Air Quality around Heathrow Airport

Q4 2017 Briefing and End of Year Summary

Background

Heathrow Airport Ltd (HAL) began an air quality monitoring programme in 1993. Today HAL owns and operates one on-airport monitor and funds three other monitors around the airport. Data from these four continuous monitoring stations, as well as eight other continuous monitors operated by local authorities and DEFRA within 2km of the Airport, are shared and summarised on heathrowairwatch.org.uk.

Air quality management is a key priority for HAL and we continue to work in partnership with our key stakeholders – especially local authorities and national Government – to reduce emissions from all sources in the area in order to meet the EU & UK limit values. The main pollutants of concern around Heathrow are measured at all stations – nitrogen dioxide (NO_2) and particles (measured as PM_{10} and $PM_{2.5}$).

Headlines

Key information for this quarter is:

- Data for all stations summarised in this report are still provisional and have not yet been ratified for the full year;
- NO_2 concentrations slightly increased only at three of the monitoring sites between 2016 and 2017. They decreased or remained the same at every other site;
- The annual mean NO_2 concentration remained below the EU limit values at 9 of the 11 monitoring sites outside the airport boundary within 2km of Heathrow. NO_2 concentrations only remain above EU limits at Hillingdon and Hayes monitoring stations, north of the M4 (airport emissions from all sources contribute 16% and 6% of total NO_X at these stations, respectively);
- The hourly mean NO_2 limit value was not exceeded at the continuous monitoring stations. 18 hourly exceedances of 200µgm^{-3} are allowed per year before the limit value is breached for a given location;
- The daily mean PM_{10} limit value was also not exceeded at the continuous monitoring stations. 35 daily exceedances of 50µg m^{-3} are allowed per year before the limit value is breached for a given location. Heathrow LHR2 recorded seven daily exceedances of 50µgm^{-3} PM_{10} in 2017; and
- The number of aircraft movements made by the newest aircraft (CAEP8) has increased to 23.41% in 2017 and the percentage of continues to rise (see Fig. 2).

Measured Concentrations

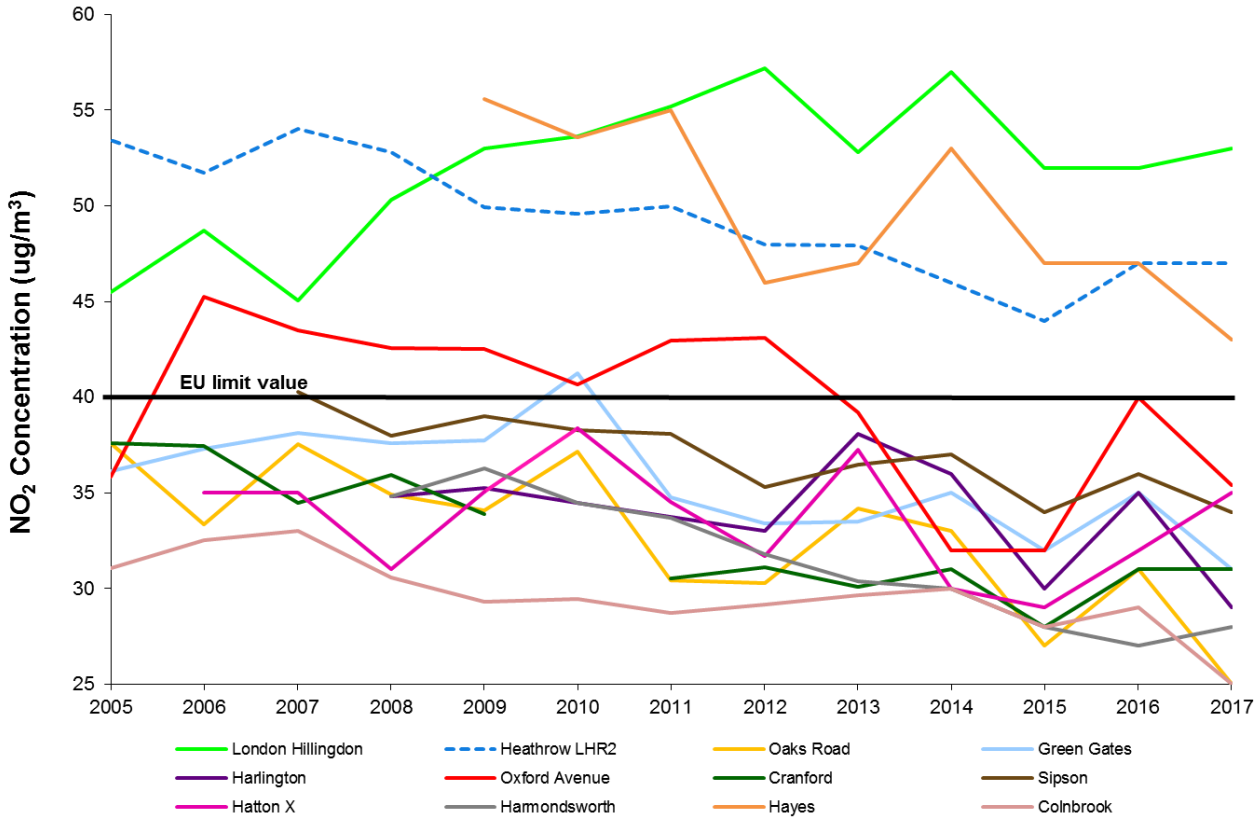
Air quality monitoring is carried out at 12 continuous automatic monitoring stations within 2km of Heathrow. Details of these monitoring stations, including an interactive map of their locations, are available at heathrowairwatch.org.uk.

