACC	0.05	0.05	0.01	9.10%	6.72%	12.32%	5.00%	8%
CROATIA	ZAGREB ACC	LDZOACC	0.26	0.25	0.57	5.60%	-1.63%	0.78%	4.00%	-3%
CYPRUS	NICOSIA ACC	LCCCACC	0.26	1.38	2.47	7.50%	5.01%	4.83%	9.00%	-5%
CZECH REPUBLIC	PRAGUE ACC	LKAAACC	0.09	0.04	0.01	0.40%	7.55%	6.85%	2.00%	8%
DENMARK	COPENHAGEN ACC	EKDKACC	0.08	0.03	0.00	-0.60%	1.34%	1.66%	2.00%	2%
ESTONIA	TALLINN ACC	EETTACC	0.03	0.02	0.01	-0.80%	0.31%	1.65%	suff	0%
EUROCONTROL	MAASTRICHT UAC	EDYYUAC	0.18	0.22	0.34	1.80%	1.12%	1.86%	1.00%	-2%
FINLAND	TAMPERE ACC	EFESACC	0.10	0.03	0.03	-1.30%	-2.70%	-3.05%	suff	0%
FRANCE	BORDEAUX ACC	LFBBALL	0.12	0.22	0.34	2.30%	2.86%	2.96%	0.00%	0%
FRANCE	REIMS ACC	LFEEACC	0.20	0.65	0.55	1.60%	2.38%	2.07%	1.00%	2%
FRANCE	PARIS ACC	LFFFALL	0.13	0.05	0.14	1.40%	4.45%	2.56%	1.00%	3%
FRANCE	MARSEILLE ACC	LFMMACC	0.15	0.25	0.20	1.70%	0.04%	0.48%	2.00%	2%
FRANCE	BREST ACC	LFRRACC	0.11	0.46	1.41	2.60%	-0.19%	-0.81%	0.00%	-5%

COUNTRY	ACC	ACC Code	EN-ROUTE DELAY			TRAFFIC			CAPACITY	
			Breakdown	Forecast	Actual	Forecast	Summer	Annual	NOP Plan	Actual
FYROM	SKOPJE ACC	LWSSACC	0.19	0.07	0.01	8.40%	0.30%	3.13%	5.00%	0%
GEORGIA	TBILISI ACC	UGGGACC	0.01	0.00	0.00	-2.10%	9.05%	6.47%	suff	0%
GERMANY	LANGEN ACC	EDGGALL	0.23	0.22	0.14	0.40%	1.06%	0.81%	-1.00%	2%
GERMANY	MUNCHEN ACC	EDMMACC	0.19	0.05	0.04	0.60%	3.40%	2.71%	0.00%	2%
GERMANY	KARLSRUHE UAC	EDUUUAC	0.26	0.23	0.18	1.70%	1.14%	1.89%	6.00%	3%
GERMANY	BREMEN ACC	EDWWACC	0.06	0.03	0.08	0.20%	1.40%	2.21%	0.00%	0%
GREECE	ATHINAI ACC	LGGGACC	0.20	2.19	0.96	14.20%	3.49%	5.76%	-5.00%	0%
GREECE	MAKEDONIA ACC	LGMDACC	0.16	1.96	0.51	12.20%	2.77%	4.25%	-5.00%	0%
HUNGARY	BUDAPEST ACC	LHCCACC	0.06	0.04	0.03	7.60%	10.12%	11.25%	2.50%	16%
IRELAND	DUBLIN ACC	EIDWACC	0.01	0.01	0.00	3.60%	7.81%	7.78%	3.00%	0%
IRELAND	SHANNON ACC	EISNACC	0.02	0.01	0.00	1.60%	2.28%	3.75%	2.00%	0%
ITALY	BRINDISI ACC	LIBBACC	0.01	0.01	0.00	6.60%	-2.23%	-4.53%	5.00%	5%
ITALY	MILAN ACC	LIMMACC	0.08	0.02	0.00	2.2% (+1%)	2.28%	9.76%	5.00%	2%
ITALY	PADOVA ACC	LIPPACC	0.08	0.06	0.00	3.0% (-5%)	-5.97%	-4.87%	N/A	N/A
ITALY	ROME ACC	LIRRACC	0.04	0.01	0.02	1.4% (+9%)	1.40%	-4.27%	N/A	N/A
LATVIA	RIGA ACC	EVRRACC	0.04	0.01	0.00	-0.90%	0.13%	0.83%	suff	0%
LITHUANIA	VILNIUS ACC	EYVCACC	0.01	0.01	0.00	-1.70%	-1.11%	0.10%	suff	0%
MALTA	MALTA ACC	LMMMACC	0.01	0.01	0.00	-9.50%	5.37%	0.88%	suff	8%
MOLDOVA	CHISINAU ACC	LUUUACC	0.02	0.00	0.00	-10.80%	-11.48%	-20.05%	suff	0%
MOROCCO	CASABLANCA ACC	GMMMACC	*n/a*	*n/a*					n/a[xvi]	
NETHERLANDS	AMSTERDAM ACC	EHAAACC	0.14	0.05	0.10	1.00%	4.32%	4.05%	0.00%	4%
NORWAY	BODO ACC	ENBDACC	0.10	0.01	0.00	-2.30%	0.81%	0.29%	suff	0%
NORWAY	OSLO ACC	ENOSACC	0.13	0.01	0.06	-2.90%	-4.22%	0.49%	suff	-3%
NORWAY	STAVANGER ACC	ENSVACC	0.11	0.01	0.03	-3.80%	-1.54%	-2.26%	10.00%	2%
POLAND	WARSAW ACC	EPWWACC	0.23	0.82	0.19	0.00%	-1.58%	-0.53%	3.00%	5%
PORTUGAL	LISBON ACC	LPPCACC	0.12	0.15	0.51	3.80%	4.37%	5.14%	3.00%	0%
ROMANIA	BUCHAREST ACC	LRBBACC	0.01	0.01	0.03	6.30%	2.33%	6.19%	suff	0%
SERBIA & MONT.	BELGRADE ACC	LYBAACC	0.10	0.02	0.03	7.20%	7.77%	8.73%	1.00%	10%
SLOVAKIA	BRATISLAVA ACC	LZBBACC	0.10	0.10	0.08	3.00%	5.66%	7.04%	3.00%	9%
SLOVENIA	LJUBLJANA ACC	LJLAACC	0.21	0.04	0.00	2.50%	-4.98%	-2.45%	5-15%	0%

COUNTRY	ACC	ACC Code	EN-ROUTE DELAY			TRAFFIC			CAPACITY	
			Breakdown	Forecast	Actual	Forecast	Summer	Annual	NOP Plan	Actual
SPAIN	CANARIAS ACC	GCCCACC	0.28	0.31	0.26	3.60%	-1.35%	-0.94%	1.00%	0%
SPAIN	BARCELONA ACC	LECBACC	0.23	0.39	0.46	4.80%	1.16%	2.10%	3.00%	0%
SPAIN	MADRID ACC	LECMALL	0.14	0.14	0.10	4.10%	4.45%	4.02%	0.00%	3%
SPAIN	PALMA ACC	LECPACC	0.18	0.21	0.17	5.50%	2.42%	3.69%	2.00%	2%
SPAIN	SEVILLA ACC	LECSACC	0.11	0.07	0.04	4.20%	1.71%	0.94%	0.00%	0%
SWEDEN	MALMO ACC	ESMMACC	0.07	0.02	0.00	-0.30%	0.77%	1.15%	2.00%	0%
SWEDEN	STOCKHOLM ACC	ESOSACC	0.07	0.02	0.03	-0.90%	0.47%	-0.09%	2.00%	0%
SWITZERLAND	GENEVA ACC	LSAGACC	0.18	0.10	0.06	0.50%	0.73%	1.35%	1.00%	2%
SWITZERLAND	ZURICH ACC	LSAZACC	0.18	0.09	0.10	0.20%	0.37%	0.97%	2.00%	2%
TURKEY	ANKARA ACC	LTAAACC	0.16	0.07	0.12	4.30%	10.23%	11.84%	N/A	N/A
TURKEY	ISTANBUL ACC	LTBBACC	*n/a*	*n/a*			7.50%	2.73%	N/A	N/A
UKRAINE	KYIV ACC	UKBVACC	0.01	0.00	0.00	-25.10%	-17.82%	-24.60%	suff	0%
UKRAINE	DNIPROPETROVSK ACC	UKDVACC	0.01	0.00	0.00	-45.30%	-75.32%	-81.62%	suff	0%
UKRAINE	SIMFEROPOL ACC	UKFVACC	*n/a*	*n/a*	0.00				N/A	N/A
UKRAINE	L'VIV ACC	UKLVACC	0.01	0.00	0.00	-25.20%	-23.68%	-33.96%	suff	0%
UKRAINE	ODESA ACC	UKOVACC	0.01	0.00	0.00	-12.20%	-12.53%	-14.74%	suff	0%
UNITED KINGDOM	PRESTWICK ACC	EGPXALL	0.12	0.03	0.01	1.50%	1.66%	1.70%	1.00%	0%
UNITED KINGDOM	LONDON ACC	EGTTACC	0.19	0.06	0.06	2.90%	2.28%	2.77%	2.00%	3%
UNITED KINGDOM	LONDON TC	EGTTTC	0.10	0.02	0.06	3.10%	2.14%	3.25%	1.00%	0%

Table 4: overview of the ACC performances in 2015

The performance of Athens, Makedonia and Warsaw ACCs was better than foreseen in the NOP 2015-2019. The Greek ACCs' performance was better than expected due to the availability of more sectors than forecast. Short-term measures such as restricting summer leave helped the situation, but an increase in controller numbers is required.

The performance of some other ACCs did not match the capacity plan and these are discussed below.

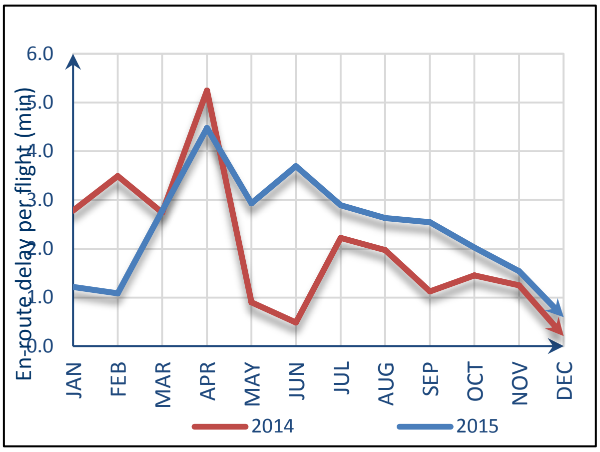


Figure 33: Monthly En-route delay per flight in Nicosia ACC

There were 4.8% more flights in Nicosia ACC in 2015. This included traffic avoiding Ukrainian airspace and other disruptions (Syria, Libya). There was 127% more ATFM delay in summer. Sector productivity is low relative to other areas and Nicosia ACC did not deliver the sectors declared in the NOP.

The availability of an incentive scheme from 1 July did not have the same impact as in 2014. NM continued to work with Cypriot authorities on the ANSP restructuring that should resolve many of the current issues, e.g. restricted rostering.

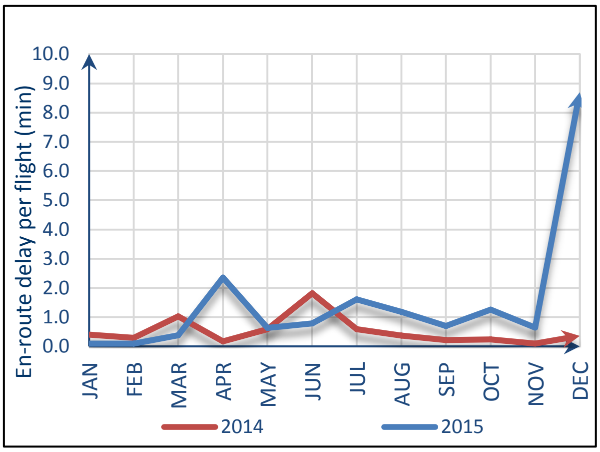


Figure 34: Monthly En-route delay per flight in Brest ACC

There were 0.8% fewer flights in Brest ACC in 2015.

During summer, Brest ACC did not deliver sectors as declared in the NOP, particular either side of the 0800-1200 period where delays were notably high. There was no warning of this change to plan. Higher than expected capacity reductions for ERATO implementation in November-December led to high ATFM delays; there were fewer flights (down 11%) as traffic avoided Brest airspace.

