

Air Quality Research Briefing

June 2019



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National Assembly for Wales
Senedd Research

Air Quality

Research Briefing

June 2019

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Paper Overview:

Wales has some of the worst air quality in the UK. Cardiff and Port Talbot both have higher particulate matter levels than Birmingham or Manchester and a road in Caerphilly is the most polluted outside of London. This air pollution contributes to around 2,000 deaths per year in Wales. It has been described by Public Health Wales as an urgent public health crisis, second only to smoking. Some areas in Wales have breached EU regulations for several years, culminating in the Welsh Government being taken to court for its lack of action.

Unlike Scotland, which has its own Air Quality Strategy and lower pollution limits, air quality strategy in Wales has mostly been determined by EU regulations, and delivered by Local Authorities. The Welsh Government has intervened only in the Neath Port Talbot Air Quality Management Area. The announcement of a Clean Air Plan for Wales in 2018 does suggest that the Welsh Government is going to take more action on air quality.



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Introduction

Wales has some of the worst air quality in the UK. Cardiff and Port Talbot both have **higher particulate matter levels** than Birmingham or Manchester and a **road in Caerphilly** is the most polluted outside of London. This air pollution contributes to around **2,000 deaths per year in Wales**. It has been described by Public Health Wales as an urgent public health crisis, second only to smoking. Some areas in Wales have breached EU regulations for several years, culminating in the Welsh Government being taken to court for its lack of action.

Unlike Scotland, which has its own Air Quality Strategy and lower pollution limits, air quality strategy in Wales has mostly been determined by EU regulations, and delivered by Local Authorities. The Welsh Government has only intervened directly in the Neath Port Talbot Air Quality Management Area. The announcement of a Clean Air Plan for Wales in 2018 does suggest that the Welsh Government will take more action on air quality in future.

Background

What are the main air pollutants?

The primary air pollutants that impact health are nitrogen dioxide (NO₂), ozone (O₃) and other small, particulate matter (PM₁₀ for matter <10 µm in size or PM_{2.5} for matter <2.5 µm). These pollutants come from a range of sources, but the vast majority arise from the burning of fuels. This makes road transport the primary mobile source of emissions, and industrial combustion or production processes the main static sources.

NO₂ and particulate matter (PM) pollution levels are worse in areas close to these sources. PM typically reaches high levels near industrial sites, and NO₂ is measured at dangerous levels near busy and congested roads. Most NO₂ is emitted directly, making it a primary pollutant. PM can be emitted directly as a primary pollutant, but also forms from the reaction of other pollutants in the atmosphere (secondary pollutant).

In comparison, ozone can travel long distances and reach high concentrations in areas far from sources. As a result dealing with ozone levels requires a higher level approach, typically national or even international, compared to the Local Authority driven approach for reducing local spikes in NO₂ and PM. This is compounded by the fact that ozone is a secondary pollutant, making sources more difficult to identify.

There are a number of other air pollutants that are legislated on in Wales, but all of these occur significantly below EU limits and have limited public health impact. Historically sulfur dioxide (SO₂) levels were a major issue. SO₂ emissions have largely been eliminated, **falling by over 90 % over the last twenty years across the UK**, a success story for EU air quality regulations.

