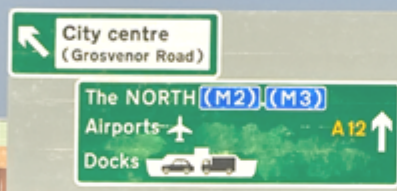




Department of
**Agriculture, Environment
and Rural Affairs**
www.daera-ni.gov.uk



Air Pollution in Northern Ireland 2017

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1. Report Highlights

This is the sixteenth in a series of annual reports on air quality in Northern Ireland. It has been written and produced by the Department of Agriculture, Environment and Rural Affairs (DAERA).

The key purpose of this report is to summarise air quality monitoring results for Northern Ireland in 2017, in order to inform the public, government and wider air quality community in Northern Ireland. This report also contains useful information on air quality policy and legislation as well as sources of pollution. Figure 1.1 shows the locations of all the automatic air quality monitoring sites in Northern Ireland that were in operation during part or all of 2017.

Fig. 1.1: Air Quality Monitoring Stations

- | | |
|----------------------------------|----------------------------------|
| 1 Londonderry Rosemount* | 13 Belfast Ormeau Road |
| 2 Londonderry Dale's Corner | 14 Belfast Stockman's Lane |
| 3 Limavady Dungiven | 15 Lisburn Dunmurry Seymour Hill |
| 4 Ballymena Ballykeel | 16 Lough Navar |
| 5 Ballymena Antrim Road | 17 Armagh Lonsdale Road |
| 6 Strabane Springhill Park | 18 Downpatrick Roadside |
| 7 Newtownabbey Antrim Road | 19 Newry Canal Street |
| 8 North Down Holywood A2 | |
| 9 Belfast Centre | |
| 10 Belfast Newtownards Road | |
| 11 Castlereagh Dundonald | |
| 12 Belfast Westlink Roden Street | |





The Department of Agriculture, Environment and Rural Affairs has compiled this report from data supplied by Northern Ireland's network of automatic monitoring stations (Figure 1.1). Some of these are run on behalf of the Department, while others are managed by district councils, via the Local Air Quality Management Scheme, for which the Department provides funding support.

This report reviews the pollutants monitored and highlights exceedances of air quality objectives, highlighting emerging trends as it looks at how air pollution has changed over time and how it currently varies spatially across the region. Each edition of the report takes a particular issue to examine in-depth, and this year's focus is on household heating emissions.

Air quality in Northern Ireland has improved substantially in recent decades. In particular, concentrations of sulphur dioxide, a pollutant associated with coal and oil combustion, have declined significantly over the past twenty years. However, some pollutants in some parts

of Northern Ireland continue to exceed air quality objectives. A continued effort to reduce air pollution is therefore important, together with monitoring to assess progress and to provide sound, science-based input into policy development.

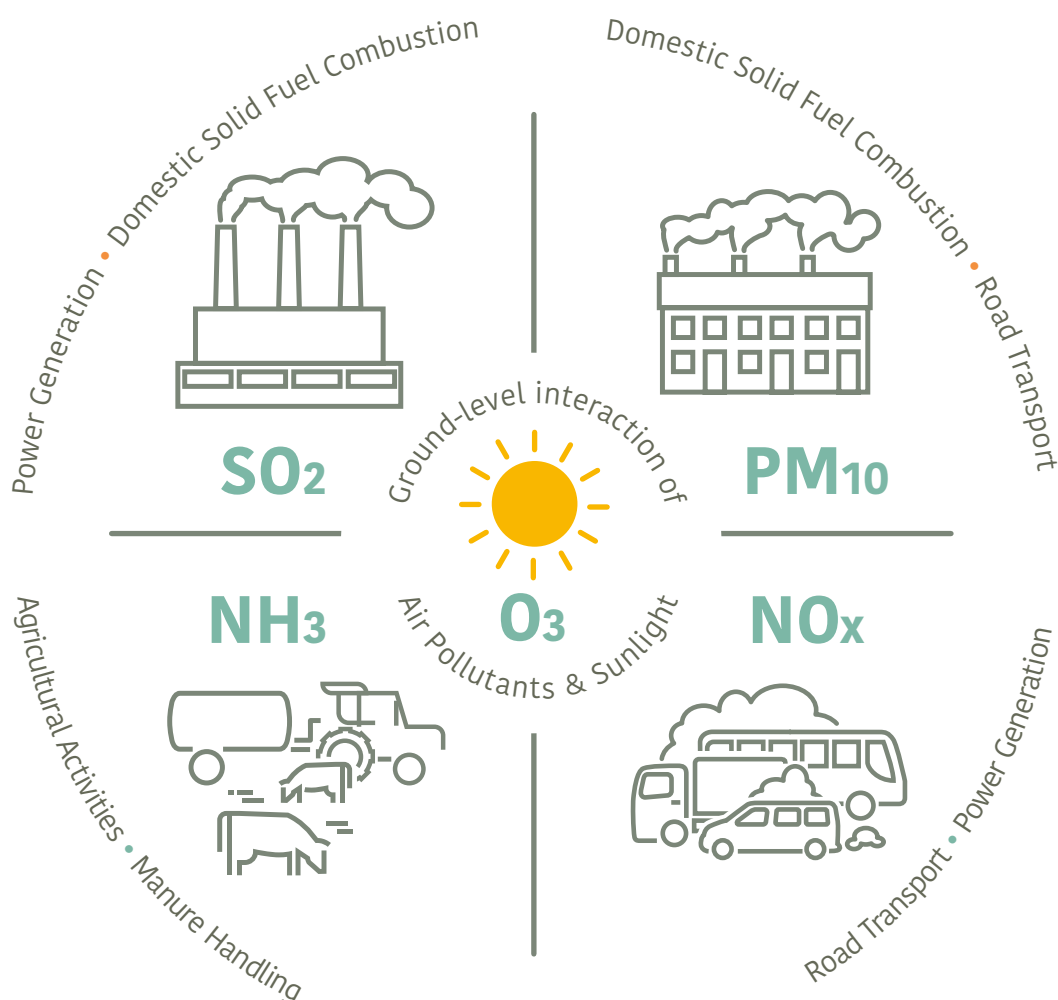
Concentrations of sulphur dioxide, a pollutant associated with coal and oil combustion, have declined significantly over the past twenty years.

2. Sources of Air Pollution in NI

There are many sources of air pollutants. Some of the largest sources are:

- Sulphur dioxide, SO_2 : a pollutant produced during coal combustion, particularly from power generation and household heating.
- Particulate matter, PM_{10} and $\text{PM}_{2.5}$: by-products of burning fuels, in particular solid fuels (domestic wood and coal burning), industrial combustion and road transport. Half of the PM produced from road transport is from fuel combustion, while the other half is from tyre and brake dust and road wear.
- Nitrogen oxides, NO_x includes nitrogen monoxide NO and nitrogen dioxide NO_2 : road transport and energy generation. The NO_x emitted by road transport, however, poses more of a problem because it leads to increased concentrations of this pollutant at ground level in busy streets.
- Ammonia, NH_3 : a gas that is emitted from waste and agricultural activities – in particular, manure handling, storage and spreading.
- Ground-level ozone, O_3 : a secondary pollutant, formed by the interaction of other air pollutants in the presence of sunlight.

Figure 2.1: Main Sources of Air Pollution



3. Legislation and Policy / What Can Be Done

The management of air quality in Northern Ireland is currently based on the requirements of European Union (EU) Air Quality Directives, and on the UK Air Quality Strategy. These requirements are incorporated (or ‘transposed’) into Northern Ireland’s own legislation by statutory measures, forming the basis of a strong framework for managing air quality.

The European Union

Much of Northern Ireland’s air quality legislation has its roots within the Air Quality Directives which apply to all Member States of the European Union:

- Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe (the Air Quality Directive), which relates to sulphur dioxide, oxides of nitrogen, particulate matter, lead, carbon monoxide, benzene and ozone in ambient air; and
- Directive 2004/107/EC (the Fourth Daughter Directive) relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons (PAH) in ambient air.