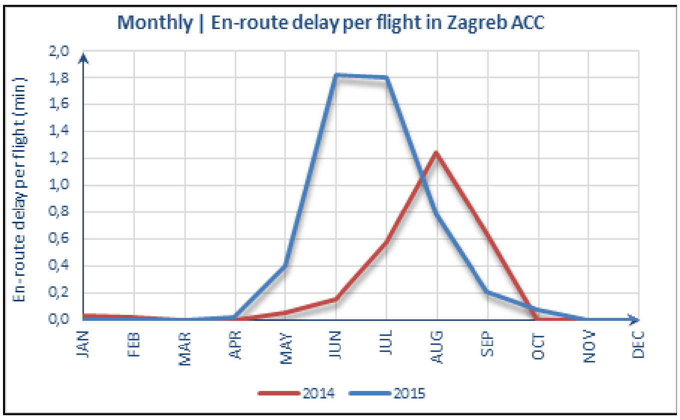


Figure 35: Monthly En-route delay per flight in Zagreb ACC

There were 0.8% more flights in Zagreb ACC in 2015. Zagreb ACC's performance was not as good as expected, and the level of delay too high to meet the network target. The availability of capacity at specific periods was the root cause of ATFM delays; Zagreb faced social issues/contract negotiations during June/July.

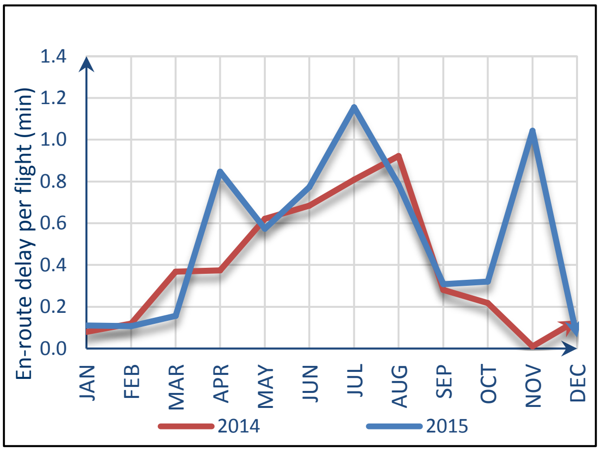


Figure 36: Monthly En-route delay per flight in Reims ACC

There were 2.1% more flights in Reims ACC in 2015. There was 13.7% more ATFM delay in summer and further delay due to industrial action in April and November. Reims ACC provided slightly more sectors than 2014 particularly at the weekend but traffic levels were high at specific times of the week/day.

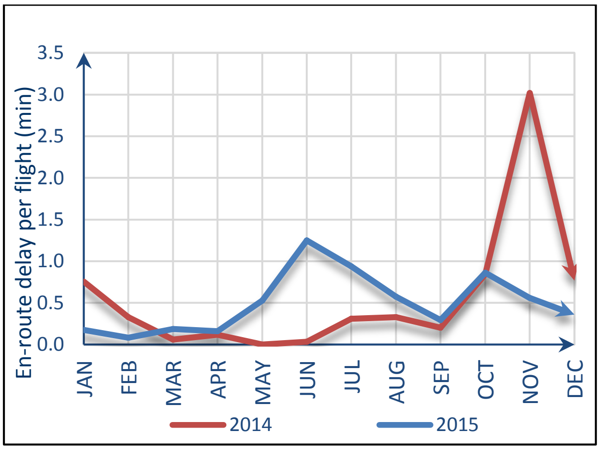


Figure 37: Monthly En-route delay per flight in Lisbon ACC

There were 5% more flights in Lisbon ACC in 2015. There was 166% more ATFM delay in summer.

Lisbon ACCs's performance was not as good as expected, and the level of delay too high to meet the network target. The availability of capacity at specific periods was the root cause of ATFM delays, with Lisbon constrained by labour laws (number of hours).

6 AIRPORTS

The integration of airports with the network progressed significantly in 2015.

There was progress towards the wider A-CDM implementation in Europe: 3 additional airports fully implemented A-CDM making 18 airports in total, covering 26.5% of the departures in the NM area. In 2015 7 UK airports connected to NM as ATC Advanced Tower airports, making 14 airports in total, covering 6.7% of departures in the NM area (see Advanced ATC Tower Implementation. NM now receives Departure Planning Information (DPI) messages for more than 33% of departures in the NM area.

Greek Islands had a traffic growth of 1.3% in 2015 compared to 2014 for the period between April and October. Summer 2015 was extremely challenging due to the combined effect of the shifting traffic flows, adding to the long-standing capacity problems at these airports. Without the cooperation of NM and HANSP, delays would have been much worse (see Greek Islands – Summer 2015).

In general, the partnership with airports has further improved. Airports started expressing interest in the implementation of SESAR concepts (e.g. AOP-NOP/APOC, TBS, RECAT-EU) creating the foundation to achieve future SESAR targets (See AOP-NOP/APOC, TBS, RECAT-EU).

As of October 2015 the Enhanced Information Exchange process, previously based on email exchange, was replaced by reporting via the newly established pre-tactical/tactical section of the Airport Corner. Airports welcomed this improvement and 6 major airports have provided regular information via the new interface. (See Pre-Tactical and Tactical Airports Information Exchange).

There was good collaboration from airports on the provision of strategic information to NM via the Airport Corner. Four additional airports joined this process in 2015 (see Airport Strategic Information Provision).

NM achieved a closer and more effective collaboration with airports through a number of bilateral meetings, visits and exchanges organised by the ACI Liaison officer.

6.1 AIRPORT TRAFFIC EVOLUTION

Overall flights increased by 1.5% in 2015 compared to 2014.

Nº	ICAO ID	AIRPORT NAME	TFC	%	Nº	ICAO ID	AIRPORT NAME	TFC	%
1	LFPG	PARIS CH DE GAULLE	652	0.9%	26	EFHK	HELSINKI-VANTAA	232	0.9%
2	EGLL	LONDON/HEATHROW	649	0.2%	27	LGAV	ATHINAI/ ELEFTHERIOS VENIZELOS	232	13.7%
3	EDDF	FRANKFURT MAIN	641	-0.2%	28	EGSS	LONDON/STANSTED	230	7.5%
4	EHAM	AMSTERDAM/SCHIPHOL	633	2.9%	29	LPPT	LISBOA	227	6.1%
5	LTBA	ISTANBUL-ATATURK	621	5.6%	30	LIMC	MILANO MALPENSA	220	-3.5%
6	EDDM	MUENCHEN	517	0.8%	31	EDDH	HAMBURG	206	2.5%
7	LEMD	ADOLFO SUAREZ MADRID-BARAJAS	502	7.0%	32	EPWA	CHOPINA W WARSZAWIE	192	1.1%
8	LIRF	ROMA/FIUMICINO	432	0.9%	33	LFMN	NICE-COTE D'AZUR	186	-0.5%
9	LEBL	BARCELONA/EL PRAT	396	1.8%	34	EDDK	KOELN-BONN	172	4.2%
10	EGKK	LONDON/GATWICK	367	3.1%	35	LKPR	PRAHA RUZYNE	169	1.8%
11	LSZH	ZURICH	353	0.0%	36	EDDS	STUTTGART	163	4.5%
12	EKCH	COPENHAGEN/KASTRUP	349	1.2%	37	LIML	MILAN/LINATE	160	4.6%
13	LOWW	WIEN SCHWECHAT	332	-2.1%	38	EGGW	LONDON/LUTON	159	12.0%
14	ENGM	OSLO/GARDERMOEN	331	-2.4%	39	EGPH	EDINBURGH	155	4.7%
15	LFPO	PARIS ORLY	321	1.6%	40	LFLL	LYON SAINT-EXUPERY	149	0.7%
16	EBBR	BRUSSELS NATIONAL	320	3.6%	41	LLBG	TEL AVIV/BEN GURION	149	7.2%
17	ESSA	STOCKHOLM-ARLANDA	310	-1.0%	42	LEMG	MALAGA/COSTA DEL SOL	147	1.4%
18	LTFJ	ISTANBUL/SABIHA GOKCEN	292	18.7%	43	GCLP	GRAN CANARIA	134	-2.2%
19	EDDL	DUSSELDORF	287	-0.4%	44	EGBB	BIRMINGHAM	133	1.5%
20	EIDW	DUBLIN	269	9.8%	45	LROP	BUCURESTI/HENRI COANDA	132	5.6%
21	EDDT	BERLIN-TEGEL	250	1.2%	46	LFML	MARSEILLE PROVENCE	131	-1.5%
22	LSGG	GENEVA	249	0.4%	47	LTAC	ANKARA-ESENBOGA	129	5.7%
23	LEPA	PALMA DE MALLORCA	244	3.4%	48	ENBR	BERGEN/FLESLAND	126	-6.0%
24	EGCC	MANCHESTER	237	1.7%	49	LHBP	BUDAPEST LISZT FERENC INT.	126	6.8%
25	LTAI	ANTALYA	233	-1.3%	50	LFBO	TOULOUSE BLAGNAC	121	-0.8%

Table 5: Top 50 airports (average daily arrivals)

Eight of the top ten airports (Paris/Charles De Gaulle, Amsterdam/Schiphol, Istanbul/Ataturk, Munich, Madrid/Barajas, Rome/Fiumicino, Barcelona/El Prat and London/Gatwick) had an increase in the average daily flights in 2015, and London/Heathrow and Frankfurt/Main remained at a similar level as 2014.

Overall, the biggest increases were at Istanbul/Sabiha Gökcen (+18.7%), Athens (+13.7%) and London/Luton (+12%) airports.

The largest decreases were at Bergen/Flesland (-6%), Milan/Malpensa (-3.5%), Oslo/Gardermoen (-2.4%) and Vienna/Schwechat (-2.1%) airports.

6.2 HOT SPOTS

Istanbul/Sabiha Gökcen airport recorded high traffic growth in 2015 (see Table 5). ATFM delays increased from a daily average of 684 minutes in 2014 to 3,660 minutes in 2015, of which 3,138 minutes was airport capacity delays and 471 minutes due to weather.

Similarly, Istanbul/Ataturk airport recorded high traffic growth in 2015. ATFM delays increased from a daily average of 1,011 minutes in 2014 to 2,889 minutes in 2015. Airport capacity delays contributed a daily average of 2,077 minutes of the airports ATFM delay. ATFM delays due to weather generated a daily average of 704 minutes.

Amsterdam/Schiphol airport had traffic growth. The average daily airport ATFM delay increased from 1,011 minutes in 2014 to 2,015 minutes in 2015. Airport weather accounted for a daily average of 1,151 minutes and airport capacity for 524 minutes per day.

6.3 HOT SPOTS

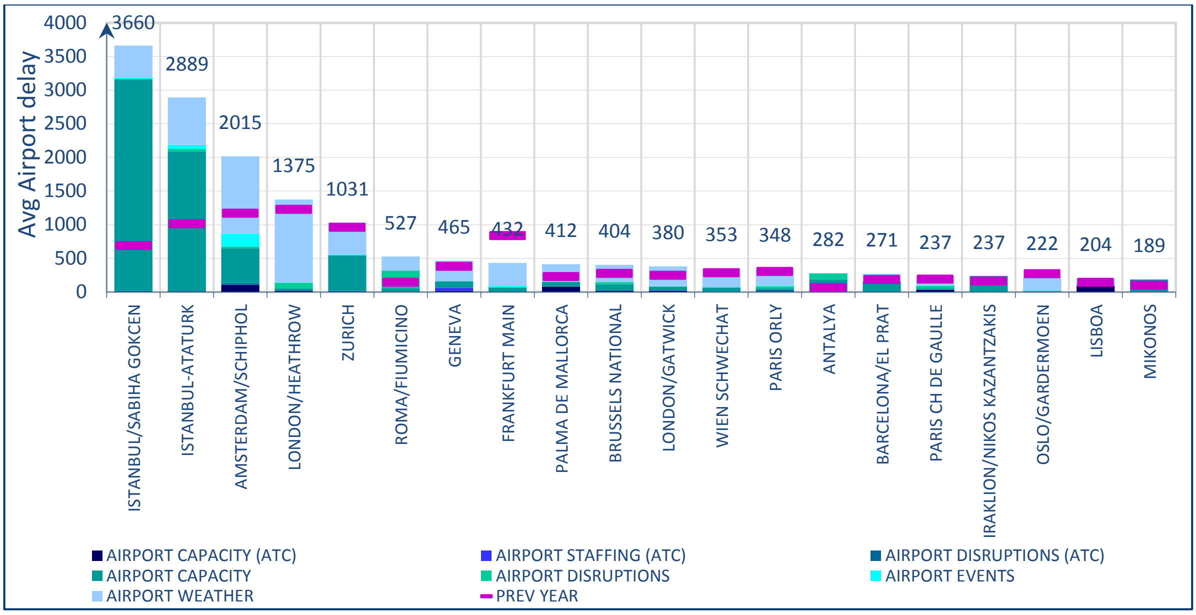


Figure 38: Top 20 airport delay locations during 2015

London/Heathrow had 0.2% traffic growth. It is no longer the top airport ATFM delay location. The average daily airport ATFM delay increased from 1,226 minutes in 2014 to 1,375 minutes in 2015, of which 1,151 minutes was due to weather.