Air quality in Wales

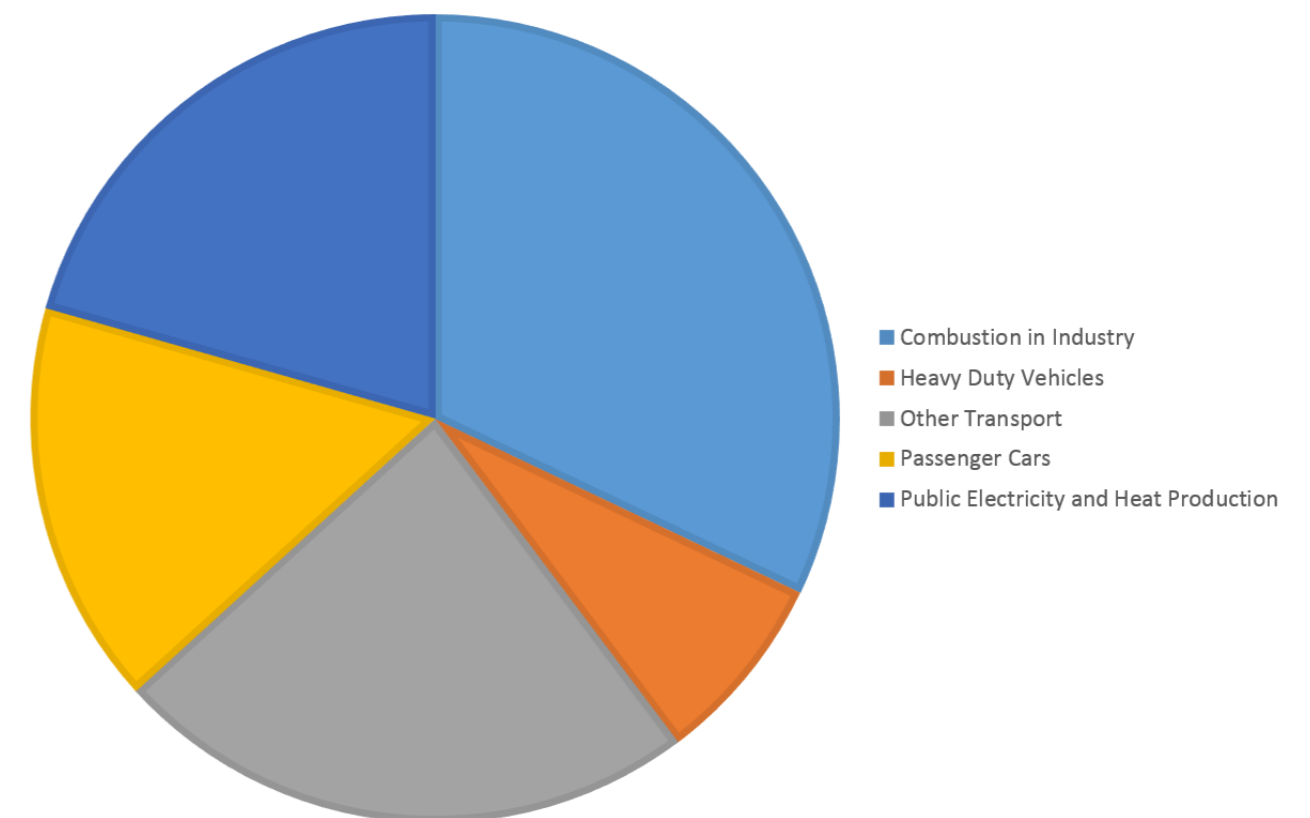
Wales has some of the worst air quality in the UK, which is surprising given its low population density and relatively small cities. Cardiff and Port Talbot both have **higher PM10 levels** than either Birmingham or Manchester. Hafod-yr-ynys, **a road in Caerphilly**, is the most polluted road in the UK outside London. It exceeded hourly NO₂ limits on 60 occasions in 2016 (42 times more than allowed under EU law) and its annual mean NO₂ is almost double the EU limit.

Air quality data is collected from active and non-active monitoring sites. There are around 40 active monitoring sites in Wales, primarily located in Swansea, Port Talbot, Cardiff and Wrexham. These provide continuous measurements that can be **viewed online**. There are over 1000 non-active monitoring sites (primarily NO₂ detectors) that provide data over longer periods of time (typically monthly).

The data from active monitoring sites is used to inform the public about potentially hazardous, brief increases in air pollution levels and also to measure compliance with EU directives. The results show that air pollution limits were exceeded at five sites during 2016, all of which exceeded the annual NO₂ limit. There were no exceedances of EU PM limits or ozone targets in Wales in 2016.

NO₂ is the subject of all the Air Quality Management Areas (AQMAs) in Wales, except Neath Port Talbot. The main source of **NO₂ is road transport**, which accounts for nearly a third of all NO₂ emissions in the UK (see Figure 1). Most breaches of EU limits within the UK are a result of roadside NO₂, 80 % of which comes from road transport.