In June 2016, the UK voted to leave the European Union and in March 2017 the UK Government began the formal process of doing so. DAERA is actively preparing for UK Exit; this includes reviewing the implications for environmental legislation

The Air Quality Standards Regulations (Northern Ireland) 2010

These Regulations transpose the provisions of the above Directives into Northern Ireland’s own legislation. As well as the EU limit values and non-mandatory target values for ambient concentrations of pollutants, the Regulations set out requirements for ambient air quality monitoring, including the number of monitoring sites required, siting criteria and acceptable methodology. They also identify the duties of Northern Ireland’s Government Departments in relation to achieving limit and target values. It is the responsibility of DAERA to inform the public about air quality in the region, particularly with regard to warning the public when information and alert thresholds are exceeded.

[A target to improve air quality exists in the Northern Ireland Executive’s Draft Programme for Government](#) 

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, first published in 1997 and updated in 2007, provides a comprehensive framework for tackling air pollution. It was established on the basis of strong scientific evidence and a science-based understanding of the effects of air pollutants on health and the environment. The Strategy sets objectives to be met within the UK for a suite of pollutants. The scientific basis, the objectives set and provisions contained within the Strategy are closely associated with the corresponding standards set within European Air Quality Directives, as listed above. The Strategy's provisions for some pollutants differ from those in the Directives,

with these differences relating to scientific evidence and expert opinion that is specific to the UK situation. However, all the Air Quality Strategy objectives are at least as stringent as the corresponding limit values in the Air Quality Directive or 4th Daughter Directive. The full Air Quality Strategy and its technical annexes are available online and can be viewed at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf 

DAERA is developing a long term Air Quality Strategy for Northern Ireland, which will include reviewing all current air quality policy.

Table 3.1: Air Quality Management Areas in Northern Ireland

District Council	Number of AQMA's	Pollutant which triggered designation	Sources
Antrim and Newtownabbey Borough Council	1	Nitrogen dioxide	Road traffic
Armagh City, Banbridge and Craigavon Borough Council	1	Nitrogen dioxide	Road traffic
Belfast City Council	4	Nitrogen dioxide	Road traffic
Causeway Coast and Glens Borough Council	1	Nitrogen dioxide	Road traffic
Derry City and Strabane District Council	8 (4 of these were revoked late 2018)	Nitrogen dioxide (5) and PM ₁₀ (3)	Road traffic (5) Domestic emissions (3)
Lisburn and Castlereagh City Council	1	Nitrogen dioxide	Road traffic
Mid and East Antrim Borough Council	2	PM ₁₀ (1) and Nitrogen dioxide (1)	Road traffic
Mid Ulster District Council	3	Nitrogen dioxide	Road traffic
Newry Mourne and Down District Council	2	Nitrogen dioxide (1) and PM ₁₀ (1)	Road traffic



Local Air Quality Management

Local Air Quality Management (LAQM) provides the framework under the Environment Order (NI) 2002, within which air quality is managed by the 11 district councils in Northern Ireland. LAQM requires district councils to review and assess a range of air pollutants against the objectives set by the UK Air Quality Strategy, using a range of monitoring, modelling, observations and corresponding analyses. For locations where objectives are not expected to be met by the relevant target date, district councils are required to declare an Air Quality Management Area (AQMA), and (along with relevant authorities), to develop an Action Plan addressing the problem. There are currently 23 AQMAs in Northern Ireland, as shown in Table 3.1. Nine councils have AQMAs: of these, six have AQMAs for NO₂ only, and three have AQMAs for PM₁₀ and NO₂. There are no AQMAs in place for any other pollutants.

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland provides a comprehensive framework for tackling air pollution

4. Air Pollution Monitoring Results and Tables for 2017

Monitoring in Northern Ireland / Key Findings

A wide range of air quality monitoring is carried out in Northern Ireland. Some monitoring sites are run as part of UK-wide monitoring networks; others are operated by district councils in order to meet local objectives.

The Air Quality Directive requires Member States to be divided into 'zones' for reporting purposes. Northern Ireland comprises two reporting zones – the 'Belfast Metropolitan Urban Area' agglomeration (the conurbation of Greater Belfast), and the 'Northern Ireland' zone (the rest of the region). The Directive then specifies how many monitoring sites (or 'stations') are needed in each zone (based on its size and population). Only sites which meet the stringent siting criteria of the Directive may be used for reporting to the European Commission. The Directive siting criteria are different from those used for LAQM: for example, sites located close to major road junctions are used in LAQM, but must not be used for Directive compliance monitoring purposes. There are also different criteria regarding relevant public exposure.

The following pollutants were monitored in Northern Ireland during 2017:

- Carbon monoxide (CO);
- Oxides of nitrogen (NO_x), comprising nitric oxide (NO) and nitrogen dioxide (NO₂);
- Sulphur dioxide (SO₂);
- Particles (as PM₁₀, PM_{2.5}, and black carbon);
- Ozone (O₃);
- Benzene;
- Polluting elements – including lead, arsenic, cadmium, nickel and mercury; and
- Polycyclic Aromatic Hydrocarbons (PAHs).

There were 19 automatic air quality monitoring stations that operated for all of 2017 in Northern Ireland. Each was equipped with continuous monitoring equipment for one or more of the pollutants for which automatic methods are used: CO, NO_x, SO₂, PM₁₀, PM_{2.5} and O₃. These sites (shown previously in Figure 1.1) provide hourly information on a wide range of pollutants. Data from the continuous monitoring sites are communicated rapidly to the public via the website www.airqualityni.co.uk. Public warnings are issued when levels approach or reach 'high' levels as defined by the Daily Air Quality Index (see <https://uk-air.defra.gov.uk/air-pollution/daq/index> [for an explanation of this Index](#) .

Seven of the automatic monitoring sites (Armagh Lonsdale Road, Ballymena Antrim Road, Ballymena Ballykeel, Belfast Centre, Belfast Stockman's Lane, Londonderry Rosemount and Lough Navar) were part of the UK's national monitoring network, and were used to assess compliance with the Air Quality Directive. Non-automatic monitoring techniques are used for benzene, metallic pollutants, black carbon and PAHs. Some of these measurements are used to assess compliance with the Air Quality Directive and Fourth Daughter Directive.

In addition, district councils use diffusion tubes for indicative monitoring of NO₂. These low-cost, single-use samplers absorb the pollutant directly from the air and need no power supply. They measure average concentrations over a specified sampling period (typically one month), and provide a useful and economical supplement to automatic monitoring.

The Volatile Correction Model

Three of Northern Ireland's ten PM₁₀ monitoring sites used the Tapered Element Oscillating Microbalance (TEOM) to measure PM₁₀ during 2017. The relatively high operating temperature of the TEOM (necessary to prevent condensation on the filter) can result in the loss of volatile components of the particulate matter sampled, causing under-estimation of the PM₁₀ concentration. It is, however, possible to correct for this using the Volatile Correction Model (VCM) developed by King's College, London. The VCM uses data from Filter Dynamic Measurement Systems (FDMS) PM₁₀ analysers in the region, which measure both the volatile and non-volatile fractions, to calculate an appropriate correction based on the location of the instrument and the period of the measurements. The resulting corrected measurements have been demonstrated as equivalent to the European reference method. To access the model and for more information, [visit the Volatile Correction Model page](#) . The TEOM PM₁₀ data presented in this report have been corrected to gravimetric equivalent using the VCM. This issue only arises for PM₁₀: there is at present no requirement to correct TEOM measurements of PM_{2.5}, and in any case all of Northern Ireland's PM_{2.5} monitoring sites use the FDMS analyser.

Key Results for 2017

This section summarises key monitoring results from 2017, including compliance with EU limit values and the corresponding Air Quality Strategy (AQS) objectives. Further information is provided on the [Northern Ireland Air website](#) .