Zurich airport traffic remained stable whereas delays slightly increased compared to 2014. Airport capacity, weather and limited availability of the optimum runway configuration due to environmental constraints were the main delay causes.

Rome/Fiumicino airport delays significantly increased compared to 2014, mainly due to the fire in terminal 3 at Rome/Fiumicino airport overnight on 6-7 May. A 20% airport capacity reduction applied for the remainder of May with airspace users requested to make reductions on all inter-European flights between end of May until mid-July. See Airports for more information. Adverse weather conditions also generated delays.

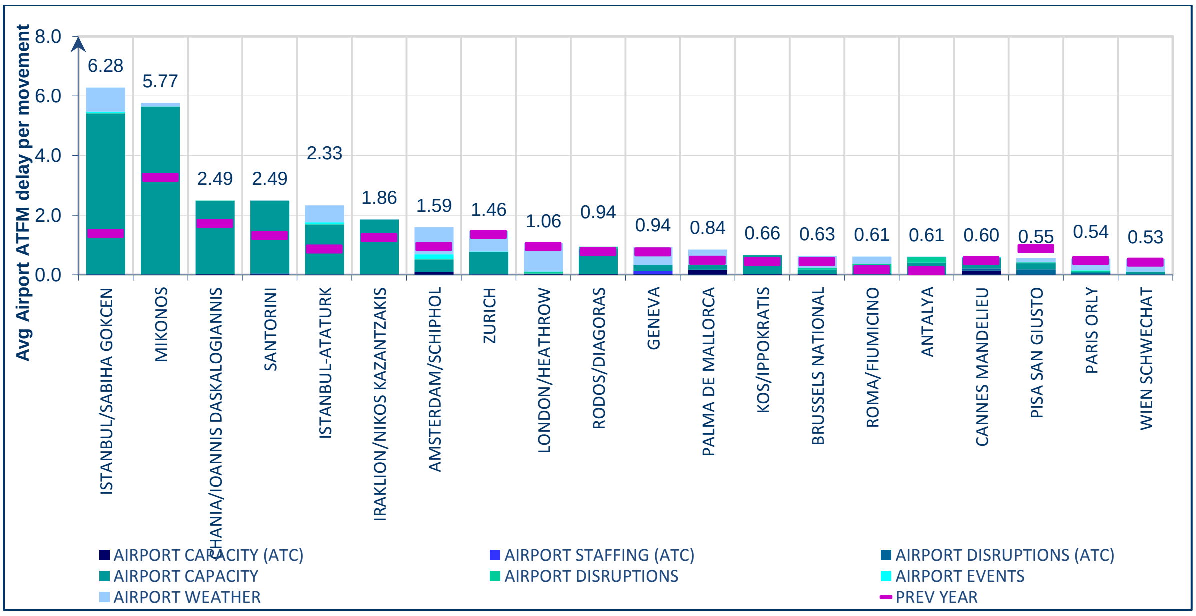


Figure 39: Top 20 airport delay per flight locations during 2015

Greek airports had high traffic growth and remained in the top 20 airports delay per flight locations (see Figure 39), again with airport capacity as the main delay cause. Mikonos, Chania D. Daskalogiannis, Santorini, Iraklion N. Kazantzakis, Rodos Diagoras and Kos airports delays per flight increased compared to 2014. Mikonos airport appeared in the top 20 average delay locations.

Geneva airport had 0.4% traffic growth and delays increased compared to 2014. Adverse weather conditions were the main cause for delays. Airport capacity and airport ATC staffing caused additional ATFM delays.

Frankfurt/Main airport traffic remained at the same level but delay decreased significantly; and is, therefore, no longer in the top 20 airports delay per flight locations. Adverse weather conditions caused most of the delays, but caused much less delays than in previous year.

Palma de Mallorca recorded a traffic growth and delays increased significantly compared to 2014. Adverse weather conditions were the main cause for delays.

Brussels/Zaventem with 3.6% traffic growth had increased delays compared to 2014. Adverse weather conditions followed by airport capacity were the main delay causes.

Antalya airport appears in the top 20 airports delay locations and the top 20 airports delay per flight locations due to significant increase in delays compared to 2014, although the traffic has decreased. Airport capacity and disruptions generated most of the delays.

Barcelona/El Prat with 1.8% traffic growth had increased delays compared to 2014. Airport capacity and adverse weather conditions generated most of delays.

Cannes/Mandelieu airport delay per flight increased compared to 2014 mainly due to capacity issues.

Pisa/San Giusto airport delay per flight decreased compared to 2014, but it remained in the top 20 airports delay per flight.

London/Gatwick, Vienna, Paris/Orly, Paris/Charles de Gaulle and Lisbon airports delays increased compared to 2014. Adverse weather conditions were the main delay cause.

London/City traffic increased, but delays decreased compared to 2014.

Oslo/Gardermoen traffic and delays decreased compared to 2014. Adverse weather conditions caused most of the delays, but caused much less delays than 2014.

Munich airport is no longer in the top 20 airports average daily delay locations.

London/City, London/Gatwick and Oslo/Gardermoen are no longer in the top 20 delay per flight locations.

6.4 GREEK ISLANDS – SUMMER 2015

Summer traffic[xvii] to the Greek Islands summer destinations increased by 1.3% in 2015 compared to 2014. These airports are operating at the limit of their declared capacity during periods of peak demand, so arrival delays over the period increased from approximately 430,000 minutes to approximately 762,000 minutes. However, the overall performance has improved since 2012 when the joint Network Manager / HCAA Action Plan was put in place (see Figure 40: Greek Island Airports - Traffic and Arrival Delay Evolution 2011-15).

Summer 2015 was extremely challenging due to the combined effect of the shifting traffic flows, adding to the long-standing problems at these airports. The problems relate to: airport layout, terminal buildings capacity, and a relatively wide airport slot tolerance window of +/- 30 min for such small capacity airports.

In 2015 a new rule was published by the HCAA, requiring GA/BA traffic to request airport slots. This had a positive effect of better control. However insufficient ATCOs available as well as lack of radar facilities that, in consequence, require the application of procedural approach at certain destinations, are the main contributing factors for delays, besides the lack of airport infrastructure. These long standing problems are unlikely to find resolution before the privatisation of the airports which supposedly may provide sufficient funding for the airport infrastructure and technological modernisation.

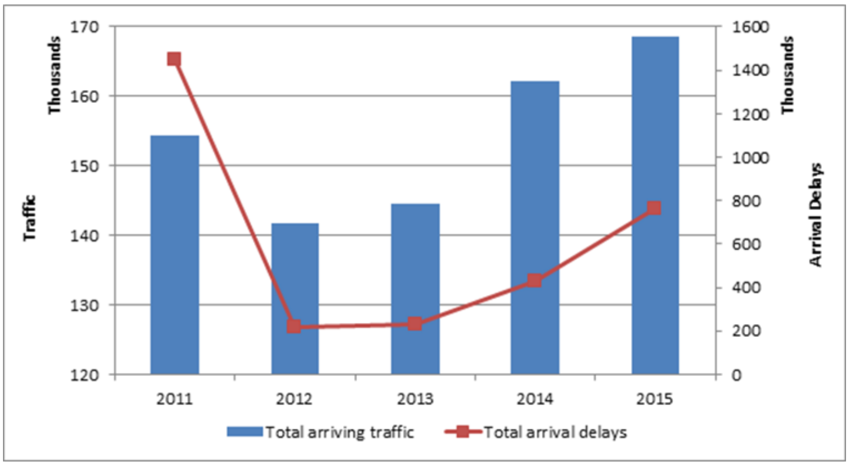


Figure 40: Greek Island Airports - Traffic and Arrival Delay Evolution 2011-15

In addition, traffic from Northern Europe with destination Greece had to contend with en-route regulations across Europe which affected the AO's performance in respecting airport slots at Greek airports.

Previous years' actions were enhanced in 2015. The preparation for the summer season was done in February 2015 in close collaboration between NM and airlines, HCAA, HSCA and HANSP to highlight the busiest days and busiest airports. NM re-iterated the importance of fair play by adhering to the allocated airport slot.

The summer 2015 experience led to the identification of further actions that are necessary in preparation for 2016:

- GA/BA traffic must remain part of the full Airport Slot Coordination process (at least for the June to September period). If this is not done, summer 2016 risks to be even worse than summer 2015 given that airline carriers are trying to increase their flights to Greece.
- The online coordination system, allowing operators to request Airport Slots outside of office hours may well lead to a decrease in 'off slot' operations as operators will no longer be able to request slots that are not available.
- NM will recommend minor schedule changes aimed at delivering flights regularly at 10 min intervals at the initial approach fix. The intention is to optimise runway throughput with the given approach separations. NMOC is investigating this and actions will be coordinated with the specific Greek island airports where the measure is to apply.
- Close 'on the day' cooperation with HANSP will allow full utilisation of capacity.
- Close cooperation with GA/BA handling companies in Greece will allow 'extra' capacity to be filled at those airports where most GA/BA flights are only drop off/pick up and usually on the ground approx. 15min.

6.5 AIRPORT CDM IMPLEMENTATION

During the course of 2015, 3 airports fully implemented A-CDM. These airports are Venice on 20 January, Prague on 2 September, and Barcelona on 20 October. This brings the total number of fully implemented airports to 18, covering 26.5% of departures in the NM area.

In 2014 the European Commission, through the TEN-T Agency, made available a second tranche of funding (up to 20% of eligible costs) to assist airports in implementing A-CDM. Participation implies a commitment to implement A-CDM. Eight airports benefitted from this tranche, which finished at the end of 2015.

More and more airports are implementing A-CDM bringing benefits not only themselves but also neighbouring ACCs thanks to increased predictability.

Information on individual airports that implemented A-CDM in 2015 can be found in Annex III.

6.6 ADVANCED ATC TOWER IMPLEMENTATION

Airports that have no plans to implement the A-CDM process but still wish to integrate with the ATM network may do so as an Advanced ATC Tower airport. A number of airports are also considering this option as a first step towards full A-CDM implementation. Such airports provide a reduced set of DPI messages with a reduced set of advantages (compared to A-CDM airports). An Advanced ATC Tower airport provides Target Take-Off-Time (TTOT) estimations as well as Variable Taxi-Times (VTTs) and SIDs to the NMOC. These are provided from the moment that the aircraft leaves the blocks.

In 2015 seven UK airports connected to the Network as Advanced ATC Tower airports. These airports are Aberdeen, Edinburgh, Glasgow, London City, London Luton, Manchester and London Stansted. This brings the total number of Advanced ATC Tower airports to 14, representing 6.7% of departures in the NM area.

The 18 A-CDM airports together with the 14 Advanced ATC Tower airports mean that NM now receives Departure Planning Information (DPI) messages for more than 33% of departures in the NM area.

Information on individual airports which implemented Advanced ATC Tower in 2015 can be found in Annex III.

6.7 RECAT-EU

The RECAT-EU wake turbulence scheme is a re-categorisation into a 6-category scheme of ICAO wake turbulence (WT) longitudinal separation minima on approach and departure. It is based on a set of principles, comparing the wake generation and wake resistance between aircraft types, and splitting ICAO Heavy and Medium categories into ‘Upper’ and ‘Lower’ part. This allows reduction of separation minima by 1 or 2 nautical miles for followers behind weaker wake generator types, and/or for followers with higher wake resistance including behind A380.

In 2014, EASA approved the safety case report for the RECAT-EU wake turbulence scheme. This assured States and Air Navigation Service Providers that the scheme could be used to update their current schemes.

Paris CDG has conducted deployment activities and operations are planned for 1st Quarter 2016.