Figure 1 Nitrogen Dioxide Emissions in the UK by Source



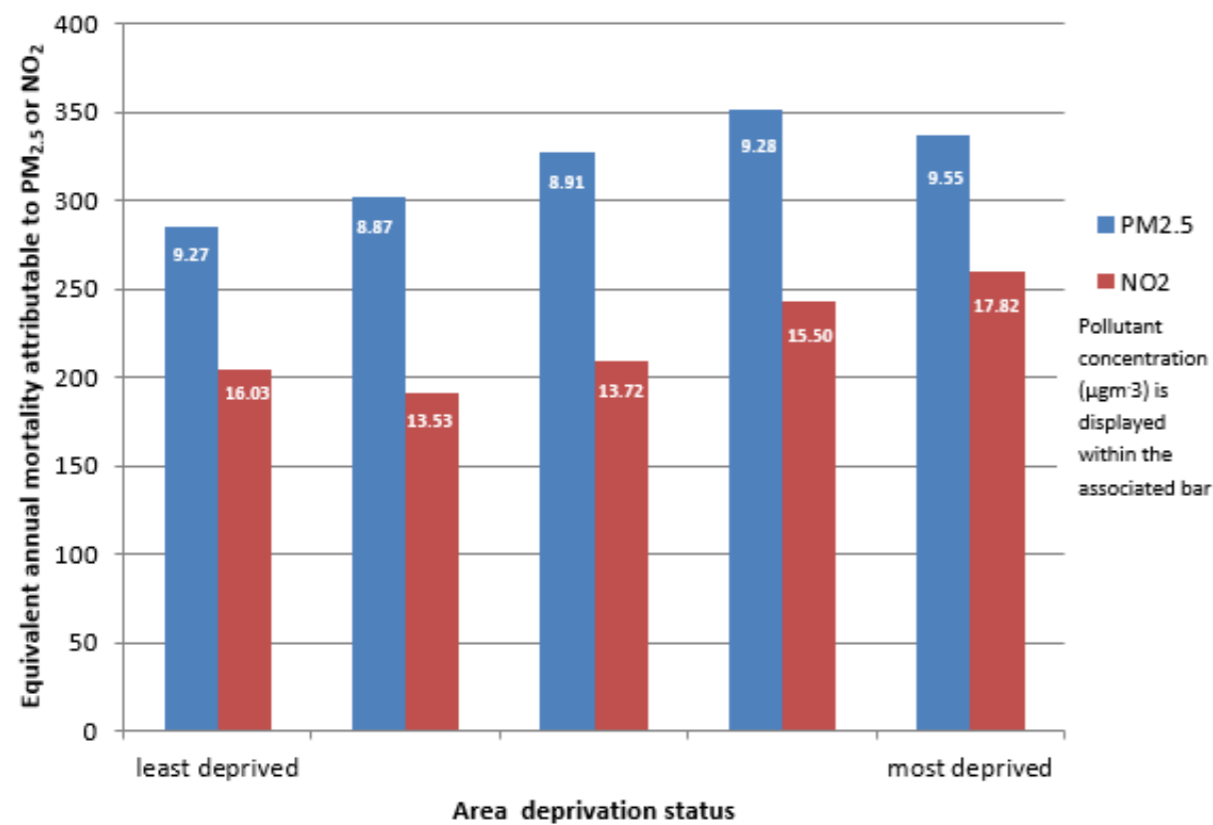
Health effects of air pollution in Wales

It is estimated that air pollution contributes to **2,000 deaths a year in Wales (6% of total deaths)** and **30,000-40,000 across the UK (6-7 %)**. It is second only to smoking as a public health priority according to Huw Brunt, Lead Consultant in Environmental Public Health, Public Health Wales.

The main risk occurs through the exacerbation of existing cardiovascular diseases, as well as being a cause of asthma and lung cancer. The long term impacts of air pollution are not well understood. Children are particularly vulnerable, meaning the effects of today's air pollution may be seen well into the future.

