



Air Quality

Heathrow Expansion Factsheet 4

What impact would a new runway at Heathrow have on Air Quality?

The UK as a whole is already breaching legal air quality standards. Reducing these levels is challenging, and may be costly. Expanding Heathrow would increase local air pollution as the number of flights and passenger land based journeys to and from the airport rise. This could affect over 100,000 additional people.

Given that existing airport operations already result in a breach of legal air pollution limits, it seems unlikely that a third runway could be built while remaining within the law.

Why does it matter?

1. Poor air quality affects human health. Two air pollutants in the UK pose the greatest threat: nitrogen dioxide (NO₂), and particulates (PM₁₀ and PM_{2.5}). NO₂ is especially problematic for people sensitive to changes in air quality, such as asthmatics. It is also a precursor to more harmful particulates, such as PM₁₀ and PM_{2.5}, which can penetrate deep into the lungs causing cardiovascular problems.
2. Poor air quality threatens ecosystems. NO_x – a term for all nitrogen oxides, which include NO₂ and NO (Nitric Oxide) – is the greatest threat, altering nutrient availability for plants and causing acid rain.
3. The UK is currently in breach of air quality standards [\[1\]](#). It is required by a UK Supreme Court Judgement to show, by the end of 2015, how it will achieve compliance as soon as possible. Largely because of the impact of increases in road transport, Heathrow expansion will worsen air pollution unless mitigation measures are identified that can be shown to work, and that do not further delay removal of existing excesses, and that are affordable. If these cannot be identified, then Heathrow expansion is not deliverable. The Government cannot knowingly approve a plan for expansion without a realistic plan to put breaches right.
4. Fines payable for non-compliance would affect the business case for investment in expansion. Investment in expansion that may later find its income stream curtailed by statutory pollution limits increases risk and thereby reduces available finance and increases cost.

Where does air pollution come from?

5. The sources of NO_x and particulates include aircraft engines, brake and tyre wear, auxiliary power units (APUs), ground support equipment, and road traffic. The primary source of increased NO_x emissions in proximity to Heathrow is aircraft engines. But as these are generated at elevated heights, their impact on local air quality at ground level is reduced. The most significant emissions of NO_x derive therefore from road traffic around the airport.

Where does it matter?

6. The pollutants cause greatest harm where they accumulate close to a sensitive “receptor” such as a school, and are not dispersed, particularly if exposure extends over a period of time – for example averaged over a year.

What controls exist?

7. There are international, national and local control measures. See Annex 1 for details of controls for human health.

8. The Airports Commission's stated objective in appraising air quality is "to improve air quality consistent with EU standards and local planning requirements" (our italics). The National Planning Policy Framework (NPPF) states that sustainable development should contribute to *reducing* pollution (our italics) [2]. The National Policy Statement for National Networks, specific to nationally significant infrastructure projects, requires the Secretary of State to "give air quality considerations substantial weight" [3].

What's the current UK compliance record?

9. The UK is currently failing to comply with air quality requirements. A UK Supreme Court Judgement has ruled that the UK Government must show, by the end of 2015, how it will comply as soon as possible [1].
10. Pollution levels around Heathrow have been exceeding internationally agreed standards for some time. In 2014 Defra updated forecasts for compliance and suggested that compliance will now not be achieved until post 2030. The reason for the delay in compliance is stated by Defra as: "This is largely due to the failure of the European vehicle emission standards for diesel cars to deliver the expected emission reductions of NOx" [4].

What's the impact of Heathrow expansion?

11. The Airports Commission said in its 2014/15 consultation "Due to the increase in harmful emissions forecast to result from both the NWR and ENR schemes the Commission judges that without mitigation measures the scheme performance is *significantly adverse* in relation to the objective of improving air quality consistent with EU standards and local planning policy requirements." [5]
12. The subsequent report on air pollution by Jacobs in May 2015 examines possible mitigation measures [6]. It appears however to under-estimate the pollution generated by surface access and the mitigation measures identified do not clearly demonstrate that the *significantly adverse* performance can be improved. This needs further testing.

What are the proposed mitigation measures for compliance?