In parallel, NM initiated an awareness and promotion campaign. Several European airports expressed interest and NM initiated contact and provided information material. NM also met four airports to assess the potential for deployment.

To further scope the RECAT-EU solution for meeting the local operational constraints and maximizing benefits, NM agreed to conduct detailed capacity benefit analyses in collaboration with the local stakeholders.

6.8 TIME BASED SEPARATION FOR ARRIVAL (TBS)

Within the scope of SESAR, the TBS project has developed new operating methods for spacing aircraft by time during strong headwind conditions, instead of applying distance separations.

By reducing space between a pair of aircraft, TBS aims to decrease the gap between the landing rate in light headwind conditions and with strong wind, maintaining high efficiency and capacity levels in all wind conditions (with major gains expected at busy airports). As the wake strength impacting the aircraft is lower with heavy winds, safety levels will be maintained even if the distance between the pair of aircraft is reduced.

First TBS operations went live at London/Heathrow in March 2015. Four European airports have shown interests for TBS in their implementation plans for the coming years.

6.9 ADVANCED SURFACE MANAGEMENT, GUIDANCE AND CONTROL SYSTEMS (A-SMGCS)

The Advanced Surface Movement Guidance and Control System (A-SMGCS) is recognised as an important technical and operational enabler laying the foundation for an enhanced and efficient airport Surface Management. Maintaining runway throughput through an efficient surface management without jeopardising runway safety is another important goal to which A-SMGCS is a key contributor.

A-SMGCS Surveillance function (currently denominated Level 1) and A-SMGCS Airport Safety Nets (including the current Level 2) are pre-requisites for specific Pilot Common Projects[xviii] . Major airports have already implemented Level 1 and Level 2 and others are in the process of implementing either Level 1 or Level 2. The NMD/Airport Unit will ensure that it maintains its knowledge on all A-SMGCS related subjects and topics, in order to guarantee the proper deployment of Essential Operational Changes in the key area of Airport Integration & Throughput.

An A-SMGCS task force was created in 2015, endorsed by the Airport Operations Team (AOT). The main task is to update the existing EUROCONTROL A-SMGCS documentation. The task force is composed of experts from ANSP, Airport Operator, Industry, SESAR and EUROCONTROL.

6.10 PRE-TACTICAL AND TACTICAL AIRPORTS INFORMATION EXCHANGE

The Enhanced Information Exchange (EIE) is a process of sharing data on anticipated capacity impact of airport events (weather related or other) between airports and the NMOC during the ATFM pre-tactical phase of operations.

The Enhanced Information Exchange is an important step in the integration of airports and the network, building upon the data exchange already taking place through A-CDM and coordination between airport stakeholders and NMOC.

As of October 2015 the EIE reporting process, previously based on email exchange, was replaced by reporting via the newly established pre-tactical/tactical section of the Airport Corner which allows airports to report on events in a consistent and already familiar fashion thereby considerably reducing the workload associated with the reporting. Providing this feature via the Airport Corner subsequently removed the need for a trial as any airport using the Airport Corner reporting is free to input data not only strategically as it used to be but now also pre-tactically through the same process without having to formally join a specific trial procedure.

The pre-tactical input via the Airport Corner was well received and by end of 2015 6 airports had already reported 26 events via the newly established process.

6.11 TOWARDS APOC AND AOP-NOP EXCHANGE

APOC and AOP-NOP exchange are concepts that emerged within SESAR. Their aim is to facilitate and improve collaborative decision-making and operational planning at airports.

The APOC is the Airport Operations Centre, a community of airport stakeholders consisting of, but not limited to, Airport Operator, local ANSP, Airlines and Ground handlers, who manage the airport operations with a view to optimise performance on a daily basis taking into account event reports or performance alerts.

The AOP is the Airport Operations Plan that reflects all data of the current operational planning for the tactical and pre-tactical phase. The NOP in this case is the equivalent on NM side. Data from AOP and NOP shall complement each other by AOP-NOP automated exchange of information via System Wide Information Management (SWIM).

APOC or other forms of airport ground coordination and AOP-NOP exchange are two essential elements for the ongoing integration of airports and the network, which is why the Network Manager is focusing on reinforcing collaboration between the group of local stakeholders and NM (NMOC). An event possibly impacting airport capacity or demand triggers a collaborative assessment of the operational impact, followed by a collaborative decision making process, the outcome of which is shared with all stakeholders involved, including NM.

In 2015 a dedicated Task Force was created with the participation of Frankfurt, Dusseldorf, Helsinki Vantaa, London/Heathrow, Amsterdam/Schiphol, Oslo Gardermoen, Stockholm/Arlanda, Geneva and Zurich airports. In addition specific coordination meetings were held with Copenhagen, Prague, Nice, Oslo Gardermoen, Luxembourg, Athens, Amsterdam/Schiphol and London/Heathrow airports to exchange operational experience and address expected benefits for all parties.

This activity is linked closely to the pre-tactical and tactical Airports Information Exchange described in section 6.10, which is a use case for the collaboration process between airports and NM.

6.12 CAPACITY ASSESSMENTS AND METHODOLOGY

The Airport Unit has completed a runway throughput study for Prague Airport in 2015. This study was a combined request from Prague Airport Operator and ANS CR.

6.13 AIRPORT CAPACITY AND PERFORMANCE (ACAP) TRAINING

NM developed a new training course in 2015 to look at airport capacity and performance (ACAP) from a network perspective. This course gives insight in capacity planning from an airport operator's point of view, including the local actors as well as from a NM point of view. It helps to understand how airport capacity can be assessed and how enhancements can be determined based on such an assessment. It also provides an understanding of the entire chain of *Demand Capacity Operations Pilot perspective Delay Innovations/Solutions*, complemented by a gaming exercise. The target audience for this course are all main actors in the network.

A successful pilot course was delivered in October 2015 and regular courses are offered twice yearly as from March 2016.

6.14 AIRPORTS STRATEGIC INFORMATION PROVISION

As defined under the Network Manager Functions Implementing Regulation (677/2011) – Annex V – Appendix II – Airports, Network Manager has a task to help airports to take advantage of the 'network approach' to solve operational issues and enhance performance.

NM implemented 7 years ago a centralised reporting process to capture relevant airports strategic information and monitor airport operations and planning. The process supports the early identification of mitigation actions aiming to minimise any negative operational impact in the network in the short, medium and long-term.

A secured web based tool, the Airport Corner, enables this process permitting quick and easy information provision from key airport stakeholders. In 2015, four airports joined this process: Antalya, Bratislava, Malta, Tallinn and Toulouse airports resulting in 75 major European airports actively contributing to this process. Another 35 additional airports (RP2) are in the process of joining it.

In October 2015, the process was enhanced enabling airports to share information on events impacting the pre-tactical phase of operations through the Enhanced Airport Information Exchange with NM (see section 6.10).

The expected benefits are airports information sharing among all partners enabling an improved situational awareness, enhanced planning and improved predictability for better demand-capacity balancing. This finally would result in optimised airports and network performance.

6.15 OTHER ACTIVITIES

6.15.1 REDUCED SLOT TOLERANCE WINDOW (STW)

In 2015 an operational trial was organised in collaboration with London/Heathrow and Frankfurt/Main airports to verify if a reduction of the STW can help to reduce the risk of over-deliveries.

The purpose of this trial was to demonstrate a clear link between the reduction of the STW and a reduction of over-deliveries, especially in the en-route sectors and secondly to demonstrate that a reduction of the STW will positively influence CTOT adherence at the departure airports. A STW reduction is expected to contribute to smoother and more cost efficient operations within the network. Specifically, it should reduce the risk of over-deliveries and increase predictability. A reduction of over-deliveries will also reduce the need to apply ATFM measures and will potentially increase capacity.

First results indicate that CTOT adherence can be improved by up to 20%. The assessment of the results of this trial will take place in 2016 and depending on the outcome, a similar event with a wider scope will be organised in coordination with the relevant stakeholders.

6.15.2 FLIGHT PLAN SUSPENSION REQUESTS

NM supports a state's decision-making authority when it decides to introduce flight plan suspensions at coordinated airports.

In 2014, the French DGAC started such a process for Nice/Cote D'Azur airport and extended it to Lyon/Saint-Exupery for 2015 onwards. As from winter season 2015/2016, the DGAC asked NM to apply the procedure for an indefinite duration for the two airports.

Italy's ENAC has applied a similar process for Venice airport in past summer seasons. A new agreement is being prepared between ENAC and NM covering all Italian coordinated airports.

6.16 AIRPORT DISRUPTIONS

A number of unplanned events[xi] (disruptions) imposed capacity reductions at certain airports:

Date	Location	Event	Traffic Impact	ATFM Delay Impact
6 January	**Zurich**	**ILS failure during low visibility.**	**None**	**2,285 minutes**
9 January	**Paris/Charles De Gaulle**	**Unavailability of runway 27 due to security incident.**	**None**	**2,768 minutes**
16 January	**Italy**	**ATC industrial action.**	**Not known.**	**Airport - 6,009 minutes. En-route - 423 minutes.**
24 January	**Frankfurt/Main**	**De-icing problems resulted in lack of apron space.**	**None**	**5,196 minutes**
26 January	**Amsterdam/Schiphol**	**Limited working positions.**	**None**	**2,640 minutes**
30 January	**Amsterdam/Schiphol**	**Snow clearance.**	**Not known.**	**3,362 minutes.**
12/13 February	**Paris/Charles De Gaulle**	**Non ATC industrial action.**	**Not known.**	**11,704 minutes.**
16 February	**Amsterdam/Schiphol**	**On-line Data Interchange (OLDI) issues.**	**None**	**2,369 minutes**
17 February	**Italy**	**ATC industrial action.**	**150 flights**	**Airport - 3,003 minutes. En-route - 523 minutes.**
Date	**Location**	**Event**	**Traffic Impact**	**ATFM Delay Impact**
20 March	**Italy**	**ATC industrial action.**	**Not known.**	**Airport - 4,489 minutes. Minimal en-route impact.**
27 March	**Netherlands**	**National power failure between 0900 and 1000.**	**Not known.**	**Amsterdam/Schiphol- 5,428 minutes. Rotterdam/The Hague and Eindhoven airports also impacted.**
25 April	**Istanbul/Ataturk**	**Aircraft incident, main runway blocked for most of the day.**	**None**	**12,089 minutes.**
6-7 May	**Rome/Fiumicino**	**An overnight fire in terminal 3 impacted operations.**	**20% capacity reduction introduced by NOTAM which remained effective until end-July.**	**7 May - 9,156 minutes. 8-31 May - 32,746 minutes. June - 34,311 minutes. July - 17,296 minutes.**
9 June	**Istanbul/Ataturk, Istanbul/Sabiha Gökcen**	**FDPS failure.**	**None**	**Istanbul/Ataturk - 3,646 minutes. Istanbul/Sabiha Gökcen - 5,488 minutes.**
1/2, 18/19, 25/26 July	**Antalya**	**Unscheduled runway maintenance on 1/2 July and further apron and taxiway maintenance on 18/19 and 25/26 July.**	**None**	**30,759 minutes**
13 July	**London/Heathrow**	**Security incident disrupted operations; further disruption due to strong winds.**	**None**	**12,647 minutes**
28 July	**Pisa/San Giusto**	**ILS flight check.**	**Not known.**	**2,444 minutes.**
29 July	**Rome/Fiumicino**	**Fire in the vicinity of the airport.**		**2,449 minutes.**

August	**Antalya**	**Runway maintenance during weekends.**	**Not known.**	**23,437 minutes.**
August	**Paris/Orly**	**Runway maintenance.**	**Not known.**	**11,517 minutes.**
24 August	**London/Gatwick**	**Reduction in airport capacity due to lack of aircraft parking stands during thunderstorms; capacity increased during morning but further disruptions in the afternoon due to thunderstorms.**	**Not known.**	**13,777 minutes**
26 August	**Dublin**	**A fire in a hanger adjacent to the runway resulted in the application ATFM measures due to reduced fire service cover for the duration of the incident.**	**Co-ordination between NM and Dublin and London FMPs allowed traffic to and from London/Heathrow airport to be expedited to prevent ground congestion at London/Heathrow airport where operations were being disrupted by strong winds.**	**3,407 minutes.**
7 October	**Antalya**	**Runway/taxiway maintenance.**	**Not known.**	**6,157 minutes.**
22 October	**Istanbul/Sabiha Gökcen**	**Voice Communication System (VCS) issues and frequency failure during thunderstorms and heavy rain.**	**None**	**13,771 minutes.**

Table 6: Unplanned Events

7 FLIGHT EFFICIENCY

This chapter provides a summary of the progress made on the implementation of the actions agreed in the joint IATA/CANSO/EUROCONTROL Flight Efficiency Plan[xix], drawn up in 2008, and responds to the requirements of the SES performance scheme.