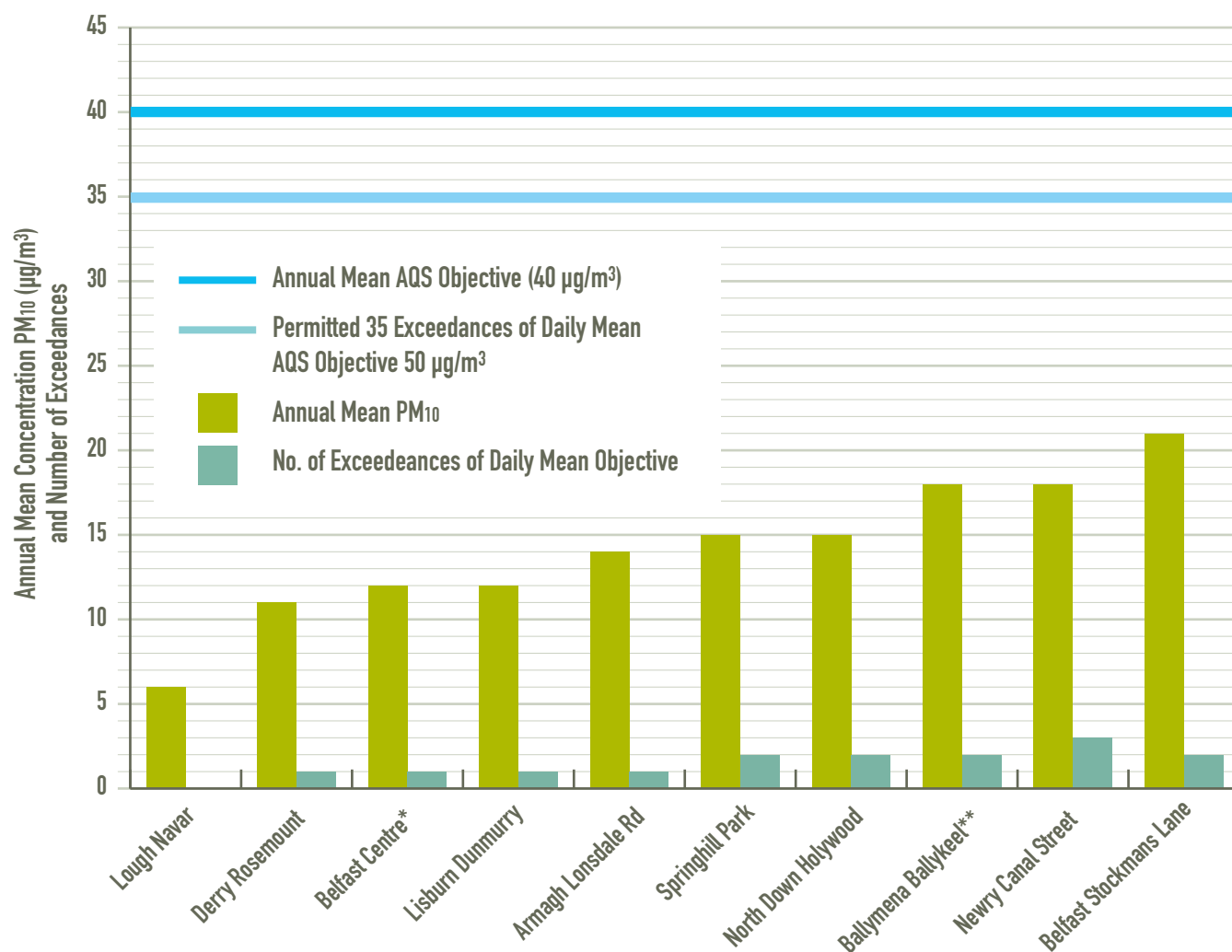
Carbon Monoxide was monitored using an automatic instrument at one site – Belfast Centre. The results were well within the EU limit value and AQS objective for this pollutant, and have been for many years.

Benzene was monitored at one site, Belfast Centre, which met the annual mean EU limit value and AQS objective (for the running annual mean) in 2017, as it has for many years.

Metallic and Other Polluting Elements including lead, arsenic, cadmium and nickel – were monitored using non-automatic techniques at Belfast Centre, as part of the Heavy Metals Network. The results for 2017 were within the annual mean EU limit value and AQS objective for lead, and within the EU annual mean target values for arsenic, cadmium and nickel.

Sulphur Dioxide was monitored at five automatic sites during 2017. All sites met the EU limit values for SO₂ (1-hour and 24-hour mean), and the AQS objective for the 15-minute mean.

Particulate Matter PM₁₀. Particulate matter as PM₁₀ was monitored at ten locations in 2017. Figure 4.1 shows the annual mean PM₁₀ concentrations (shown by the darker coloured bars), and the number of exceedances of the daily mean limit value and objective (shown by the lighter coloured bars). Three of these sites (Newry Canal Street, North Down Holywood A2 and Lisburn Dunmurry Seymour Hill) used the TEOM instrument, so data from these sites have been corrected to the gravimetric equivalent using the King's College Volatile Correction Model as explained in Section 4. All sites met the limit value and objective of 40 µg/m³ for annual mean PM₁₀, and no sites exceeded the daily mean limit value and objective of 50 µg/m³ on more than the maximum permitted 35 occasions during the year (after VCM correction if applicable).

Figure 4.1: Annual Mean PM₁₀ Concentrations and Exceedances of Daily Objective, 2017

* indicates sites with <85% data capture

** indicates sites with <50% data capture

Particulate matter PM_{2.5}. Fine particulate matter as PM_{2.5} was monitored (using the FDMS analyser) at Belfast Centre and at Londonderry Rosemount throughout 2017. Both sites reported annual mean PM_{2.5} concentrations well below the EU Stage 1 limit value of 25 µg/m³ (which has to be met by 1st Jan 2015). Levels were also below the EU Stage 2 limit value of 20 µg/m³ (which has to be achieved by 1st Jan 2020).

Nitrogen Dioxide was monitored using automatic analysers at 16 sites during 2017. Figure 4.2 shows the annual mean NO₂ concentrations (shown by the darker coloured bars), and the number of exceedances of the hourly mean objective (shown by the lighter coloured bars). This figure presents

all sites, including three with very low data capture: Ballymena Antrim Road, Newry Canal Street and Limavady Dungiven. The annual means for these sites are shown by striped rather than solid shading.

Three sites exceeded the AQS objective for annual mean NO₂ concentration (40 µg/m³). These were as follows: Belfast Stockman's Lane (52 µg/m³), Downpatrick Roadside (47 µg/m³) and Limavady Dungiven (46 µg/m³). However, it should be noted that Limavady Dungiven had only 75% data capture – insufficient for a valid annual mean. All three of the above are traffic-related sites beside major or busy roads.

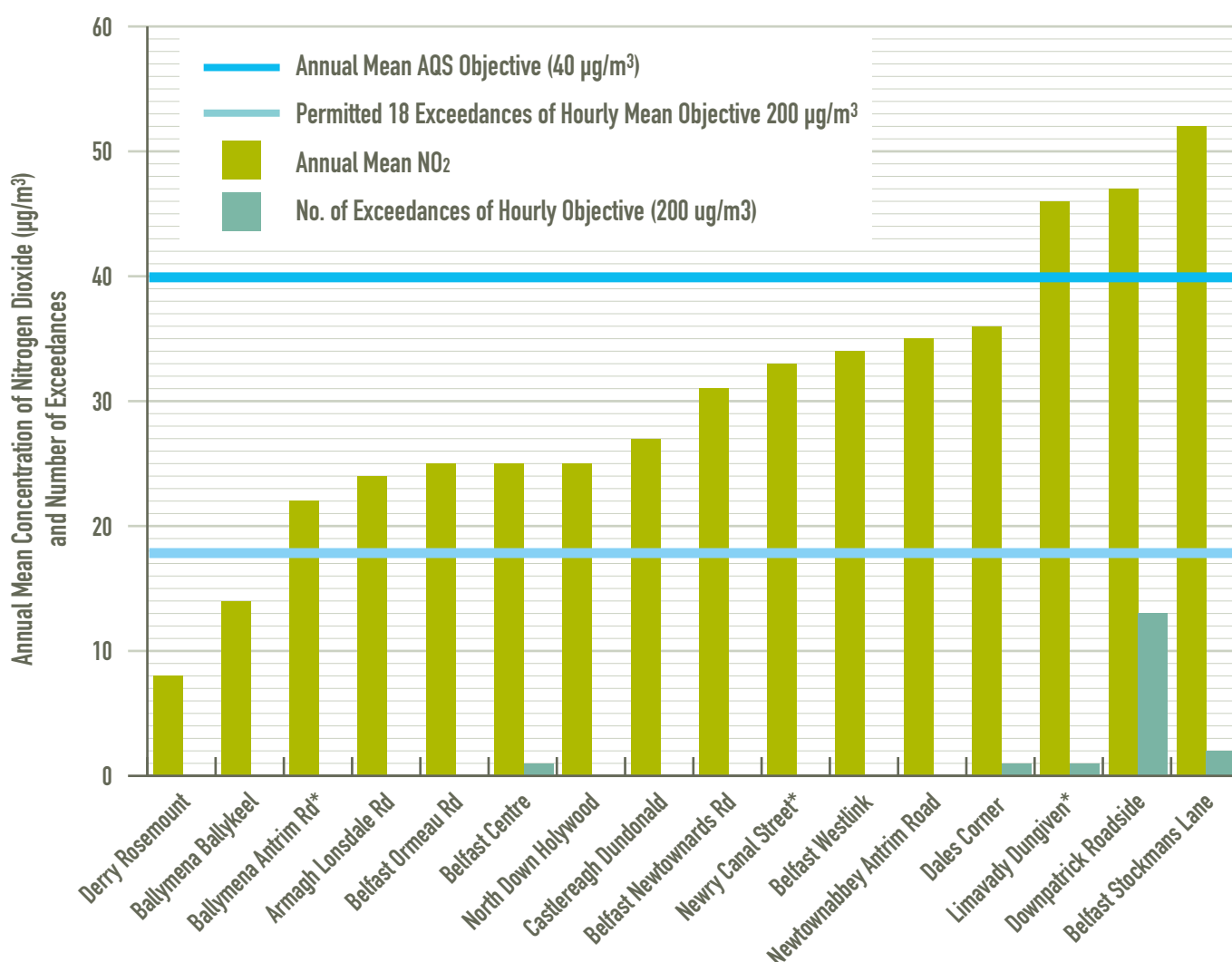
No sites exceeded the hourly mean limit value of $200\mu\text{g}/\text{m}^3$ on more than the permitted 18 occasions. Where data capture is less than 85%, exceedance of the hourly mean objective is judged on whether the 99.8th percentile of hourly values has exceeded $200\mu\text{g}/\text{m}^3$ rather than the number of hourly means above the objective. This was not the case for any sites.