For a strict comparison against EU limit values and air quality objectives, data capture should be >90% over a calendar year. The annual mean EU limit value for both NO_2 and PM_{10} is 40µgm^{-3}. The hourly mean limit value for NO_2 is 200µgm^{-3}, not to be exceeded more than 18 times per calendar year. The daily mean limit value for PM_{10} is 50µgm^{-3}, not to be exceeded on more than 35 days per calendar year. Table 1 provides a summary of the results from each station within 2km of Heathrow's boundary as well as the location type describing the environment. The data shown are provisional. Fig. 1 presents annual average NO_2 measurement trends at sites either on or close to the airport.

Table 1. Summary of continuous monitoring sites within 2km of Heathrow and provisional results in 2017

Monitoring station	Owner	Location Type	2017 Average NO_2 (µgm^{-3})	Hourly NO_2 exceedances (hours)	Daily PM_{10} exceedances (days)
Heathrow LHR2	Heathrow	Airport	47	12	7
Harlington	Heathrow	Urban Industrial	29	0	3
Green Gates	Heathrow	Airport	31	0	3
Oaks Road	Heathrow	Airport	25	0	4
London Hillingdon	Defra	Urban Background	53	0	N/A
Hayes	Hillingdon	Roadside	43	5	28
Harmondsworth	Hillingdon	Urban Background	28	2	6
Oxford Ave	Hillingdon	Urban Background	35	1	3
Sipson	Hillingdon	Urban Background	34	0	N/A
Hatton Cross	Hounslow	Roadside	35	8	2
Cranford	Hounslow	Suburban	31	10	
Colnbrook	Slough	Suburban	25	0	4

Figure 1. Measured annual average NO_2 concentrations around Heathrow since 2005



Key information from this data is:

- Data for 2017 still provisional;
- NO_2 concentrations slightly increased only at three of the monitoring sites between 2016 and 2017 (Harmondsworth, Hatton Cross and London Hillingdon). They decreased or remained the same at every other site;
- Two sites exceeded the NO_2 annual mean EU limit value outside of the airport boundary:
    - London Hillingdon is mainly affected by emissions from traffic on the M4. The NO_2 concentration recorded in 2017 was 53µgm^{-3} (slight increase from 2016). Modelling has shown that airport related emissions (including airport-related traffic) contribute 16% of measured NO_X concentrations at this site;
    - The concentration at Hayes, located 1.9 km to the northeast of the airport, decreased from 47 to 43µgm^{-3} between 2016 and 2017. Emissions at Hayes are also dominated by road traffic. Heathrow emissions contribute less than 6% of total NO_X measured at this site; and
- LHR2 (blue dotted line), located on the airport next to the northern runway, has shown a general decline in concentration since installation in 1993, even though air transport movements (ATMs) have increased over the same period. Annual average NO_2 was 47µgm^{-3} in 2017, the same as in 2016. The EU limit values for ambient air quality are not applicable at LHR2 as members of the pubic do not have access to the site.

Monitoring at HAL Sites

Table 2 provides a summary of measured data capture from HAL's four monitoring sites. Year-end data capture at HAL's monitoring sites remained above 90% for all pollutants monitored.

Table 2. 2017 data capture at HAL-funded monitoring sites

Monitoring station	NO_2 data capture	PM_{10} data capture	$PM_{2.5}$ data capture
Heathrow LHR2	95.7%	99.8%	99.8%
Harlington	98.7%	99.8%	99.8%
Green Gates	99.6%	99.6%	99.6%
Oaks Road	99.1%	98.0%	98.0%

Emission Reduction Efforts

We successfully reduced annual ground-based nitrogen oxides (NOx) emissions by 430 tonnes (16%) between 2009 and 2013[1] as part of our commitment to playing our part in improving local air quality. These reductions were achieved through a combination of efforts to reduce emissions from every major source, including aircraft, vehicles, and heating.

CAEP standard of aircraft movements

Through its Committee on Aviation Environmental Protection (CAEP), the International Civil Aviation Organization (ICAO) sets new emissions standards for aircraft engines – including for NO_x. Engine models which were certified on or after 1 January 2014 must meet CAEP8, the latest standard for NOx.

Fig.2. shows the proportion of aircraft movements at Heathrow based on CAEP standards. The proportion of flights made by newer, cleaner aircraft (CAEP6 or better) increased from 57.58% in 2016 to 59.29% at the end of Q4 2017. CAEP8 only movements increased to 23.41%. The trend is expected to continue as airlines proceed in replacing their older, higher emission aircraft and Heathrow's NO_x emission landing charges and engagement encourages the use of best-in-class aircraft.

[1]http://www.heathrowairwatch.org.uk/documents/Heathrow_Airport_2013_Air_Quality_Assessment_Detailed_Emissions_Inventory.pdf

Figure 2. Total aircraft movements since 2010 by CAEP standard