The NM flight efficiency targets and objectives are included in the Network Performance Plan (NPP) 2015 - 2019 as described below:

- Route extension - airspace design
  NM objective:
  - achieve an improvement of the DES indicator by 0.06 percentage points between 2014 and 2015
- Route extension - last filed flight plan
  Target:
  - achieve KEP target of 4.78% for the SES area and 4.51% for the NM area
- Route extension - actual trajectory
  Target:
  - achieve KEP target of 2.96% for both SES and NM areas
- Increase the CDR1/2 usage
  NM objective:
  - increase the CDR availability (CD-RAI) and CDR usage (CDR-RAU) by 5% between 2015 and 2019

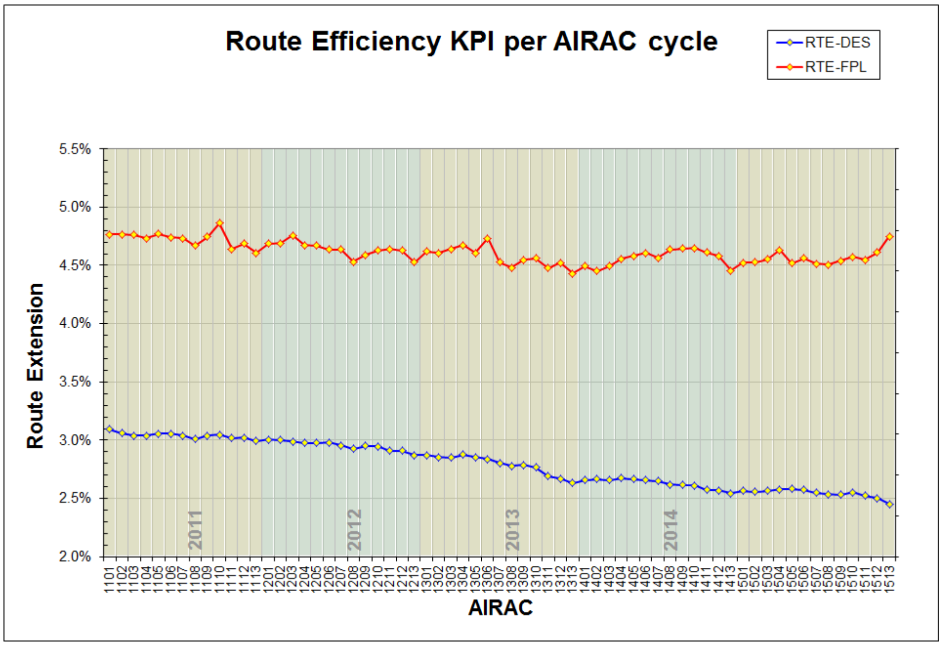


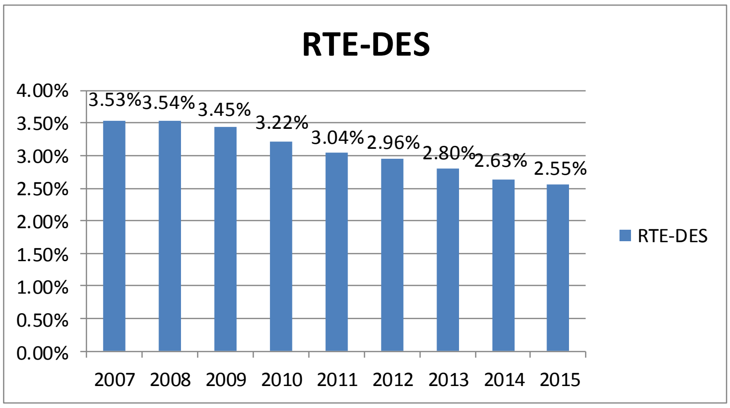
Figure 41: Route efficiency KPI per AIRAC cycle

Flight efficiency indicators are monitored for pure airspace design and for flight planning. Figure 41 shows the evolution of those indicators since the beginning of 2010, showing a downward trend over the whole period. While the airspace design target was met for 2015, the last filed flight plan target was missed by 0.04 percentage points.

The evolution recorded on the route extension based on the last filed flight plan during the year 2015 was heavily impacted by industrial actions, social issues that led to reduced capacities and re-routings to avoid capacity constrained and avoided/closed areas due to crisis situation. Those events had a detrimental effect on the flight planning indicator and thus on the overall flight efficiency, which led to significant losses recorded during the AIRAC cycles of March, April, November and December 2015. This evolution continues to demonstrate the necessity to provide constantly sufficient capacity to further improve the flight planning indicator and to reduce the gap with the airspace design indicator.

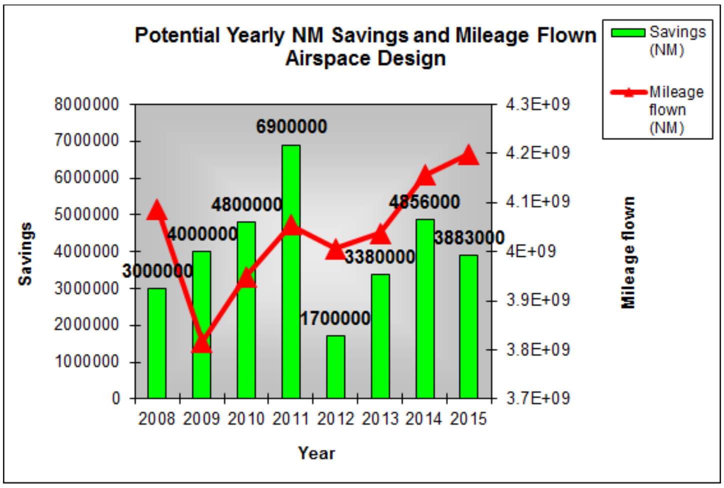
7.1 AIRSPACE DESIGN

As part of the Flight Efficiency Plan, intensive work has been undertaken by States and ANSPs in close cooperation with NM to develop and implement enhanced airspace design solutions, with some 250 airspace improvement packages being developed and implemented in the 12 months prior to summer 2015. As a result, the route extension due to airspace design continued its downward trend throughout the year, reaching its lowest level ever in December 2015 at 2.50%.



The average route extension due to airspace design decreased from 2.63% in 2014 to 2.55% in 2015, an average potential daily saving of nearly 10,668 nautical miles.

Figure 42: yearly evolution of airspace design indicator



Over the reporting year, this represents a potential saving of 3.88 million nautical miles, approximately 20 kilotons of fuel, reduced emissions of 80 kilotons, or 20 million Euros.

Figure 43: Potential Yearly savings due to airspace design

7.2 AIRSPACE CHANGES VS FLIGHT PLANNING

The flight planning indicator measures how much longer is the flight planned trajectory than the great circle. It reflects inefficiencies in the use of the airspace (due to RAD restrictions, CDR availability, inefficient flight-planning, etc.), but also user preferences for cheaper rather than shorter routes.

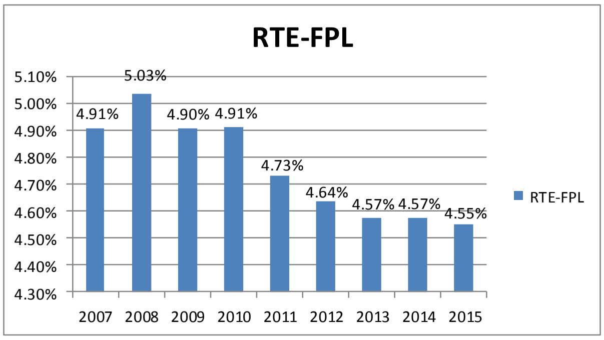


Figure 44: Yearly evolution of flight-planning indicator

The average route extension based on the latest filed flight plan decreased from 4.57% in 2014, to 4.56% in 2015. The trend showed increases during March and April, November and December due to several industrial actions and airspace avoidance/closure due to crisis situation.

The average flight-planned distance decreased only slightly when compared to 2014, resulting in some 1.24 million nautical miles savings over the whole year. This means an average daily decrease of nearly 3,423 nautical miles. Over the year this represents savings of approximately 7.7 kilotons of fuel, decreased emissions of 25.6 kilotons, or €6.4 million savings.

Figure 45 shows the corresponding yearly savings and the relationship with the mileage flown over the past eight years:

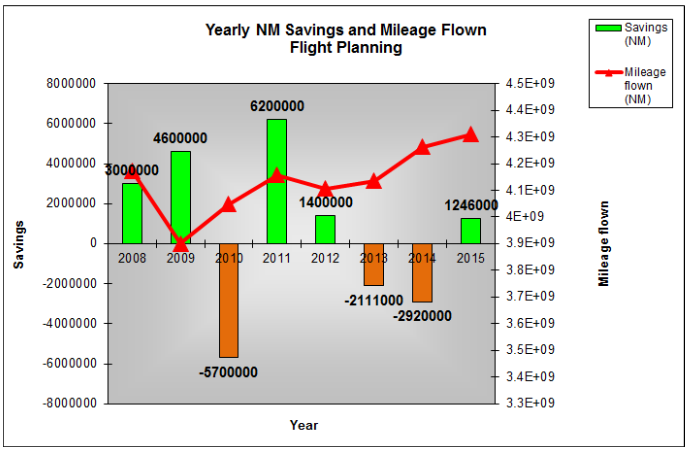


Figure 45: Yearly NM savings and mileage flown

The trend reflects the combined effect of: industrial actions, special events (e.g. Ukraine crisis situation, Libyan airspace closure, etc.) and technical problems on the network and adverse weather. These affected the network performance, despite NM efforts made during the year to facilitate efficient airline operator flight-planning through the Flight Efficiency Initiative.

This situation emphasises yet again that more efforts must be made to improve the efficiency of the airspace utilisation and to constantly provide sufficient capacity thus ensuring that the indicator based on the latest filed flight plan follows a similar trend to the airspace design indicator.

7.3 ACTUAL TRAJECTORY

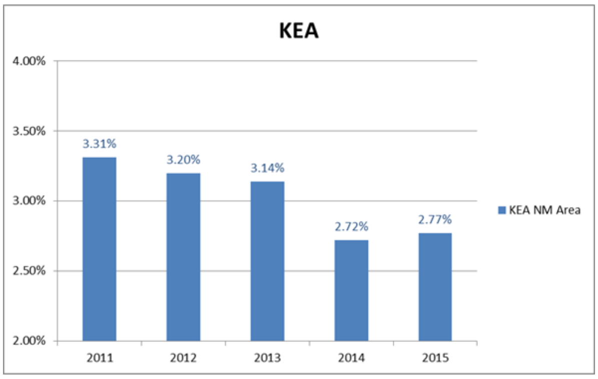


Figure 46: route extension due to actual trajectory

The actual trajectory (KEA) targets have been met, showing that the European airspace structure offers appropriate capabilities. The Free-Route Airspace (FRA) was the major contribution towards achieving the KEA indicator.

7.4 CONDITIONAL ROUTES (CDR)

CDR availability is an important element when considering the ASM in the network operations context. Figure 47 shows little changes in absolute figures for the evolution of CDR development as elements of the network in 2015 compared to 2014. This is due to mainly to changes in CDR categories with many CDR1/2 to permit night routes opened and to the continuous network improvement process (covered by ERNIP).

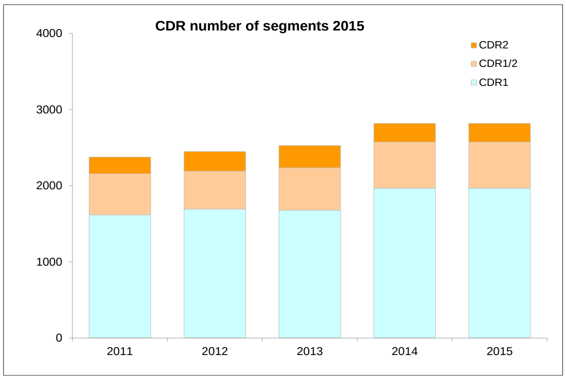


Figure 47: Evolution of CDR availability

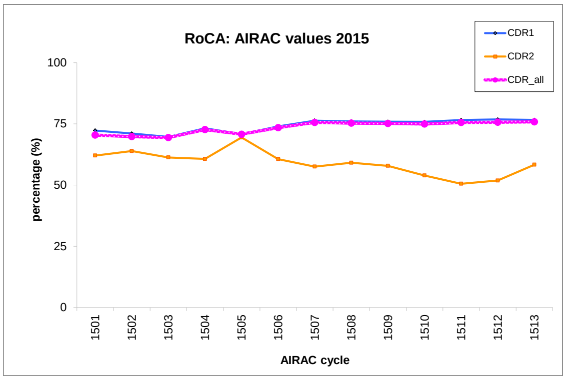


Figure 48: Rate of CDR availability (RoCA) in 2015

RoCA for all CDR categories is relatively constant over the entire year (Figure 48).

