



Air Pollution in Northern Ireland 2006



1 Introduction



This brochure is the fifth in a series of annual reports on air quality in Northern Ireland. Produced by AEA Energy & Environment on behalf of the Department of Environment in Northern Ireland, it is intended to provide a summary of air quality monitoring carried out on behalf of Government and by District Councils during 2006.

This year's report has been expanded significantly, as well as extensively re-designed. It also includes some new topic areas for 2006. Section 2 of this report reviews the continuing developments in air quality legislation and policy affecting Northern Ireland. Section 3 summarises the main national air quality monitoring programmes, together with locations of monitoring sites. In Section 4, we review long-term trends in air quality, followed by spatial patterns of pollution in Section 5. In Section 6, we examine issues of social equity in relation to air quality. Finally, for readers wanting to find out more, additional web-based and published sources of information on Northern Ireland's air quality issues are summarised in Section 7.

Air quality in Northern Ireland has shown substantial improvement in recent years. In particular, levels of pollutants associated with coal and oil combustion have declined significantly over the past decade. However, some pollutants in some parts of Northern Ireland continue to exceed air quality objectives. The 2006 review of the Air Quality Strategy reports that current average levels of man-made particulate pollution in the UK are estimated to reduce life expectancy by up to eight months. Continued effort to reduce air pollution is therefore important, together with monitoring to assess progress.

2 Legislation and policy



The management of air quality is based on a series of statutory measures and policy programmes originating from Europe, the UK and Northern Ireland itself. Together, these form the basis of a strong framework for managing air quality in Northern Ireland over the coming years.

2.1 The European Union Process

Much of the foundation for managing air quality in Northern Ireland can be traced back to the objectives and provisions contained within the series of Air Quality Directives adopted by all Member States of the European Union.

One of the most recent developments in European policy will affect the way that we manage fine particulate matter in the air, known as PM. Currently, PM is most commonly monitored as PM₁₀ (fine particles with an aerodynamic diameter less than or equal to a nominal 10 micrometer). However, evidence from a number of epidemiological studies and directly from the World Health Organisation (WHO) suggests that major health impacts of PM are associated with the fraction below 2.5 microns in size (known as PM_{2.5}). Based on this and other evidence, a new Air Quality Directive is currently being formulated at the European level, and this is set - for the first time - to incorporate objectives for PM_{2.5}.

In addition, scientific evidence now suggests that PM should be considered as a 'non-threshold' pollutant, i.e. there is no 'safe' limit below which effects on health will not occur. Therefore the new Air Quality Directive is proposing that an 'exposure reduction' approach should be adopted for managing PM, whereby a year-on-year percentage reduction of observed levels is required. Revisions to the provisions and objectives for other pollutants are also being considered. It is expected that the new Directive will be agreed by all Member States and finalised by the end of 2007.

2.2 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, establishes a strong 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 for a series of pollutants to be met within all UK countries. 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 described above. However, provisions and corresponding objectives for some pollutants differ from those in the Air Quality Directives; these differences relate to scientific evidence and expert opinion that is specific to the UK situation.

A major revision of the Strategy was published in July 2007. The revision provides a detailed update of the effectiveness of current provisions and objectives, as well as proposing a series of new regulatory measures and objectives to be adopted. The key outcomes from the Strategy revision are that all current objectives for pollutants will be maintained. Additional objectives for PM_{2.5} to protect human health, and for ozone to protect ecosystems, have been adopted. Both of these new objectives are in line with corresponding standards that are either already adopted within existing Air Quality Directives, or are proposed under the new Directive (Table 1). In addition, a series of policy measures have been considered for adoption following detailed cost-benefit analysis. The full revised Air Quality Strategy and associated technical annexes can be seen at:

<http://www.defra.gov.uk/environment/airquality/strategy/index.htm>

The Department of the Environment in Northern Ireland has also now published its own Air Quality Standards Regulations (Northern Ireland) 2007, which came into operation on 28th May. Other relevant legislation includes the Sulphur Content of Liquid Fuels Regulations (Northern Ireland) 2007 which came into force on the 31st May 2007. This legislation limits the permissible sulphur content of liquid fuel oils such as those used for domestic heating, and thus helps to reduce emissions of sulphur dioxide.