Belfast Stockman's Lane is affiliated into the national network which is used for monitoring compliance with the Air Quality Directive. This site falls within the Belfast Metropolitan Urban Area reporting zone, which in 2017 and previous years has been identified as non-compliant with the EU Directive limit value for annual mean NO_2 (also

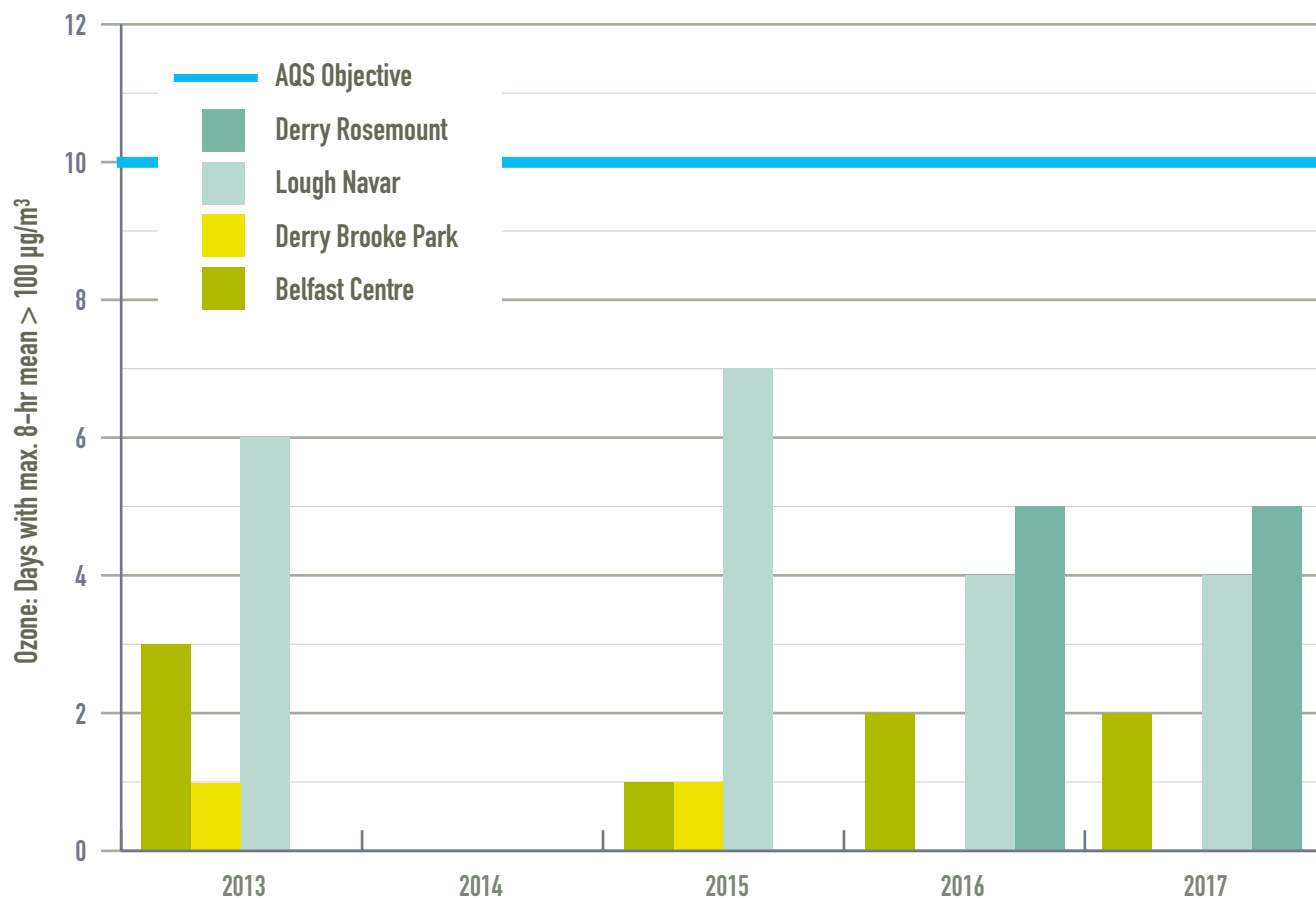
$40\mu\text{g}/\text{m}^3$). None of the other sites that exceeded the AQS objective for this pollutant are used for Directive compliance monitoring.

Ozone was monitored at Belfast Centre, Londonderry Brooke Park (subsequently at its replacement Londonderry Rosemount), and the rural Lough Navar site. No sites exceeded the EU target value for human health of $120\mu\text{g}/\text{m}^3$ (for the maximum daily 8-hour mean) on more than the permitted 25 days, or the more stringent AQS objective of $100\mu\text{g}/\text{m}^3$ on more than the permitted 10 days in 2017 (Figure 4.3), although all three sites had at least one exceedance day during 2017. Unlike some other pollutants, levels of ozone (O_3) in Northern Ireland do not appear to be

Figure 4.2: Annual Mean NO_2 Concentrations and Exceedances of Hourly Objective, 2017



* indicates sites with <85% data capture

Figure 4.3: Ozone - Days with Maximum 8-Hour Mean $>100 \mu\text{g}/\text{m}^3$ for Five Years 2013-2017

decreasing, but remain variable from year to year. Ozone exceedances happen in some years but not others (for example, there were none in 2014). The reasons for this relate to how ozone is formed: it is a 'secondary' pollutant – that is, it is formed by reactions involving other pollutants, in the presence of sunlight, and over several hours. This means that the number of ozone exceedances in any given year depends substantially on weather conditions. There is also evidence that the 'hemispheric background' concentration of O_3 has increased since the 1950s due to the contribution from global human activities. O_3 exceedances therefore remain possible in future. Ozone is also a 'transboundary' pollutant: once formed it may persist for several days and be transported over long distances. This means that much of the ozone measured in a particular area may have been generated elsewhere, and so it is more difficult to reduce concentrations by local action.

Polycyclic Aromatic Hydrocarbons (PAHs) were monitored at three sites in 2017; Ballymena Ballykeel, Londonderry Brandywell and Kilmakee Leisure Centre in Dunmurry. All are part of the UK PAH Monitoring Network. The network measures a range of PAH compounds, but one species in particular, benzo[a]pyrene (B[a]P), is used as a 'marker' for PAH compounds and is the subject of an AQS objective and EU target value. Figure 4.4 shows the annual mean concentrations at these three sites over the past five years. Londonderry Brandywell exceeded the EU target value of $1\text{ng}/\text{m}^3$ for annual mean B[a]P concentration during 2016 (which was to be met by 31st Dec 2012); however, in 2017 this figure fell below the target value again. The other two sites were compliant. All three sites continue to exceed the more stringent AQS annual mean objective of $0.25\text{ng}/\text{m}^3$ for this PAH species, which was to have been achieved by 31st Dec 2010.