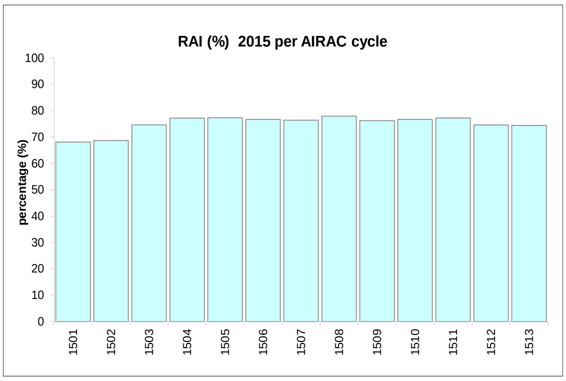


Figure 49: RAI (%) 2015 per AIRAC cycle

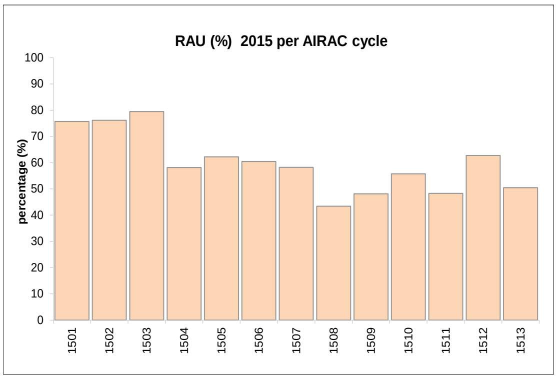


Figure 50: RAU (%) 2015 per AIRAC cycle

The Rate of Aircraft Interested (RAI) that planned the available CDR is relatively constant at a value of approx. 75.18% for the entire year 2015 (Figure 49).

The Rate of Aircraft actually Using (RAU) CDR is lower (60%). This is the result of ATC intervention for various reasons (expedite traffic, weather, etc) – see Figure 50.

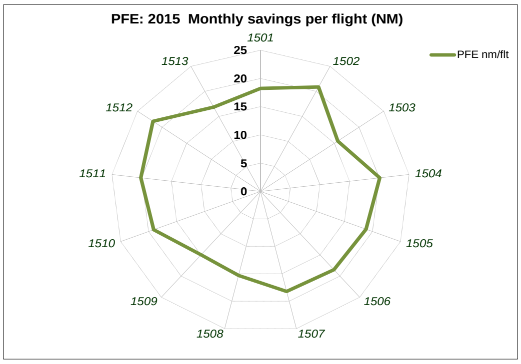


Figure 51: PFE: 2015 Monthly Distance savings (nautical miles per flight)

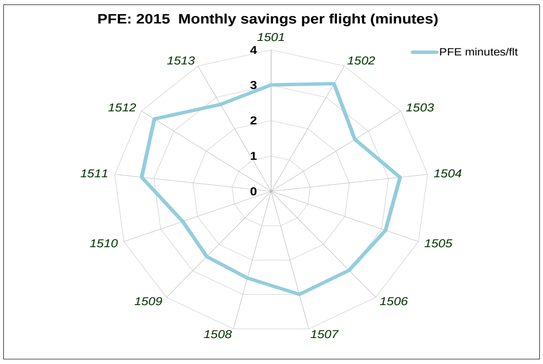


Figure 52: PFE: 2015 Monthly time savings (minutes per flight)

The savings per flight in distance and in time due to CDR are strongly dependent on the network opportunities offered by the CDR but in reality the actual traffic is not always able to follow the planned trajectory that would maximise the efficiency due to various causes outside the flight planning process. With the current advances in airspace configurations Free Route Airspace and direct routes implemented in more ECAC regions are on many occasions more attractive than using the CDR routing solutions.

Potential Flight Economy (PFE) can be realised when using the available CDRs for planning. This is influenced mainly by the CDR availability rate (RoCA) and the awareness/ability/willingness of the aircraft operators to consider the available CDRs in their FPL solutions. The indicator shows how far the real planned trajectories are from the optimum ones.

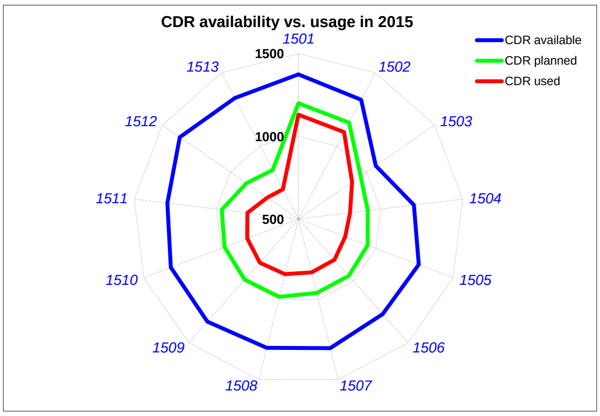


Figure 53: CDR availability vs. usage in 2015

Figure 53 shows the number of CDR available for flight planning (blue line), the number that were actually flight planned (green line) and the number that were actually flown (red line).

The numbers indicating the CDR used and planned versus the CDR available show an almost constant difference. The explanation is that the route structure is stable enough and familiar enough to aircraft operators and offers sufficient predictability for the CDR opportunities. This is also a consequence of the higher availability (RoCA) of the CDR. Figure 53 shows the reserve to further enhance the utilisation of available CDRs.

Concerning the actual traffic, the PFE is calculated with the actual flown CDRs from those available. The values may differ from the planned ones for a number of reasons (ATC intervention for direct/rerouting, delayed departure miss the CDR uptake and forcing to alter the initial FPL, weather, etc). When making the comparison and the values are smaller, it can also signify that less potential economy is obtained when the initial trajectories are closer to optimal. Figure 54 and Figure 55 depict the aggregated values calculated for all CDR types (CDR1, CDR1/2, CDR2) averaged by month:

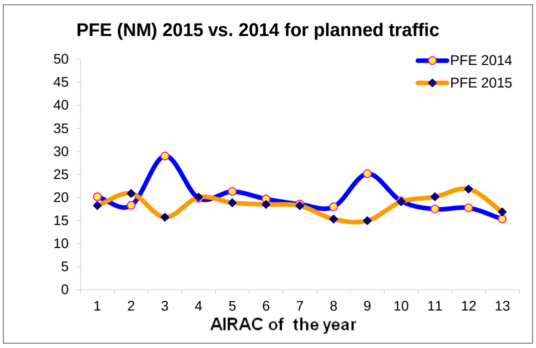


Figure 54: PFE 2015 vs 2014 for planned traffic

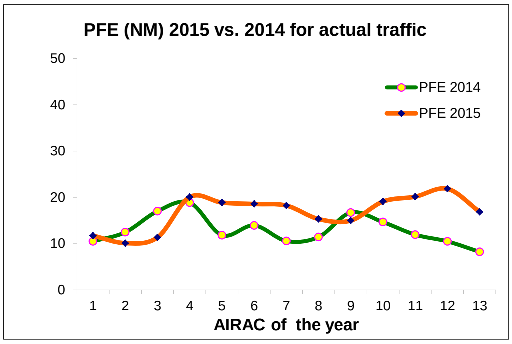


Figure 55: PFE 2015 vs 2014 for actual traffic

Comparing the Potential Flight Economy (PFE) for 2015 with 2014 for the planned traffic, one can see that the value is relatively constantly over 2015 with a slight increase in autumn.

The actual gain is following in general the planned trend with similar values and better than in 2014.

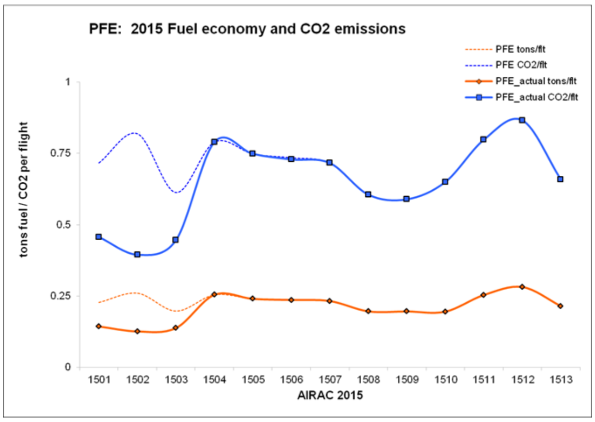


Figure 56: PFE: 2014 Fuel economy and CO2 emissions

The environmental indicators of PFE translated in fuel savings and reduced CO_2 emissions illustrated in Figure 56 have been calculated using the ICAO methodology for fuel burned and CO_2 emissions. The curves indicate that there are differences between the expected economy from flight planning and the achieved results for the actual traffic. These differences have the same causes mentioned before mainly due to trajectory changes from the initial flight plan during the flight progress.

7.5 FREE ROUTE OPERATIONS

By the end of 2015, the following ACCs have either fully or partially implemented Free Route Airspace operations:

Full Free Route Airspace implementation	Lisbon ACC
	Copenhagen ACC, Malmo ACC and Stockholm ACC as part of Denmark/Sweden FAB
	Shannon ACC/UAC as part of the ENSURE - EN-route Shannon, Upper Airspace Redesign project
	Stavanger, Bodo, Tampere, Tallinn, Riga ACCs as part of NEFAB
	Vilnius ACC
	Budapest ACC
Full Night Free Route Airspace implementation	Sofia ACC
	Chisinau ACC
	Bucuresti ACC
	Zagreb ACC
	Belgrade ACC
	Kyiv, Lviv , Odesa, Dnipropetrovsk ACCs
DCT based implementation	Reims, Brest, Bordeaux, Paris, Marseille ACCs
	Madrid ACC
	London and Prestwick ACCs
	Maastricht UAC
	Karlsruhe UAC
	Geneva and Zurich ACCs
	Milan, Rome, Brindisi and Padua ACCs
	Malta ACC
	Athens and Macedonia ACCs
	Ljubljana ACC
	Wein ACC
	Prague ACC
	Warsaw ACC
	Skopje ACC

Table 7: Free Route Airspace operations

The following map shows the European Free Route Airspace deployment status as of end 2015:

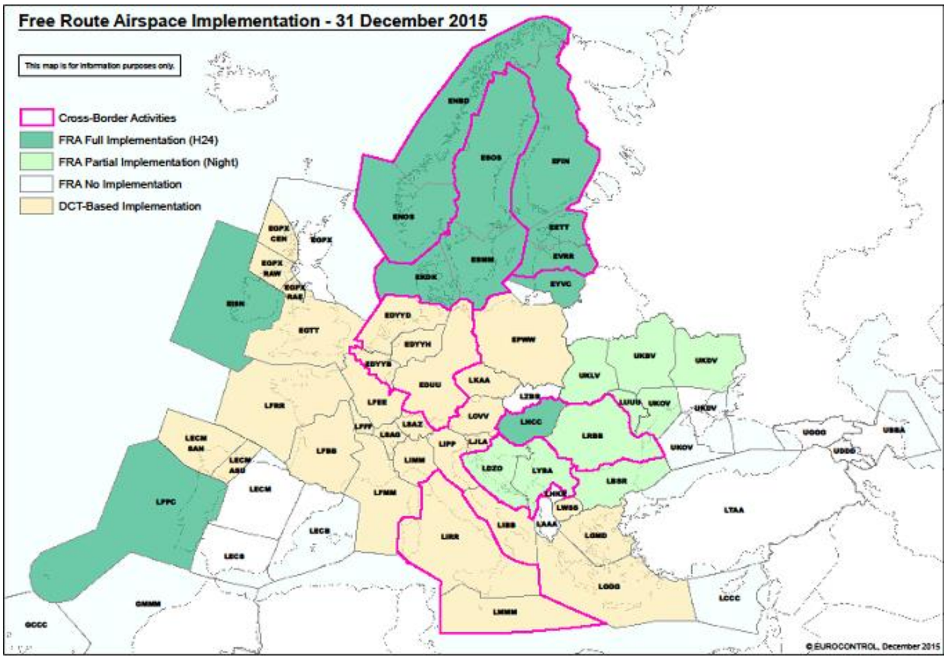


Figure 57: Map –Free Route Airspace Deployment until end 2015.