Table 1: New objectives to be adopted within the Air Quality Strategy for England, Scotland, Wales and Northern Ireland from 2007.

Pollutant	Applies	Objective	Measure	Date to be achieved	European obligation	Date to be achieved
Particles (PM _{2.5})	UK-except Scotland	25 µg m ⁻³	Annual Mean	2020	Target value 25 µg m ⁻³	2010
	UK urban areas	Target of 15% reduction in concentrations at urban background		Between 2010 and 2020	Target of 20% reduction in levels at urban background locations	Between 2010 and 2020
Ozone: vegetation and ecosystems	UK	Target value of 18,000 µg m ⁻³ based on AOT40 ¹ to be calculated from hourly values from May to July	Average over 5 years	1 January 2010	Target value of 18,000 µg m ⁻³ based on AOT40 ¹	1 January 2010

¹ AOT40, expressed in ppb.hours, is a measure of accumulated ozone dose exceeding a 40ppb – 80µg m⁻³ threshold; it provides a useful measure of the exposure of crops and ecosystems to this pollutant.

2.3 Local Air Quality Management

Local Air Quality Management (LAQM) provides the framework within which air quality is managed by District Councils in Northern Ireland. LAQM requires District Councils to review and assess a range of air pollutants against the objectives set out within the 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
- ▶ Develop an Action Plan to address the problem.

Nine of Northern Ireland's 26 District Councils have declared Air Quality Management Areas. Of these nine, four have declared AQMAs for PM₁₀ alone, two have declared AQMAs for NO₂ and PM₁₀ together, two have declared an AQMA for NO₂ only, and one for SO₂. A further two District Councils – Carrickfergus and Newtownabbey - have now revoked AQMAs for PM₁₀ which they had originally declared after the first round of local air quality management review and assessment, although it is likely that Newtownabbey may need to declare three new AQMAs for NO₂ in different locations. Table 2 shows the locations of these AQMAs, and what pollutants they deal with.

Eight Councils - Antrim, Ards, Ballymena, Ballymoney, Belfast, Derry, Limavady and Strabane have submitted Air Quality Action Plans to the Department. The ninth – Newry and Mourne DC – has yet to complete its Action Plan.

Table 2: Air Quality Managements Areas Declared by District Councils in Northern Ireland

Council	Pollutant	Source	Date Declared	Number of AQMAs
Antrim	SO ₂	Domestic	31/10/04	1
Ards	PM ₁₀	Domestic	1/04/05	1
Ballymena	PM ₁₀	Domestic	1/11/04	2
Ballymoney	PM ₁₀	Domestic	1/08/05	1
Belfast	NO ₂ & PM ₁₀	Roads & Domestic	31/08/04	4
Derry	NO ₂	Roads	21/02/05	1
Limavady	NO ₂	Roads	01/03/06	1
Newry & Mourne	NO ₂ & PM ₁₀	Roads	11/04/06	5
Strabane	PM ₁₀	Domestic	30/06/04	3

2.4 The Sustainable Development Strategy for Northern Ireland

May 2006 saw the publication of Northern Ireland's own environmental strategy, entitled "A Sustainable Development Strategy for Northern Ireland - first steps towards sustainability". Further details can be found at: <http://www.ofmdfmi.gov.uk/sustain-develop.pdf>.

This document sets out strategic objectives in the areas of sustainable consumption and production, natural resource protection and environmental enhancement, maintaining sustainable communities, climate change and energy use, education and government. Included within the objectives relating to natural resource protection is an objective "**To improve our air quality**". The key target of this objective is to meet the health-based objectives for the seven key pollutants in the Air Quality Strategy by 2010. Important steps in achieving this target are to:

- ▶ Evaluate District Council air quality reports/action plans, make recommendations and provide grant support to ensure that Air Quality Strategy objectives are met
- ▶ Assist in the current review of the Air Quality Strategy that outlines new measures to help extend life expectancy and cut environmental damage.