Summary

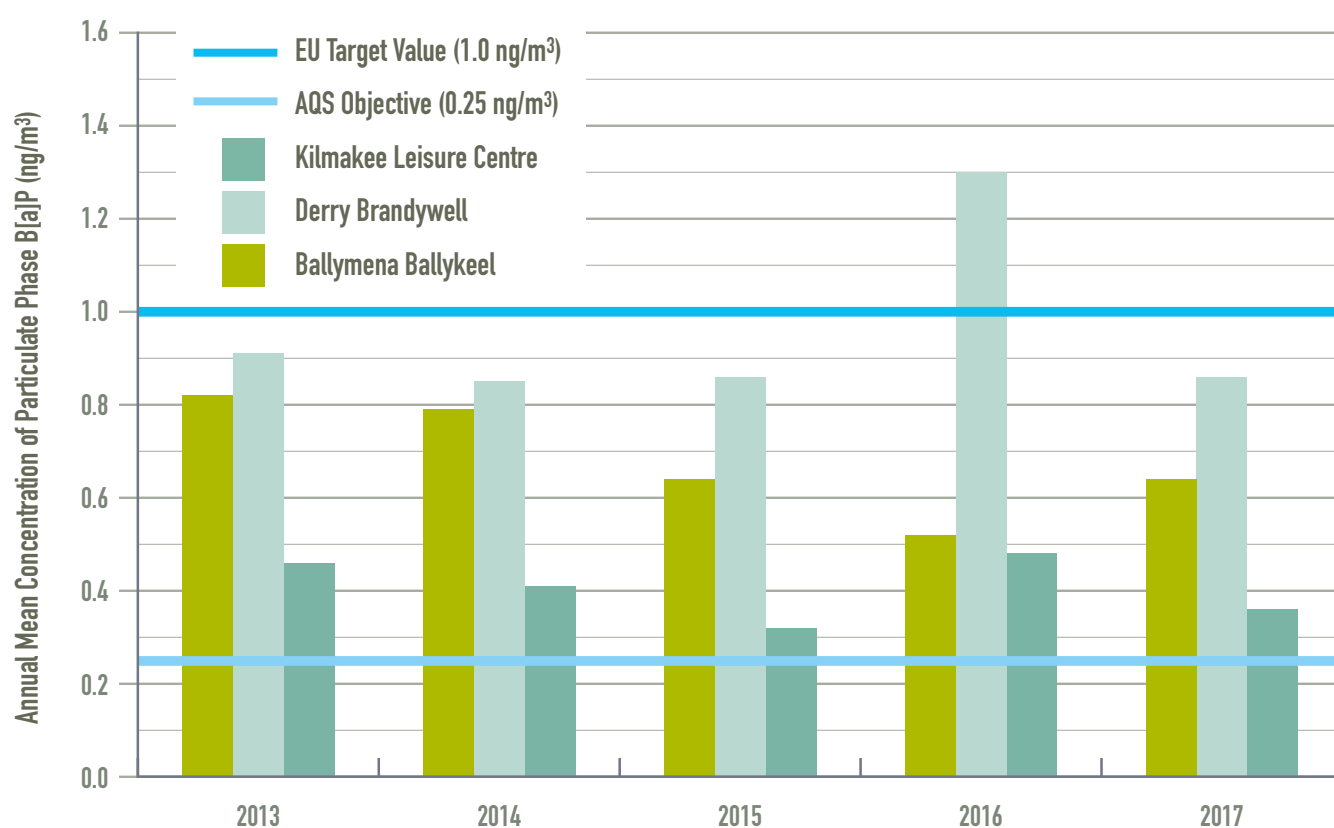
EU limit values, target values and corresponding AQS objectives, have been met by the due dates for the following pollutants in Northern Ireland –

- Particulate matter as PM₁₀ and PM_{2.5}
- Carbon monoxide
- Benzene
- Sulphur dioxide
- The elements lead, arsenic, cadmium and nickel.

However, two monitoring sites with sufficient data for a valid annual mean did not meet the limit values and objectives for nitrogen dioxide in 2017; Belfast Stockman's Lane and Downpatrick Roadside. All are traffic-related sites. One site, Belfast Stockman's Lane, was used for assessment of compliance with the Air Quality Directive. This site falls within the Belfast Metropolitan Urban

Area reporting zone, which in previous years has been identified as non-compliant with the EU Directive limit value for annual mean NO₂ (40µg/m³), on the basis of modelled data. Belfast Urban Area is not alone in this respect: many parts of the UK, and other Member States of Europe, have reported similar exceedances. Ozone concentrations are affected by both long-range, local and meteorological factors. This pollutant can therefore vary considerably from year to year. Although no sites exceeded the AQS objective in 2017, O₃ exceedances remain a possibility in future. The most recent year in which any monitoring sites in Northern Ireland exceeded the AQS objective for ozone was 2011. Following three consecutive years without an exceedance of the EU target value for benzo[a]pyrene in Northern Ireland, in 2016 Londonderry Brandywell showed exceedance, however it did not exceed in 2017. All three sites continue to exceed the more stringent AQS objective.

Figure 4.4: Annual Mean Concentrations of Benzo[a]pyrene for Five Years 2013-2017

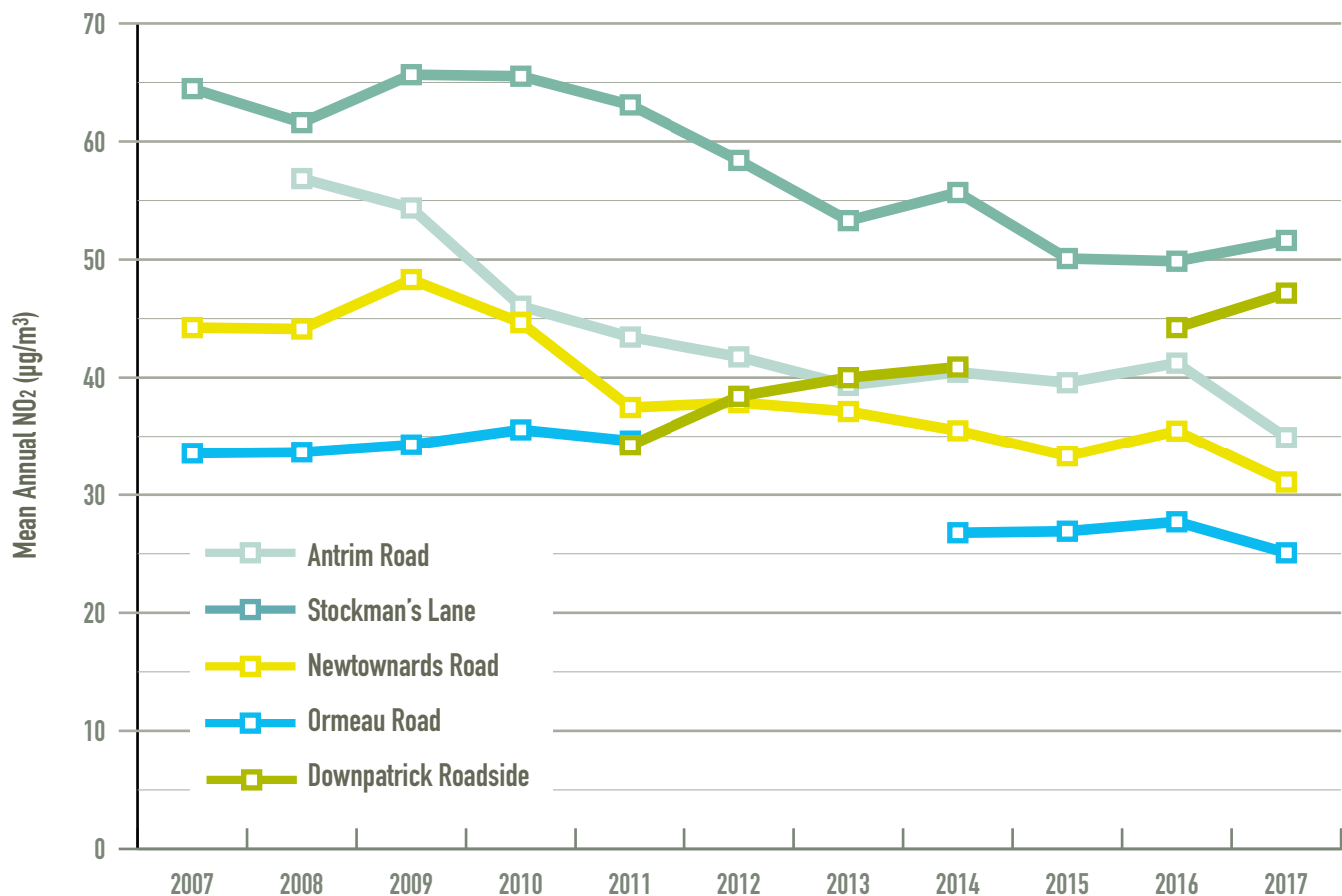


5. Air Quality Changes Over Time

Nitrogen dioxide has been measured at automatic monitoring sites in Northern Ireland since 1992 at Belfast City Centre (Lombard Street), with the next longest running site being Newtownards Road, Belfast, which was established in 2002. 16 sites monitored NO₂ in 2017.