7.6 ROUTE AVAILABILITY DOCUMENT (RAD)

The Route Availability Document (RAD) is a tool that addresses how the European network airspace may be used. According to the Commission Regulation (EU) No 255/2010[xx] the scope of the RAD is to be a common reference document containing the policies, procedures and description for route and traffic orientation.

The Network Manager Implementing Rule (Commission Regulation (EU) No 677/2011)[xxi] makes a clear reference that the European Route Network Improvement Plan shall include route network and free route airspace utilisation rules and availability.

The airspace design and airspace utilisation aspects were brought closer by the established multi-disciplinary Network Manager RAD Team guided by the Operational Stakeholders RAD Management Group.

The actions performed by the NM RAD Team have facilitated a pragmatic refinement of the RAD during 2015, with full cooperation of Operational Stakeholders, aiming to overcome weaknesses in airspace design and ATM system functionality and to ensure application of the remaining restrictions only where and when required.

The major RAD evolutions and developments in 2015 focusing particularly at network level and covering the entire NM area of responsibility were as follows:

- Withdrawal of NOTAM requirement for announcement of “last minute” changes (changes after AIRAC -6 day) and imposing coordination via e-mail;

- Reduction of the RAD Publication from 34 days (D -34) in advance of the relevant AIRAC cycle to 28 days (D -28) and harmonisation of publication and cut-off RAD dates;
- Numbering the “Increment File” publications (Version number);
- Use of RAD for Special Events;
- Availability of the NM DCT / CDR mapping tool;
- Initiation of NM Release development related to Airspace Utilisation Rules and Availability (AURA) interactive process via the NOP and use of the NOP Portal as a collaborative platform to build the RAD - AURAxxii@n-CONECT;
- Publication of harmonised text in regard to promulgation of RAD via the State AIPs.

The other RAD evolutions and developments in 2015 included the following aspects (not exhaustive):

- Appendix 4 improvements in coding allowing expansion in DCT IDs;
- Appendix 5 swap from “word” to “xls” format and further content improvement;
- Harmonisation of RAD Pan-Europe Annex - SKI season definition;
- Creation of a single Network wide European Airport Connectivity containing all general arrival / departure information, arrival procedures and departure procedures;
- Finalisation of RAD Terms and Definitions used in a common document;
- Further development of the RAD DCT Chart;
- Further adaptations in the RAD Harmonization Rule (RHR-1);
- Establishment of clear identification rule for all “Yes” DCT in Appendix 4;
- Continuation of harmonisation of terminology and definitions;
- Continuation of improvements in data structure and format, and change management;
- Continuation of improvements in RAD availability (publication) to users;
- Continuation of rationalisation of restrictions expression;
- Continuation of the pdf RAD publication.

Further RAD improvement measures have been proposed for implementation in 2016 such as:

- Gradual removal of “Indention” used as RAD Utilization definition;
- Further adaptation of the time expression and harmonisation in entire RAD;
- Further adaptations of Pan-Europe Annex and simplification of existence of two or more restrictions for same RAD “reference”;
- Further adaptation and simplification of Appendix 3;
- Finalisation of RAD Terms and Definitions used in a common document;
- Continuation of NM Release development related to Airspace Utilisation Rules and Availability (AURA) interactive process via the NOP and use of the NOP Portal as a collaborative platform to build the RAD.

7.7 CONTINUOUS CLIMB/DESCENT OPERATIONS (CCO/CDO)

Environmental restrictions are now in place at most European airports. It is likely that the number of restrictions will continue to grow, resulting in a negative impact on the optimum network performance. One major mitigation measure is the implementation of the Continuous Climb/Descent Operation (CCO/CDO) technique that offers an early opportunity to minimise the environmental impact of aircraft operations.

The rapid deployment of CDO throughout Europe, even on a limited basis (limited by hours of operation and commencement height), will empower the network to respond to the environmental challenges. This response will be enhanced by evolving CDO to be enabled with more frequency and from higher levels (the ultimate aim being from top of descent). This will be achieved by changes to the airspace architecture and the widespread availability of harmonised support tools for controllers, which will ensure lateral and/or vertical segregation without impeding the optimum profile.

In addition, the European ATM Master plan states that amongst the Deployment Baseline changes, CCO/CDO are key contributors to performance.

By the end of 2015, 89 airports have published Continuous Descent Operations in the relevant AIPs during some part of the day or night and mainly from intermediate levels at this stage. Several airports have CDOs from 'top of descent' if traffic permits and a number of airports continue to look at extending times and levels for CDOs within their airspace reorganisation plans. Moreover, 51 airports either intend (9) or indicated to have implemented (42) CDO operations. Trials have been conducted successfully and have led to the introduction of CDO procedures.

In 2015, a Task Force was established to recommend parameters for the measurement for CCO/CDO operations. These parameters will be used to measure CDO/CCO performance within the network.

During 2016 work will continue to support deployment (albeit to a more limited extent than previously), with a focus being placed on addressing matters such as CDO monitoring, definitions, awareness and training. The community and NM increasingly recognise the contribution of CCO/CDO in the context of overall flight efficiency.

8 NETWORK MANAGER

In addition to the network targets defined for 2015, NM Performance Plan defines a set of internal NM performance objectives/targets, to measure NM's contribution to the ATM network performance. In the Capacity performance area NM has the target to reduce the en-route ATFM delays by 10%.

NM Operations Centre (NMOC) looks for opportunities to reduce the delays by means of proposing alternative routes (RRPs) to the airlines, manually optimising the calculated time over (CTO) or take-off times (CTOT) (these are the direct delay reduction actions). The manual CTOT changes are performed in conjunction with the FMPs/AOs and are therefore regarded as confirmed delay reductions. Re-route proposals can only deliver delay benefit if the AO accepts the proposal - this is monitored in post-ops. These techniques reduce delays at individual flight level and deliver further delay reductions at network level through the CASA optimisation algorithm (indirect 'snowball' effect). While it is currently possible to measure the direct delay reductions initiated by NMOC, it is not possible to quantify the indirect delay reduction effect of the direct actions. The amount of delay reduced by NMOC pre-tactical planning process and the applied scenarios cannot be quantified either.

In the Flight Efficiency (FE) area, there were no specific objectives/targets in RP1, however, in order to support the official FE performance targets for RP1, NMOC initiated a flight efficiency initiative that started in May 2013 with tangible FE benefit. These indicators are explained below.

8.1 CAPACITY (DELAY REDUCTIONS)

In 2014, NMOC actions saved 1,094,350 min of ATFM delay, 75% of all savings were on En-route and 25% on Airport delays.

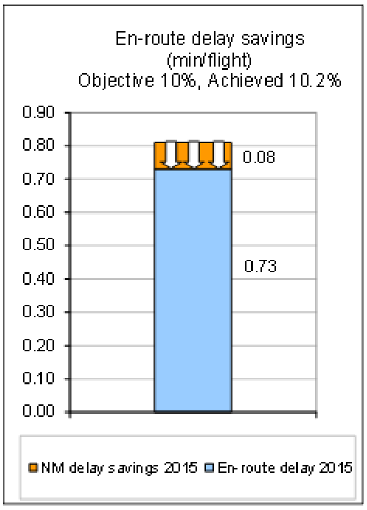


Figure 58: NMOC Delay Savings - 2014

The en-route savings of 816,625 minutes represents 10.2% of the en-route ATFM delays over the year (better than the target of 10%) and also represents a reduction of 0.08 minutes of en-route delay per flight. Reduction of the airport ATFM delays per flight was 0.03 minutes (3.9% of the total airport ATFM delay). Overall delay reduction by accepted re-routing proposals was 139,790 minutes.

8.2 ENVIRONMENT (FLIGHT EFFICIENCY)

The results offered by the implementation of Flight Efficiency improvement measures have to be strengthened and maximized by means of their integration into some important projects that have been started and that are in an advanced phase of development, with an implementation date expected in the short/medium term:

- Italy:
    - FAIR-IT Free Route Airspace Italy, Phase 2.
    - Italian Airspace re-organisation, Phase 3
    - Re-organisation of Roma TMA.
    - Reorganisation of Milano TMA, Phase 2
- Czech Republic:
    - Free Route Airspace Praha/ FRAPRA, Step 2
    - Optimization of LKAA lower airspace structure (changing division flight level between low sector and APP Brno, Karlovy Vary, Ostrava and re-design of TMAs Brno, Karlovy Vary, Ostrava and Praha)..
- France/ Spain:
    - Marseille ACC re-organisation.
    - Paris ACC re-organisation - Phase 1
- Hungary:
    - Hungarian Free Route Airspace/ HUFRA Budapest ACC.
- Portugal:
    - Lisboa ACC West-sector split.
- Spain:
    - Canarias TMA developments – new SID/STARs.
    - New Castellon airport (LECH)
    - Modification of Barcelona TMA
    - Sector split in Barcelona ACC.
- United Kingdom:
    - Direct Route Airspace Prestwick - Phase 1, above FL255 in 3 sectors.
    - Relax level capping restriction for traffic between Manchester TMA to Paris TMA during the winter months
- Ukraine:
    - Night Free Route Airspace operations above FL275 within individual UTAs in Ukraine (from 20.00-05.00 (21.00-04.00)).
- Austria:
    - New Wien ACC sectors – AWARD
    - Free Route Airspace Wien, FRAW, Stage 4a (additional DCTs).
- France/ UK:
    - New UK - Brest interface/ IBP project.
- Maastricht UAC:
    - Olno-High stand-alone sector.
- Croatia
    - Lateral and vertical implementation of Central sector FL355 and above.
- Moldova
    - Extension of time availability of NIGHT Free Route Airspace within Chisinau FIR.
- Serbia

  - Introduction of RNAV 1 procedures in Beograd TMA
- Republic of Croatia, Bosnia and Herzegovina, Montenegro and Republic of Serbia
  - SEAFRA: Night FRA cross border application in Zagreb ACC and Beograd ACC AoRs, FL325 and above.
- Bulgaria/ Turkey:
  - ADORU / VADEN / IBLAL area re-organization between Bulgaria and Turkey.
- Turkey:
  - Transfer of current Ankara, Istanbul and Izmir ACCs into new OPS rooms with a new ATC system
  - Transfer of Istanbul ACC and Izmir ACC to new Ankara ACC, FL245 and above
  - Introduction of P-RNAV SIDs/STARs for Milas/Bodrum (LTFE) airport.
- Malta/Italy:
  - Implementation of H24 DCTs, cross border with Roma UIR (Free Route Airspace Malta Phase 2).
- Germany
  - Re-aligned EDDM arrivals for MIL off (shorter route option and improved vertical profiles at the interface between Karlsruhe ACC, Munich ACC and Langen ACC).
- Hungary/Romania:
  - Implemented NIGHT cross-border Free Route Airspace between Bucuresti ACC and Budapest ACC (N-FRAB).
- Norway/United Kingdom
  - Airspace class D implemented in Balder CTA to improve the safety of operations on the continental shelf.
- Estonia, Finland, Latvia and Norway (NEFAB Free Route Airspace)
  - Implementation of H24 Free Route Airspace across NEFAB above FL95/FL135 to further improve the airspace structure between Norway FIR, Finland FIR, Tallinn FIR and Riga FIR
- Greece
  - Implementation of Night DCTs for Hellas UIR, FL355 and above (2100 - 0400 UTC).
- Austria, Germany
  - Allowing new route options (missing and cross border DCTs), improving flight efficiency for major European flows crossing more than one FAB (at the SE axis from/to UK to/from South East Europe/Middle East)
- France, Germany, Switzerland
  - Implementation of a number of cross-border DCTs to improve flight efficiency within FABEC
- Lithuania
  - Implementation of H24 Free Route Airspace FL245 and above in Vilnius ACC

With the support of the FE Cell (set up to help AOs and Flight Planning Service Providers to optimize the utilisation of the opportunities) new available routing solutions were offered to airspace users, taking into the account different rerouting need for shorter and cheaper flights resulting in significant NM savings. Dedicated RRPs for FE improvements were implemented in NM systems and proposed to the airlines

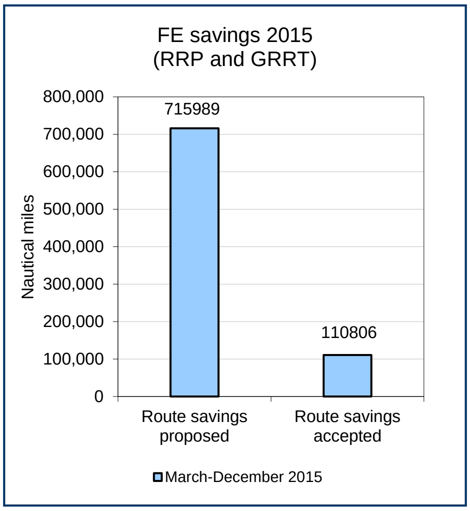


Figure 59: Flight efficiency initiative total gains

Figure 59 shows the average daily proposed and accepted savings in the March-December 2015, since new FE RRPs were implemented in the NM system. With the additional 22,850 nautical miles saved in January-February and from the CDR2 opening proposals the total saved in 2015 is 133,650 nautical miles. This translates into a total gain of 802 tons of fuel or 2,673 tons less of CO2 and €668,250 savings. NM will work with the airline to increase the acceptance rate of the NM proposals.