The effects of air pollution **disproportionately affect those in deprived areas** (Document 4.3 MB) (Figure 2). The correlation between deprived areas and health impacts from air pollution is likely associated with a combination of factors. These include those living in deprived areas being more likely to have other health conditions and deprived areas having higher total mortality.

Figure 2 Mortality attributable to pollution in Wales, separated by area deprivation status



PM is thought to be the most harmful air pollutant in the UK, contributing to around **three quarters of deaths from air pollution**. However, due to the large range of sources and complex formation it is more difficult to combat. NO_2 is the second most harmful, contributing to around half of deaths from air pollution (there is a significant portion of overlap between deaths caused by PM and NO_2). Ozone contributes to comparatively fewer deaths, around 1,000 in the UK in 2015.

Current air pollution strategy

EU, UK and Welsh legislation

There is extensive legislation regarding air quality in Wales. This includes a number of EU Directives, UK Acts and Welsh Acts which provide the framework for the UK Air Quality Strategy and Local Air Quality Management in Wales (the limits set by this legislation are shown in Table 1):

- **Directive 2008/50/EC** on ambient air quality and cleaner air for Europe (CAFE): replaces five previous acts including NO₂ and PM limits;
- **Directive 2004/107/EC** (the 4th Daughter Directive): creates targets for the concentration of arsenic, cadmium, nickel and benzo(a)pyrene in ambient air. The aim is to avoid, prevent or reduce harmful effects of these substances on human health and the environment;
- **The Environment Act 1995** establishes the framework for Air Quality Management Areas;
- **The Clean Air Act 1993**: aims to protect public health from smoke emissions;
- **Air Quality Standards (Wales) Regulations 2010**: brings into law in Wales the limits set out in the EU Directives on air quality (Table 1); and
- **The Air Quality (Wales) Regulations 2000**, as amended by the *Air Quality (Wales) (Amendment) Regulations 2002*: brings into law in Wales earlier EU directives

Table 1 Air pollution limits from EU Directives

| Pollutant | EU Limit | Averaging Period | Permitted number of exceedances |
|-------------------|--|--------------------------|-----------------------------------|
| NO ₂ | 200 µg / m ⁻³ | 1 hour | 18 |
| | 40 µg / m ⁻³ | Annual | - |
| PM ₁₀ | 50 µg / m ⁻³ | 24-hours | 35 |
| | 40 µg / m ⁻³ | Annual | - |
| PM _{2.5} | 25 µg / m ⁻³ (20 µg / m ⁻³ by 2020) | Annual | - |
| Ozone | 120 µg / m ⁻³ (target) | 8 hour running or hourly | 25 days averaged over three years |

It is important to note that these EU limits do not necessarily indicate safe levels of pollutants. For example, PM₁₀ and PM_{2.5} are within EU limits yet PM still contributes to over a thousand deaths per year. The **World Health Organisation has stricter guidelines**, which have been adopted in **Scotland for some pollutants**. Unlike Scotland, Wales does not yet have its own clean air strategy.

On 22 November the UK Government published the **Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2018**. The regulations amend existing domestic legislation, which enacts components of the Ambient Air Quality Directive and the National Emissions Ceiling Directive as well as other pieces of EU legislation, to ensure it remains effective after Brexit. The regulations were laid before the UK Parliament on 21 January under the negative procedure.

Air pollution strategy in Wales

Air quality management in Wales mainly takes place at a Local Authority level. Local Authorities are required to produce progress reports annually, and were previously required to carry out an Updating and Screening Assessment every three years. Local Authorities are required to identify areas where air pollution limits exceedance is likely and implement an **Air Quality Management Area (AQMA)**. This system was changed with **updated guidance** on Local Air Quality Management in 2017 and may change again under the forthcoming Clean Air Plan for Wales

All 22 Local Authorities in Wales also participate in the Welsh Air Quality Forum (WAQF). It comprises representatives from Local Authorities, the Welsh Government, Public Health Wales, Natural Resources Wales and several academic institutions. WAQF members direct the operation of the Welsh Air Quality Website and Database, the collection, quality assurance and quality control and dissemination of all data, and the provision of support and training to Local Authorities. The WAQF provides expertise and guidance to ensure that Local Air Quality Management statutory requirements are met, and air quality in Wales is reported in an accurate, transparent and timely manner.