The data produced by these monitoring sites and other sites, which have since been decommissioned, have improved our understanding of Northern Ireland's pollution climate. In order to understand how our air pollution has changed over time we need to establish notable trends with the available data from long term running sites. For this report, the investigation of trends has been based on subsets of five long-running sites, Downpatrick Roadside, Ormeau Road, Newtownards Road, Stockman's Lane and Antrim Road. All of the sites chosen have been in operation for a minimum of seven consecutive years, which is sufficient to assess long-term trends at a monitoring site.

Figure 5.1: Mean NO₂ values against year for five roadside automatic monitoring stations in Northern Ireland



The trend analysis in this section has been completed by plotting the average nitrogen dioxide mean for each site against the years 2008-2017.

It can be seen from the graph that generally air pollution across these sites has improved in the last 10 years. One site – Downpatrick Roadside – has shown an increase in levels of NO₂, while Belfast Stockman's Lane showed a long-term decrease until recent years, when levels have remained static, or increased slightly. This is contrary to the trend for the other sites which show a fairly steady decrease in NO₂ levels over the years.

Looking at the annual mean levels across the sites, a clear decrease can be seen from 2011 when the mean NO₂ level was 42.57 µg/m³ to 2017 where the mean level was 37.97 µg/m³, indicating that on the whole, levels of NO₂ are decreasing.

Due to the breach of the NO₂ objective at the Downpatrick Roadside site, Newry Mourne and Down District Council commenced a detailed assessment of the area around the station in November 2017. The results of this assessment will determine the next course of action, and may lead to the area being declared as an Air Quality Management Area.

Stockman's Lane falls within Belfast City Council area. The site is located within an existing Air Quality Management Area and has been the subject of mitigation measures for some time. In 2015, Belfast City Council launched an [Air Quality Action Plan](#)  with the aim of developing measures achieve compliance with the UK Air Quality Standard objective by 2020.

6. Home Heating in Northern Ireland

Emissions from household heating can present a significant problem for local air quality.

Traditional methods of heating homes solely with solid fuel may be less common in recent times; however, information gathered from the NISRA Continuous Household Survey 2016/17¹ (figure 6.1) shows that a majority of households who use an open fire do so as a secondary method of heating their homes. A further analysis of the findings carried out by NISRA states that: ‘Some households burn solid fuels to heat their home, with this being the primary method of heating for 4% of households, and a secondary method for 68% of households.’

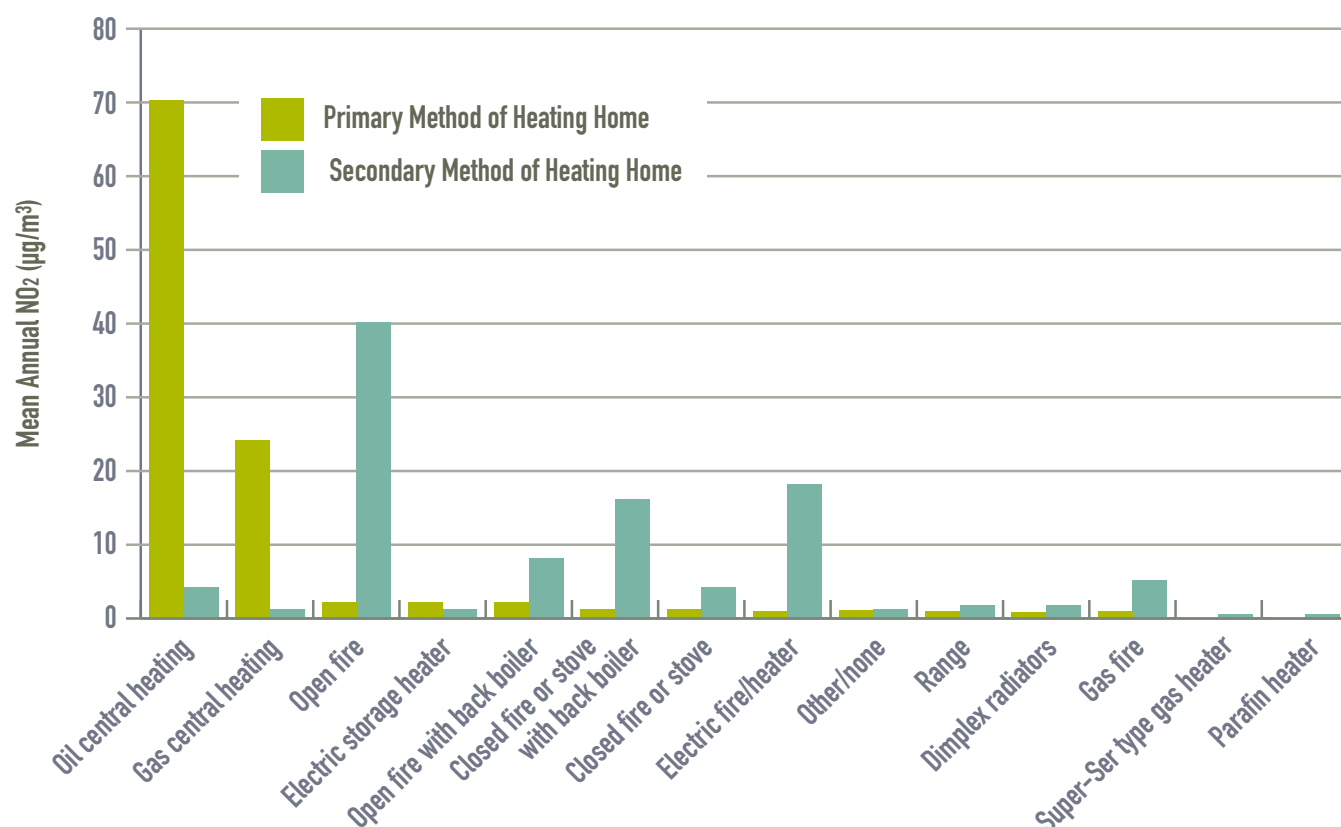
Pollutants from home heating

The primary pollutants of concern generated from household heating are:

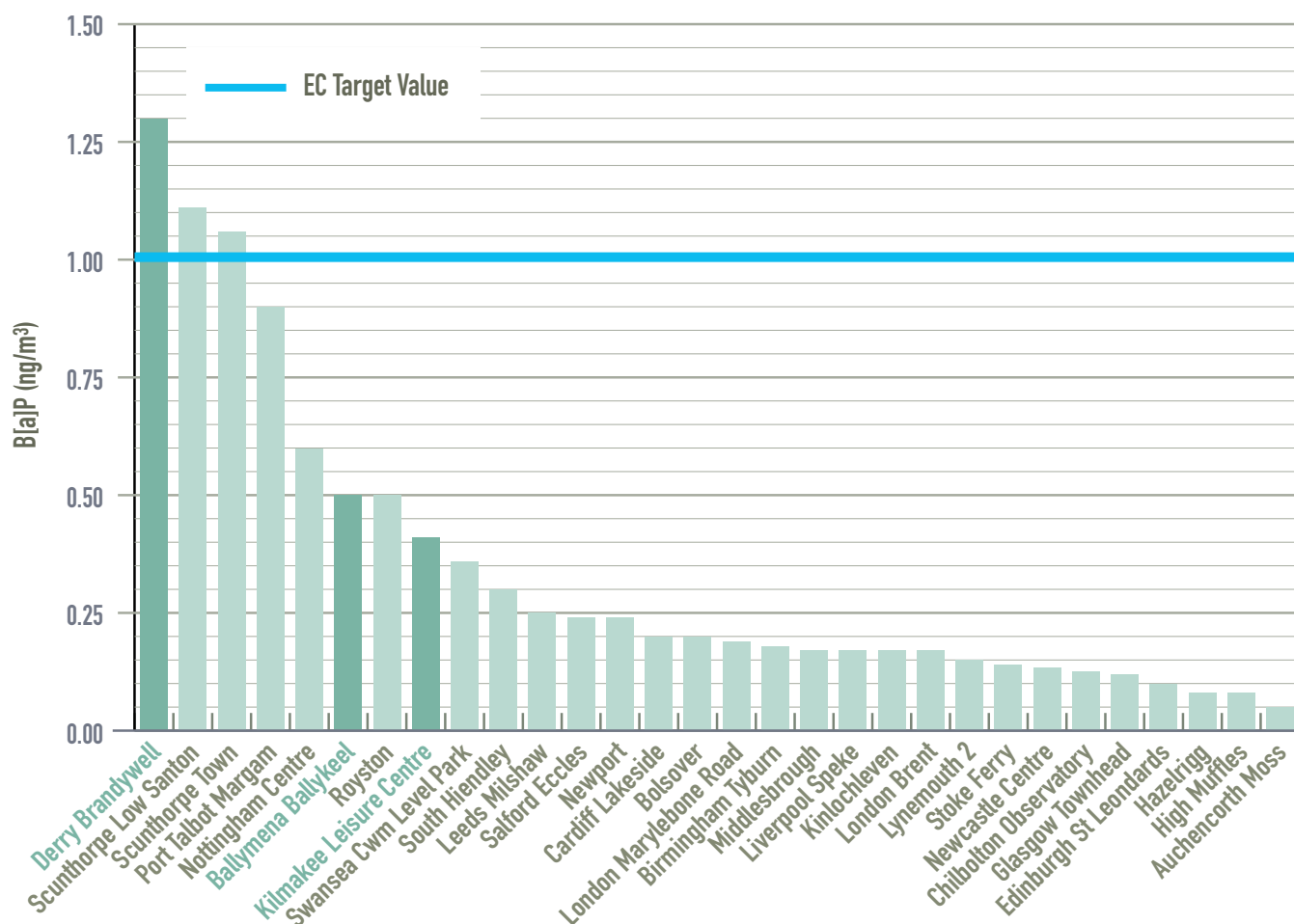
- Polycyclic aromatic hydrocarbons (PAHs),
- Particulate matter and
- Sulphur Dioxide emissions.

The scale of emissions depends on the method of combustion. Highest emissions are from the burning of smoky coal in an open fire, while the lowest are from gas heating, as can be seen in figure 6.3.

Figure 6.1: Methods of Home Heating: NISRA Continuous Household Survey 2016/17



¹ The Continuous Household Survey is based on a systematic random sample of 9,000 domestic addresses drawn each year from Northern Ireland.

Figure 6.2: Annual mean B[a]P Concentration Recorded at Monitoring sites in the UK in 2016²

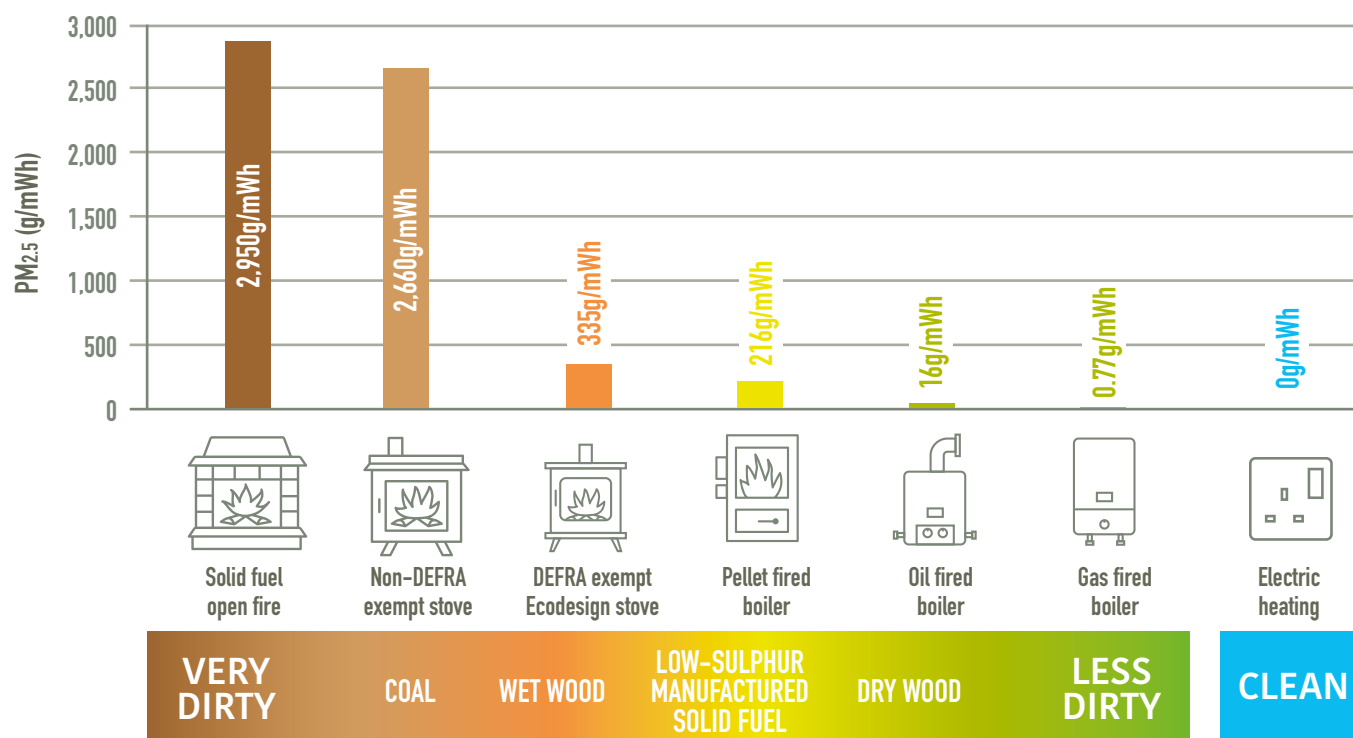
Polycyclic aromatic hydrocarbons (PAHs)

Polycyclic aromatic hydrocarbons – or PAHs – are compounds that can be formed as by-products of certain combustion processes. They are known to be potent human carcinogens (able to cause cancer) and are one of the cancer-causing constituents of cigarette smoke. They are emitted in highest levels from inefficient burning of ‘dirty’ solid fossil fuels – for example, bituminous coal or peat in open fires.

Three sites in Northern Ireland, Derry Brandywell, Ballymena Ballykeel and Kilmakee Leisure Centre, monitor benzo[a]pyrene. The UK PAH monitoring network 2016 report revealed that three Northern Ireland monitoring sites recorded the first, sixth and eighth highest annual mean values of B[a]P in the UK: see figure 6.2. In 2016 the Derry Brandywell

site was one of three UK sites at which the EU annual mean target value for B[a]P (1ng/m³) was breached, with the report noting that levels found in both Ballykeel and Brandywell, (the two other sites in Northern Ireland) were associated with domestic solid fuel use. By 2017 this figure had returned to its 2015 value

Figure 6.3: Home heating emissions



Particulate Matter

When inhaled, particulate matter acts as a respiratory irritant.

Winter air pollution episodes in Northern Ireland are primarily due to high levels of particulate matter from solid fuel burning. These episodes happen in the colder months of the year when home heating activity is increased and weather conditions do not allow for dispersal of pollutants.

Analysis of the levels of particulate matter and nitrogen dioxide measured during the month of November 2016 at the Londonderry Rosemount monitoring station indicates:

- Levels of all air pollutants increased, as the calm, relatively windless weather conditions meant that pollutants built up near ground level;
- Nitrogen dioxide levels from car traffic increased, due to not being dispersed;
- Particulate matter levels increased, due to not being dispersed, though to a greater

degree than the increases seen in NO₂, because of an increase in activity (home heating using solid fuels).

We can conclude that home heating – in particular, solid fuel use – is a major factor in particulate matter air pollution episodes in the winter.