13. A summary of the Jacobs report findings on levels of continued non-compliance as a result of Heathrow expansion is at Annex 2. It shows that without mitigation measures, expansion at Heathrow will lead to further non-compliance by 2030 for PM_{2.5} and NO₂, two of the pollutants of most concern for human health. The numbers of people affected by increased NO₂ pollution would be 121,377 for the Heathrow North West Runway (Heathrow NWR) option and 100,389 for Heathrow Extended Northern Runway (Heathrow ENR). (See the Jacobs report Executive Summary pages iii and iv [6]).
14. The Jacobs report casts doubt on the deliverability of the mitigations proposed by the Promoters of each of the runway options. Of the 8 mitigation measures proposed for Heathrow NWR, the report suggests 5 are questionable (see para 5.6.3, pages 72-76 of the Jacobs report [6]). Of the 9 measures proposed for Heathrow ENR, the report suggests 5 are questionable (see para 6.6.3 pages 96-101 of the Jacobs report [6]). The Jacobs report proposes some alternative, but untested, mitigations (see paras 5.6.4 and 6.6.4, pages 78-79 and 101-103 of the report) which *might* improve compliance. It recommends a focus on aircraft brake and tyre wear and APUs to control emissions of PM_{2.5} and road traffic emissions of NOx along Bath Road, the A4 and the M4 in Hillingdon. This may include traffic management and/or re-routing.

What are the risks to scheme delivery?

15. Compliance with air quality standards is a requirement that must be shown to be achievable to make any expansion scheme deliverable. Unlike some other criteria for the expansion scheme, air quality is restricted by absolute limits. There can be no trade-offs. A comprehensive risk appraisal is needed, with a safety margin for delivery. This should cover both the level of excesses and the delay in meeting the statutory limits. This analysis is not available.
16. There is a significant risk that the Gothenburg agreement and other targets may be tightened in future, increasing the risk of excesses.

What are the risks to people?

17. Any increase in air pollution impact after taking account of mitigation measures is contrary to the stated aims of the Airports Commission to improve air quality and to the requirements of sustainable development. The number of people experiencing an increase in local pollution as a result of Heathrow expansion could be over 100,000 as suggested by the Jacobs report figures in Tables 5.6. on page 65 (Heathrow North West Runway) and 6.6 on page 90 (Heathrow Extended Northern Runway) [6]. This estimate may be higher if the under-provision of surface access capacity and consequential road congestion and pollution are taken into account.
18. An analysis of people exposed to air pollution needs to take account of:
 - population growth in the area. It is not clear that the population growth assumed in the health impact valuation for the Commission is that used in the surface access analysis or contained in the latest London Plan;
 - those where the increased pollution levels remain under the statutory limits;
 - those where exposure is currently below statutory limits but as a result of Heathrow expansion are newly exposed to excesses;
 - those people already exposed to pollution above the limits;
 - the effects on people especially vulnerable to pollution exposure;
 - the health impact in monetary values. The Jacobs report accepts there are uncertainties in their valuation. If road congestion and pollution levels have been under-estimated, the negative health impact will be even further undervalued.

What assessment has been made of road transport and air quality?

19. Surface access has a significant impact on levels of pollution. There are a number of gaps in the analysis so far undertaken which need to be addressed before any decision is made:
 - the study period for air pollution impacts used by Jacobs in their report for the Airports Commission is 15 years, to 2030. This ignores the significant growth in passenger demand thereafter. Based on the Commission's global growth carbon traded scenario, there is a further 40% growth in terminating passenger numbers after 2030. Compared to today the number of terminating passengers are predicted to double by 2050. It is not clear that pollution levels will be lower and not exceed statutory limits after 2030;
 - the background growth in population in London (37% London wide by 2050) [7] will also affect road transport levels and therefore air pollution. This does not appear to have been taken into account;

- the analysis relies on cleaner technology which has a history of implementation delays. In 2014 Defra suggested compliance would not be achieved until after 2030 [\[8\]](#). It gave the reason as *“This is largely due to the failure of the European vehicle emission standards for diesel cars to deliver the expected emission reductions of NO_x”*. The Sunday Times (25 May 2015) revealed that the Euro 6 standard which applied to all new cars from September 2014 is a failure with the majority of new cars exceeding the standard by a wide margin. The Sunday Times quotes a spokesman for Patrick McLoughlin, the Transport Secretary, saying the EU emissions standards had clearly failed. *“The main reason NO₂ breaches are so high across Europe is because the Euro emissions standards for diesel cars failed to deliver expected reductions in NO₂ in real life”*;
- an analysis of minor road and freight transport, which both impinge on the pollution analysis, do not appear to have been included;
- the presumption by the Commission that the southwest rail access (via Richmond) is achievable could be over-optimistic given the issues with level crossings harming road traffic previously identified. Without this extra rail capacity, road congestion and pollution are likely to be higher;
- the Commission has not made clear what the cost would be of providing adequate surface access capacity;
- the Commission has not made clear what the cost would be in terms of pollution impact or the adequacy of service levels of not providing sufficient surface access capacity;
- the surface access mitigation measures in the current analysis (Tables 5.16 NWR and 6.16 ENR in the Jacobs report [\[6\]](#)) do not go far enough in reducing pollution on a timely basis. In fact no timetable is included. Most of the measures concern changes to air-side ground operations and flight operations and while not unimportant these do not deal with road congestion. Heathrow Airport Ltd has proposed a congestion zone and the Commission has considered an Ultra-Low Emissions Zone. However, the outcomes are uncertain and do not appear to have been tested against the higher levels of road congestion identified above. Mitigation, generally speaking, can be bought, but the question is whether it can be afforded at a cost of £20bn estimated by TfL [\[9\]](#). The levels of expenditure required are unlikely to be within Heathrow’s financial capability without substantial state aid (See *Fact Sheet 2 - Financial Deliverability* and *Fact Sheet 7 - Surface Transport*). If they cannot be afforded, then road congestion and air pollution will worsen, breaching legal limits.