Well-being of Future Generations

The **Well-being of Future Generations (Wales) Act 2015** lays out goals including those for a healthier and more-equal Wales. Levels of NO₂ pollution in the air was included as one of the **national indicators** accompanying the Act. The levels are taken as a national average, weighted by population. Although the data can be disaggregated by locality, it will not be separated by equality group, unlike many of the other indicators. This may help drive a general decrease in NO₂ emissions across Wales, but will not necessarily deal with the highly polluted localities that pose the biggest problem.

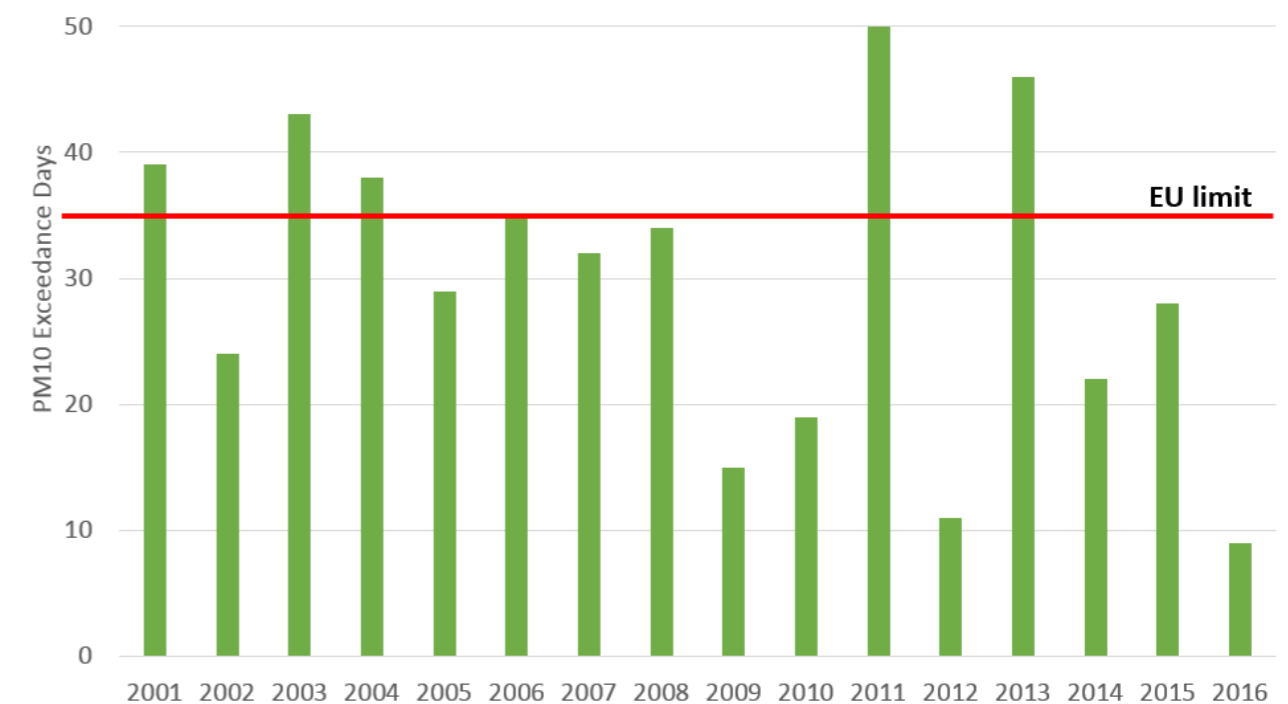
Air Quality Management Areas

There are **45 AQMAs in Wales**, spread across 13 Local Authorities in South, Mid and West Wales. With the exception of Neath Port Talbot, all the AQMAs are due to NO₂, associated with roads. Any Local Authority with an AQMA is required to put in place an Air Quality Action Plan, ideally within 12 months of an AQMA being declared.