3 Networks and data



A wide range of air quality monitoring activities 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 following pollutants were monitored in Northern Ireland during 2006:

- ▶ Carbon Monoxide (CO)
- ▶ Oxides of Nitrogen (NO_x) and Nitrogen Dioxide (NO₂)
- ▶ Sulphur Dioxide (SO₂)
- ▶ Particles (as PM₁₀ and PM_{2.5}, also using the older Black Smoke technique)
- ▶ Ozone
- ▶ Benzene
- ▶ 1,3-Butadiene
- ▶ Polycyclic Aromatic Hydrocarbons (PAH)

During 2006, there were 40 air quality monitoring stations in Northern Ireland, each equipped with continuous monitoring equipment for some or all of the above pollutants. The locations of the automatic monitoring sites are shown in Figure 1; they provide high-resolution hourly information on a wide range of pollutants. In the case of sites comprising the national network, this can be communicated rapidly to the public, together with warnings when levels approach or exceed the 'high' pollution band. Two automatic monitoring sites- in Lisburn and North Down - are shown in Figure 2.



Figure 1 Automatic monitoring stations in Northern Ireland

Northern Ireland's automatic sites are supplemented by a large number of non-automatic monitoring sites, which use less expensive techniques to provide additional information on air quality. The majority of these are diffusion tubes: low cost single-use samplers that absorb the pollutant directly from the air and need no power supply. These measure average concentrations over a specified sampling period (typically one month) instead of instantaneous concentrations, but still provide invaluable data for screening purposes, 'hot-spot' identification, local impact assessment and mapping overall levels of pollution

across the country as a whole. The pollutants measured, site numbers and areas covered are summarised in Table 3.



Figure 2 North Down Holywood (left) and Lisburn Civic Centre (right) automatic monitoring stations

Table 3. Summary of measurements made for the most important air pollutants

Pollutant	Major sources	Site numbers	Areas covered
Nitrogen Dioxide (NO ₂)	Road transport and industry	18 (Auto) >200 (Non-auto – diff. tubes)	Mostly urban
Ozone (O ₃)	Sunlight and heat, acting on road transport and industrial emissions	3 (Auto) 1 (Non-auto – diff. tubes)	Urban & rural
Particles (PM ₁₀ , 2.5)	Road transport, industry, construction, soil and natural sources	33 (Auto) 3 (Non-auto: black smoke)	Mostly urban and industrial
Sulphur dioxide (SO ₂)	Industry and fuel combustion	21 (Auto) ~50 (Non-auto: diff. tubes)	Mostly urban
Carbon Monoxide	Road transport	2 (Auto)	Urban
Volatile Organic Compounds (VOCs) Toxic Air Pollutants (TOMPS, PAHs)	Industry, transport, solvent use and some natural sources	2 (pumped tube) 2 PAH	Urban, rural & industrial
Acid Deposition	Fuel burning, agricultural and other emissions	2 (Non-auto)	Rural

During 2006, Northern Ireland's first PM_{2.5} monitoring site became operational; Belfast Centre began monitoring PM_{2.5} particulate matter in addition to the PM₁₀ fraction, in October 2006.

3.1 Automatic Monitoring - key results for 2006

Here we summarise some of the results of Northern Ireland's air quality monitoring in 2006, including compliance with Air Quality Strategy Objectives. Further information is provided on the Northern Ireland Air Quality website at www.airqualityni.gov.uk.

Carbon monoxide is monitored using automatic techniques at two sites - Belfast Centre and Londonderry Brooke Park. Both achieved the Air Quality Strategy (AQS) Objective for this pollutant.