9 ATFM COMPLIANCE

9.1 ATFM DEPARTURE SLOTS

The overall percentage of traffic departing within their Slot Tolerance Window (STW) was 88.1% in 2015, meeting the target of 80%. However, many airports did not meet the target (see ATFM Compliance - ATFM Departure Slot Monitoring report). It is an improvement over 2014 where the compliance percentage was 87.9%. NM is working with the ANSPs for improving the level of adherence.

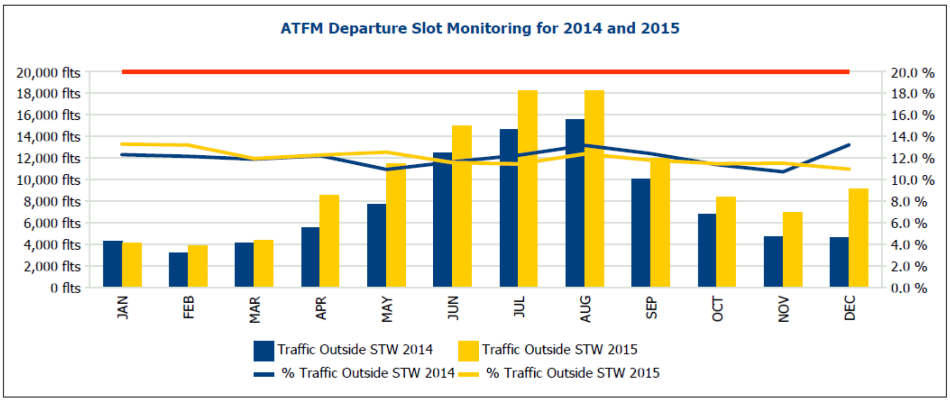


Figure 60: ATFM Departure Slot Monitoring for 2014 and 2015[xxiii]

9.2 ADHERENCE TO FLIGHT PLAN SUSPENSIONS

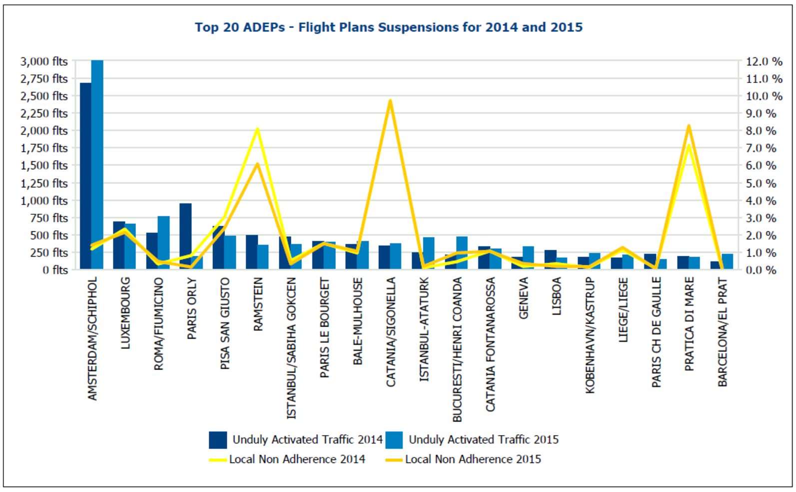


Figure 61: Top 20 ADEPs - Flight Plans Suspensions for 2014 and 2015

The percentage of flights suspended by FAM (Flight Activation Monitoring) but which were activated by airborne data received whilst the flight was temporarily suspended remained at the same level in 2015, 0.26% of all departures. Figure 61 shows the top airports where such situations occurred, as well as the percentage of these flights within the total number of flights at that airport. The introduction of Airport CDM has proven to be the most effective measure in bringing down the number of such flights.

9.3 ATFM EXEMPTIONS

The overall European percentage of ATFM exempted flights increased again in 2015 to reach 0.63% of all departures, which is above the target of 0.6% (the percentage was 0.59% in 2014). There are 22 EUROCONTROL Member States in 2015 that granted exemptions in excess of 0.6% of the State's annual departures (EU Member States will be formally notified). NM will discuss any network considerations with the State and service provider concerned.

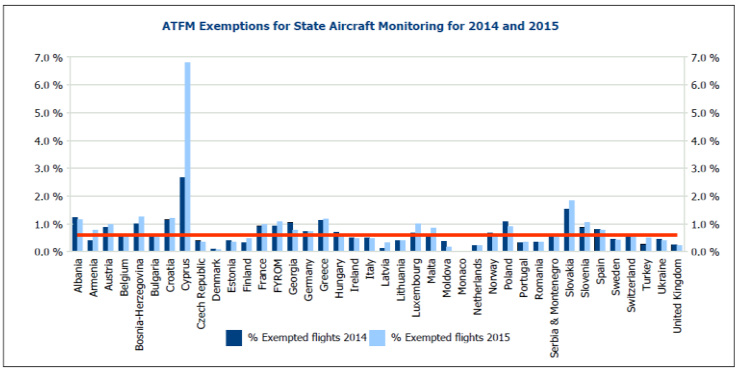


Figure 62: ATFM Exemptions for State Aircraft Monitoring for 2014 and 2015[xxiv]

9.4 MISSING FLIGHT PLANS

Figure 63 presents the evolution of the number and percentage of Missing Flight Plans – APL Flights identifying those flights that entered the European airspace without a flight plan (i.e. no initial flight plan was filed successfully in IFPS) and an ATS Unit filed the Flight Plan. The percentage of such FPs in the total remained again stable in 2015 at 0.06% (as it was in 2014 and 2013)

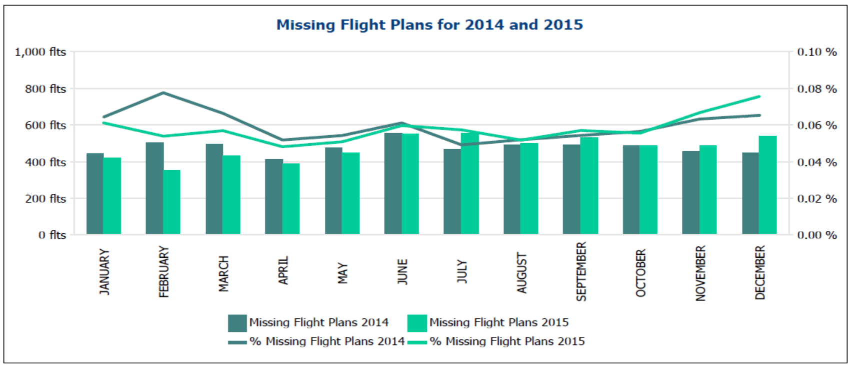


Figure 63: Missing Flight Plans for 2014 and 2015

9.5 MULTIPLE FLIGHTS

NM is using the data from Flight Activation Monitoring to identify possible multiple flight plans by measuring the number of flight plans received for which no subsequent activation or airborne information is received. Figure 64 presents the evolution of numbers and proportion of these flights within the total traffic. The number and percentage of these flights slightly increased in 2015. NM reviews the causes and the network impact of such cases and contacts the airlines or FP originators when necessary.

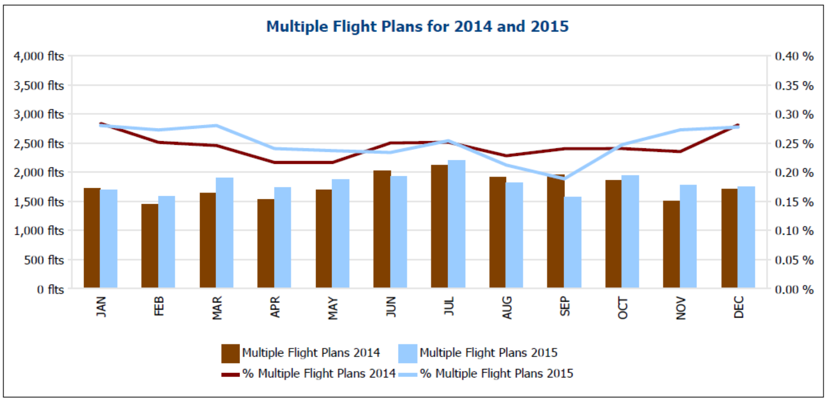


Figure 64: Multiple Flight Plans for 2014 and 2015

10 REFERENCES

EUROCONTROL Update of the Seven Year IFR Movements and Service Units Forecast 2015 – 2021, STATFOR Document 568, September 2015.

EUROCONTROL Update of the Seven Year IFR Movements and Service Units Forecast 2015 – 2021, STATFOR Document 553, February 2015.

(see: **www.eurocontrol.int/statfor**)

Transition Plan for major Projects in Europe 2013-2014.

Transition Plan for major Projects in Europe 2014-2015.

European Network Operations Plan 2015 – 2019 (**http://www.eurocontrol.int/publications/european-network-operations-plan-2015-2019**).

Network Operations Report 2014 (See **http://www.eurocontrol.int/publications/annual-network-operations-report-2014**)

i EUROCONTROL Forecast of Annual Number of IFR Flights (2015 - 2021) February 2015
ii The "effective capacity" indicator corresponds to the volume of traffic that could be accommodated with an average of 1 min en-route delay/flt, taking into account all causes. It is described in PRR 5, Annex 6.
iii EUROCONTROL Industry Monitor, the EUROCONTROL bulletin on air transport trends
Issue N° 173. May 2015.
iv network traffic here refers to all IFR movements excluding overflights.
v Summer is referring to May-August 2015 period in this part.
vi Note that, on this graph, ticket prices are deflated by overall consumer prices.
vii See http://www.eurocontrol.int/articles/ir691-data-collection-process
viii Source: Media Relations Lufthansa Group Press Release, 12 November 2015:
https://www.lufthansagroup.com/en/press/newsreleases/singleview/archive/2015/november/12/article/3832.html
ix NM estimation.
x Does not included postponed projects and should not be considered as exhaustive – see 'Transition Plan for major Projects in Europe 2014-2015' and 'Transition Plan for major Projects in Europe 2015-2016' for more information.
xi The main source for the event description is the NM ATFM Regulation (ANM) remark.
xii The required en-route delay/flight performance to achieve annual network delay target in 2015 (0.5 min/flight), also known as "delay breakdown".
xiii Forecast delay based on 2015 NOP capacity planning excluding disruptions such as industrial action and technical failures.
xiv Average delay per flight, expressed in minutes, for all ATFM delay reasons.
xv Base traffic forecast used for NOP capacity planning, variation in % compared to 2014.
xvi Morocco is not included in the NOP capacity planning process.
xvii For the period April and October 2015.
xviii Departure Management integrating Surface Management Constraints, Automated Assistance to Controller for Surface Movement Planning and Routing, Airport Safety Nets.
xix https://www.eurocontrol.int/articles/airspace-developments-and-flight-efficiency-plan-fep
xx http://www.skybrary.aero/index.php/Regulation_255/2010_-_Common_Rules_on_Air_Traffic_Flow_Management
xxi http://www.skybrary.aero/index.php/Regulation_677/2011_laying_down_detailed_rules_for_the_implementation_of_ATM_network_functions
xxii Airspace Utilisation and Route Availability (AURA)
xxiii Geographical Zone : NM or Adjacent Member States
xxiv Geographical Zone : Eurocontrol or EUR28 Member States