The record of success for AQMAs is unclear. Only eight have ever been revoked in Wales, although several more have been amended. **Reports for air pollution in Wales** have only included the exceedances of NO₂ limits since 2014, making it difficult to tell if exceedances are increasing or decreasing overall.

The one area where the Welsh Government has become directly involved is the Neath Port Talbot AQMA. This AQMA was declared in 2000 due to high PM₁₀ levels, associated with the large industrial site adjacent to the area. This proved insufficient with the site continuing to exceed, or come very close to exceeding, the permitted number of exceedances for the daily PM₁₀ limit (Figure 5). As a result the Welsh Government instituted a short term action plan in 2008, which was updated in 2012. The number of exceedance days has been generally declining in recent years but as the historic data shows, this measure can be particularly volatile, depending strongly on the activity of the Port Talbot steelworks.

Figure 3 PM10 Exceedance Days in Neath Port Talbot AQMA



The Welsh Government has also announced a **£20m air quality fund**. The fund, which will run to 2021, aims to support local authorities to comply with nitrogen dioxide limits and improve air quality in their areas.

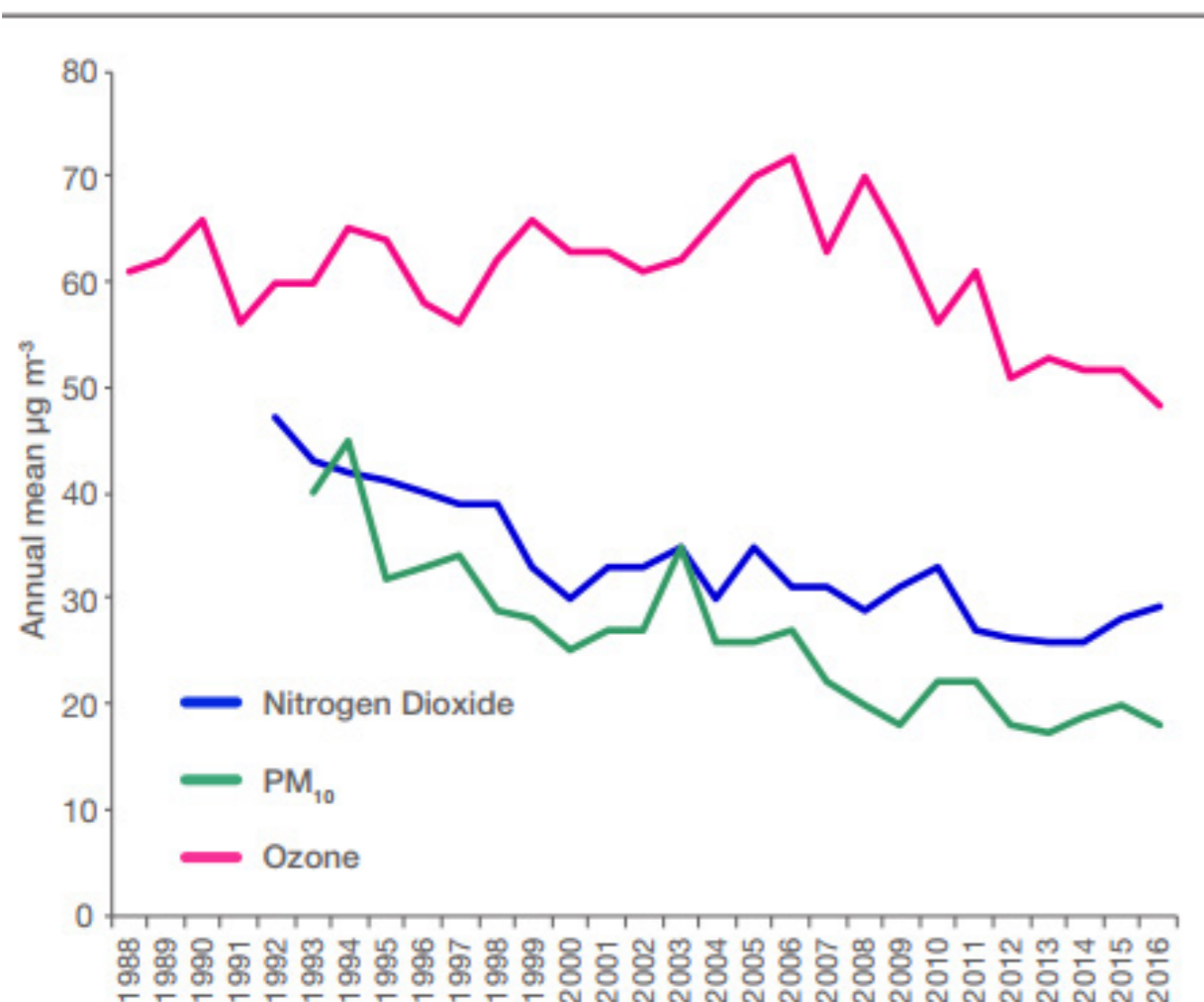
Planning Policy Wales

Planning Policy Wales: Edition 10 was published in December 2018. The policy has been rewritten and restructured around the principles of the Well-being of Future Generations Act. The new version of the policy contains a section on air quality and soundscape.

Progress on tackling air pollution

Generally, ambient PM and NO₂ levels are **decreasing in Wales** (Figure 6). This has been achieved mainly through improved regulation on diesel vehicles and a decrease in fossil fuel-based electricity generation. Due to fluctuations from a variety of causes, progress over recent years is unclear. However, there has generally been a **stall in roadside NO₂ emissions across the UK**, which is responsible for most exceedances of EU limits. This has led to a **UK government plan to tackle roadside NO₂**.

Figure 4 Ambient Pollutant Trends in Wales 1990-2016