Sulphur Dioxide

Sulphur dioxide can have direct health effects – particularly on sensitive individuals such as those with asthma – because it is a rapidly acting respiratory irritant. It can also lead to the formation of acid rain which damages plant life and biodiversity.

It is produced as a by-product when fuels that contain small amounts of sulphur are burned: these are invariably fossil fuels such as coal, oil and gas. The largest sources of sulphur dioxide in Northern Ireland are power generation and solid fuel combustion (particularly household heating).

What Can Be Done to Control Emissions?

Smoke Control Areas

Smoke control areas (SCAs) prohibit the emission from smoke from households. These areas were introduced under the Clean Air Order (1981), which allows district councils to declare parts of their district as Smoke Control Areas (SCAs). Households may, however, burn ‘authorised fuels’ in ‘exempted appliances’. For example:

- gas central heating;
- oil-fired central heating; or
- the burning of ‘smokeless’ coal, wood or anthracite in an efficient, closed-fronted fireplace or stove, which has been approved for such use by Defra.

Other stipulations under the Clean Air Order are that unauthorised fuels are only allowed to be sold in Smoke Control Areas where the use is not intended within the Smoke Control Area. If you are unsure whether or not you live in a Smoke Control Area, you should contact your local council for advice and guidance

Types of Fuel and Methods of Combustion

The levels of pollutants emitted by home heating activity depend on a) the fuel being burned, and b) the appliance used to burn the fuel.

Smokeless fuels

Smokeless fuels can be more expensive than traditional smoky fuels and this creates a preference for many people towards buying smoky fuels³. However, an analysis of heating costs by fuel type and appliance has shown that, in terms of heat energy delivered, there is no significant difference in heating costs between the use of household coal or cleaner coals in efficient closed-fronted appliances.

Eco-design Stoves

The Eco-design Directive specifies standards for solid fuel home stoves with a heating capacity of less than 50kW from 2020 onwards. It will be illegal to manufacture and sell new stoves from 1st January 2022 that do not comply with the Ecodesign requirements. This applies to all stoves and not just those in Smoke Control Areas.

The Energy Labelling Scheme

This scheme, which began in January 2018, may help to improve air quality, by encouraging the purchase of more efficient stoves, thereby reducing the amount of fuel burnt and consequential emissions.

Energy Efficiency Schemes for Housing

Various schemes exist throughout Northern Ireland to aid qualifying householders (private or rental) in making their homes more energy efficient such as:

- The affordable warmth scheme
- Boiler replacement scheme
- Northern Ireland Sustainable Energy Programme (NISPEP) Grants

³ Residential Solid Fuel and Air Pollution, 81-82.

7. Measures, Initiatives and Reports

This section highlights some of the measures and initiatives taking place in Northern Ireland, which are expected to deliver improvements in air quality.

For some of these measures, reducing air pollution is the main objective. Others may be primarily aimed at – for example - reducing traffic congestion, investing in cleaner fuels or promoting active travel; but with improved air quality as a likely co-benefit.

Belfast Rapid Transit system (the Glider service) was launched on the 3rd September 2018. It aims to provide a fast, frequent, accessible and reliable transport service for Belfast. The first phase began operation in September 2018 and links East Belfast, West Belfast and the Titanic Quarter via

the city centre. Its articulated vehicles each have a capacity of 105 people, potentially saving an estimated 83 car journeys, and use hybrid diesel/electric technologies for lower emissions.

Regional Strategic Network Transport Plan:

Publication of a Regional Strategic Network Transport Plan is included in the NICS Outcomes Delivery Plan as an action which will contribute to reducing journey times on our key economic corridors, reduce congestion and bottlenecks and improve road safety for motorists. These actions included in the Plan should also contribute to a reduction in emissions and support economic growth.

North-West multi Modal Transport Hub: Project construction has commenced on the new North-West Multi Modal Transport Hub which will be an important gateway to the North-West, regenerating the local area. It will encourage a



Belfast's new Glider service



North Coast Greenway

modal shift from car to public transport and other sustainable modes by providing integrated and convenient services to encourage more active travel for a healthier region.

Concessionary Fares: For the last five years, uptake of SmartPasses from the eligible older population has been around 80%. The Scheme delivers economic, social and environmental benefits that go beyond the immediate benefits to passengers. These benefits could include wider economic impacts which the Department for Infrastructure is exploring how it can measure the impact which the Scheme has in increasing levels of volunteering and social care, to health and wellbeing benefits associated with more active lifestyles.

Walking and Cycling Infrastructure: The Department for Infrastructure has been working on eight urban bicycle infrastructure schemes

including the recently completed Middlepath Street scheme in Belfast and the widening of the Comber Greenway to Dundonald. Funding has also been provided to Councils to enable them to develop plans for 14 greenway schemes.

Active School Travel in Northern Ireland: The Department for Infrastructure and the Public Health Agency jointly fund Sustrans (a charity promoting cycling and walking) to deliver the Active School Travel Programme across Northern Ireland until 2021. The aim of this programme is to provide schools with the skills and knowledge to get more children walking, cycling and scooting as their main mode of transport to school. During 2016-17 through a planned programme of activities and support 229, mainly primary schools, took part in the programme. At participating schools, during 2016-17 there was a 25% increase in the number of pupils who travelled actively at the end of the year when compared to the start. There was also

9% reduction in those pupils travelling by car when comparing the start of the year with the end. More information about Active School Travel in Northern Ireland can be found at <https://www.sustrans.org.uk/NIschools> 

CHIPS Project in East Belfast: the Europe-wide CHIPS project (Cycle Highways Innovation for Smarter People Transport and Spatial Planning) seeks to promote cycling and facilities for cyclists. Until 2019, Belfast will be collaborating with cities in the Netherlands, Belgium, Germany and the Republic of Ireland. Supported by funding from DAERA, Sustrans is working with CHIPS, and last year carried out a survey of cyclists using the Comber Greenway in East Belfast to identify the barriers preventing people commuting by bicycle. The results, published in January 2017, showed that in Belfast the biggest barriers were concerns about heavy traffic and possible confrontation with car drivers (<https://www.sustrans.org.uk/news/healthmain-motivator-take-cycling>) .

Draft Northern Ireland Programme for Government: this government wide framework has an indicator on air quality which is linked to a number of high level outcomes. The indicator is based on nitrogen dioxide levels across ten roadside monitoring sites in Northern Ireland, which have been chosen according to availability and reliability of long-term datasets. The Delivery Plan for this indicator sets out measures being taken across government to reduce car use by encouraging active travel and uptake of public transport.

Ammonia Action Plan: Northern Ireland has proportionately very high levels of ammonia emissions. In 2016, Northern Ireland's ammonia emissions accounted for 11% of the UK total emissions, compared to 6% of UK land area and 3% of the population. Since 94% of ammonia emissions come from the agriculture sector, this relatively high proportion of emissions reflects the scale of the agriculture sector in Northern Ireland, its status as a food exporting region and the associated importance of agriculture to the local economy. After a decrease of 17% from peak ammonia emissions in 1998, since 2010 emissions have begun to rise and in 2016 were 13% higher than they had been in 2010.

Given this trend of increasing ammonia emissions, the potential for damage to sensitive habitats from excessive nitrogen deposition and the impact on human health, DAERA is currently developing an Ammonia Action Plan. This Action Plan will outline a series of potential measures intended to achieve tangible and sustained reductions in ammonia emissions and protect sensitive habitats across Northern Ireland. The Plan will also highlight the need for targeted action at designated sites and examine regulatory policy on farm development. DAERA will continue to work with stakeholders on the detail of these measures and expects to issue a stakeholder engagement document on ammonia reduction in the New Year.

Where to find out more on air quality

The Northern Ireland Air Quality Website at www.airqualityni.co.uk provides information covering all aspects of air pollution in Northern Ireland.

DAERA's website at <https://www.daera-ni.gov.uk/> provides links to information on a range of environmental issues including biodiversity, waste and pollution. DAERA's 'Protect the Environment' web page at <https://www.daera-ni.gov.uk/topics/protect-environment> covers air quality, climate change and local environmental issues including noise.

National and local air quality forecasts are available from:

- The Air Pollution Recorded Helpline on freephone 0800 556677;
- The Defra UK Air Information Resource (UK-AIR) at <http://uk-air.defra.gov.uk/>
- The Northern Ireland Air Quality website www.airqualityni.co.uk.

For information on air quality issues in your local area please contact the Environmental Health Department of your district council.



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