Annex 1: Air Quality Pollutant Limits

International

1. The Gothenburg protocol 13 [\[10\]](#) is part of the Convention on Long-Range Trans-Boundary Air Pollution - an international agreement to protect human health and the environment from air pollution by control and reduction of local and long-range air pollution. In 2012, EU Member States agreed a set of revisions to the Protocol to reduce target levels for national emissions of four pollutants as well as Particulate Matter (PM_{2.5}) for 2020 and beyond.
2. EU Limit Values are legally binding EU parameters that must not be exceeded by Member States and were required to be met by 2010 in the case of NO₂ (Jacobs Table 2.1). Jacobs Table 2.1 page 13 gives dates from 2005 to 2020 [\[6\]](#). They are not being met in the UK and several other Member States.

National

3. The National Emissions Ceilings Directive (NECD) [\[11\]](#) sets national emissions ceilings to reduce the likelihood and effect of trans-boundary pollution. A proposal to tighten the NECD limits is under preparation and should set emissions to be respected by 2020 for the four already regulated substances and for the primary emissions of Particulate Matter (PM_{2.5}). Monitoring is undertaken by National government.

Local

4. Local air quality is evaluated by comparing concentrations of pollutants against EU ambient air quality directive limit values (EULVs) or air quality objectives (AQOs) set at locations where exposure harm to human health and ecosystems is thought to occur. The AQOs are nationally set policy targets established by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland [\[12\]](#) based on recommended guideline values from the World Health Organisation. They are often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of excesses within a specified timescale. Monitoring is undertaken by local authorities.

Annex 2: Predicted air quality results with Heathrow expansion

The Jacobs May 2015 assessment of compliance with *current* air quality standards by the UK is that the UK:

- Met the National Emissions Control Directive limits for NO_x to the last reported year (2012)
- Met the international Gothenburg targets in 2012 and is expected to meet the NO_x targets up to 2030, including the impact of either of the Heathrow 3rd runway options
- PM_{2.5} in 2030 is expected to be in exceedance by 103.63% of target for either of the Heathrow 3rd runway options
- NO₂ concentrations in 2030 are likely to exceed limits at locations along the M4 in Hillingdon. The dominant source of emissions at this site is road traffic
- PM₁₀ concentrations are anticipated to decline with no risk of exceedance.

(Figures taken from the Jacobs report Executive Summary page iii – for the NWR Scheme [\[6\]](#)).

References

- [1] Press Summary R (on the application of ClientEarth) (Appellant) v Secretary of State for the Environment, Food and Rural Affairs (Respondent) [2015] UKSC 28
https://www.supremecourt.uk/decided-cases/docs/UKSC_2012_0179_PressSummary.pdf
- [2] Department for Communities and Local Government National Planning Policy Framework (March 2012)
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
- [3] Department for Transport: National Policy Statement for National Networks (17 December 2014)
<https://www.gov.uk/government/publications/national-policy-statement-for-national-networks>
- [4] Defra: Updated projections for Nitrogen Dioxide (NO₂) compliance (2014)
http://uk-air.defra.gov.uk/assets/documents/no2ten/140708_NO2_projection_tables_FINAL.pdf
- [5] Airports Commission: Heathrow Airport North West Runway: Business Case and Sustainability Assessment (November 2014) (para 10.19 on page 122)
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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/374663/evidence-base-heathrow-airport-extended-northern-runway.pdf
- [6] Jacobs: Module 6: Air Quality Local Assessment: Detailed Emissions Inventory and Dispersion Modelling (May 2015)
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- [8] DEFRA: Updated projections for Nitrogen Dioxide (NO₂) compliance (July 2014)
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- [9] APPG: TFL response to APPG on surface access (27 March 2015)
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- [10] UNECE: Protocol to Abate Acidification, Eutrophication and Ground-level Ozone
http://www.unece.org/env/lrtap/multi_h1.html
- [11] Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants
<http://ec.europa.eu/environment/air/pollutants/ceilings.htm>
- [12] Defra et al: The air quality strategy for England, Scotland, Wales and Northern Ireland: Volume 2
<https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-2>