The halt in progress on NO₂ has been associated with a flaw in the latest diesel car emissions standards (Euro 6) and has been observed elsewhere in Europe. **These standards** required a sharp decrease in the NO_x emissions from diesel engines of over 50 %. It was found that although vehicles passed under test conditions, this didn't match a reduction in real-world performance. This was compounded by the **Volkswagen scandal**, where software was found in cars designed to cheat the emissions tests. There are now **proposed EU regulations** to combat this through real driving emissions tests, which will come into force for all new vehicles in September 2018.

Another issue causing high NO₂ emissions is illegally modified lorries. The modifications made include bypassing the exhaust gas recirculation valve to improve perceived performance, using cheap, fake "ad-blue" to save costs and removing particulate filters. Modifications were found in around **8 % of lorries tested in the UK** and has led to a further inspections.

Managing exceedances of NO₂ on the motorway and trunk road network is the direct responsibility of the Welsh Government. The Welsh Government **has introduced a number of 50mph speed limits** and road markings to smooth traffic flows where NO₂ levels exceed Directive limits. These have been implemented at each of the following locations:

- A494 at Deeside;
- A483 near Wrexham;
- M4 between junctions 41 and 42;
- M4 between junctions 25 and 26 (during the night, using the existing variable speed limit infrastructure); and
- A470 between Upper Boat and Pontypridd.
- On 21 May 2019, when asked about the impact introducing these 50mph speed limits has had on air quality, **the First Minister, Mark Drakeford, stated:**

new monitoring arrangements in place there. They are more sensitive to levels of nitrogen dioxide. It will be September before we have a data set of the sort that he advocated in his earlier question—reliable and over a time sequence—and we will know, in September, the result of that additional monitoring.

Legal cases

ClientEarth took the **UK (and Welsh) Governments to court** over their failure to comply with EU limits on air pollution. This resulted in a series of rulings against the UK Government in the **UK Supreme Court** and the **High Court**. Legally binding EU regulations state that exceedances of air pollution limits must be kept as short as possible. The UK Government action plans did not predict compliance until 2025 in some cases, so the court ruled that the UK Government must submit new air quality plans. The UK Government published its **Clean Air Strategy** early in 2019.

The ruling in the case placed a legal obligation on the Welsh Government to draft a plan by the end of April 2018, and have a final plan in place by 31 July 2018, to improve air quality across Wales in line with EU law. However, in July 2018, the Welsh Government **applied to the High Court for an extension which was granted**. In November 2018 the Welsh Government published its **supplemental plan to the UK plan for tackling roadside nitrogen dioxide concentrations** and is currently developing a Clean Air Plan for Wales (see below).

Upcoming and future strategies

Consultation on air quality

The Welsh Government carried out a **consultation on air quality in 2016**. The Welsh Government response to comments gives some indication as to likely contents of the Clean Air Plan for Wales, and fed into updated **Local Air Quality Management guidance in June 2017**.

These proposals aim to streamline the Local Authority reporting process, requiring only annual progress reports (as opposed to the existing triennial screening reports) and allowing Local Authorities to publish a report as a regional group. The consultation did not contain any questions regarding clean air zones, which have been emphasised by ClientEarth as the main way to achieve compliance with EU regulations.

Consultation on clear air zones (CAZ)

In 2018 the Welsh Government consulted on a **Clean Air Zone (CAZ) Framework for Wales**. The Framework provides guidance to local authorities who are considering options to address local air quality issues.

The framework describes:

- what a clean air zone is
- under what circumstances it may be applied
- the key considerations for local authorities who wish to establish one.

Clean Air Plan for Wales

The Welsh Government has announced that it will be launching a **Clean Air Plan for Wales** (the Welsh Plan). A consultation on the plan is **due in 2019**. During the announcement, Minister for the Environment, Hannah Blythyn said:

Poor air quality is often considered to be just an environmental issue but it also has a significant impact on our natural resources and economy. We must tackle poor air quality from all possible angles.

The Welsh Plan will include:

- a Clean Air Zone Framework to allow Local Authorities to establish Clean Air Zones in high pollution areas;

- improvements to Local Authority reporting on air quality issues; and
- the establishment of a National Air Quality Assessment and Monitoring Centre for Wales.

Based on past record, it is likely that ClientEarth and other environment groups will push for more CAZs and for them to be introduced sooner. The Scottish Government is planning to establish a Low Emission Zone in 2018 in Glasgow, following a **consultation that took place in 2017**, setting a precedent for fast implementation, although this is not without **controversy**.

Other environment groups have also **welcomed the ideas proposed for the plan** but have also emphasised the urgency required in enacting it:

We welcome the motion and the commitment of Welsh Government, however, we need strong leadership to make CAZs happen.

Air pollution is continuing to damage the lungs of people in Wales, especially those who are vulnerable such as children (because of their developing lungs), and those who have a lung condition such as Chronic Obstructive Pulmonary Disease (COPD). We need action now.

Joseph Carter, Head of British Lung Foundation Wales

We need a clear, comprehensive and funded Clean Air Plan for Wales, including effective Clean Air Zones to protect people from exposure to pollution for all vehicles in our polluted towns and cities, better monitoring of air quality across Wales, and infrastructure to enable active travel with safe walking and cycling routes.

We look forward to working with the Welsh Government, the Assembly and other experts to develop these proposal as a matter of urgency.

H Elgar, Head of Friends of the Earth Cymru

In February 2019 Dai Lloyd AM brought forward a **short debate on a Clean Air Act for Wales**. In his Labour **leadership manifesto**, the now First Minister Mark Drakeford committed to a Clean Air Act for Wales to reduce air pollution.

Air pollution control programme

On 14 February the UK Government and the devolved administrations launched a **consultation on the UK's National Air Pollution Control Programme (NAPCP)**. The National Emissions Ceiling Regulations 2018 transpose obligations in the EU Directive on the reduction of national emissions of certain pollutants into domestic law. The consultation closed in March. The regulations require the Secretary of State to prepare and publish a UK National Air Pollution Control Programme by 1 April 2019. At the time of writing this was yet to be published.

Key sources

Welsh Government, **[Air pollution in Wales 2016](#)**

[Well-being of Future Generations \(Wales\) Act 2015](#)

UK Government, **[UK plan for tackling roadside nitrogen dioxide emissions](#)**

Scottish Parliament Information Centre, **[Air Quality in Scotland](#)**