Nitrogen dioxide was monitored using automatic techniques at 18 sites during 2006. No sites exceeded the AQS Objective of 200 µg m⁻³ for the hourly mean more than the permitted 18 times. However, four roadside automatic sites exceeded the AQS Objective for the annual mean (40 µg m⁻³). These were Belfast Newtownards Road, Belfast Westlink,

Belfast Stockman's Lane, and Newry Trevor Hill, all of which are close to busy roads. These sites have therefore failed to meet the annual mean objective for NO₂.

Sulphur dioxide Sulphur dioxide was monitored at 21 automatic sites in 2006. All sites in Northern Ireland continue to meet the requirements of the Air Quality Strategy for 15-minute, 1-hour and 24-hour mean SO₂. 2006 was the third year running in which all the AQS Objectives were met for SO₂, at all Northern Ireland's automatic monitoring sites. This is an indication of the progress that has been made in reducing ambient levels of this pollutant in Northern Ireland, in recent years.

Particulate matter – PM₁₀ Particulate matter as PM₁₀ was monitored automatically at 33 locations in 2006. All the monitoring stations met the AQS Objective of 40 µg m⁻³ (gravimetric equivalent) for the annual mean PM₁₀, as gravimetric equivalent. 2006 is the first year in which all Northern Ireland's sites achieved this objective. However, two sites exceeded the AQS Objective of 50 µg m⁻³ (gravimetric equivalent) for the 24-hour mean on more than the permitted 35 occasions. These were Belfast Stockman's Lane, and Newry, Trevor Hill. Both are roadside sites located close to busy roads.

Ozone was monitored using automatic analysers at Belfast Centre, Derry Brooke Park, and Lough Navar (rural). Ozone (O₃) is a secondary pollutant that is formed by reactions involving other pollutant gases, in the presence of sunlight, and over several hours. Once formed, it may persist for several days and be transported over long distances. This means that District Councils have little control over ozone levels in their area.

Unlike some other pollutants, levels of ozone in Northern Ireland do not appear to be decreasing, but remain variable from year to year, depending on weather conditions. Ozone exceedences therefore remain a possibility; the most recent occurred in 2003. However, during 2006 no sites exceeded the target value of the AQS Objective on more than the permitted ten days.

Benzene and 1,3-Butadiene are monitored at Belfast Centre and Belfast Roadside. Both sites continue to easily meet the objectives for these pollutants.

Polycyclic aromatic hydrocarbons (PAH) are monitored at two sites: Lisburn (Dunmurry) and Belfast (Clara Street). Of these two sites, only Belfast Clara Street met the AQS Objective for the PAH pollutant benzo(a) pyrene during 2006. As in previous years, levels of this pollutant at Lisburn remain high compared with other urban sites, and significantly above the AQS Objective. The major source of PAH in the vicinity of the site is thought to be the widespread use of domestic solid fuels. Both sites will be required to consistently meet this Objective by the due date of 2010.

Summary: Northern Ireland's air quality continues to improve. Results from Northern Ireland's network of automatic air quality monitoring stations show that the Air Quality Strategy Objectives for the following pollutants have been met by the due dates –

- ▶ Carbon monoxide
- ▶ Benzene
- ▶ 1,3-Butadiene
- ▶ Sulphur dioxide
- ▶ Lead

However, there remain a small number of sites close to busy roads in Belfast and Newry, that did not meet AQS Objectives for annual mean nitrogen dioxide and for 24-hour mean particulate matter as PM₁₀. Also, benzo (a) pyrene concentrations at Lisburn (Dunmurry) remain above the AQS Objective for 2010.

3.2 Non-Automatic Monitoring in 2006

Sampler-based pollution monitoring can provide a powerful and cost-effective way of determining overall pollution levels over large areas. Northern Ireland's automatic monitoring sites are therefore supplemented by over 200 District Council-operated sites using non-automatic sampling methods. The most widely used of these techniques is passive sampling, using diffusion tubes.

The main programmes of sampler-based monitoring in Northern Ireland are as follows:

1) Diffusion tubes

These measure periodic (typically monthly) concentrations of nitrogen dioxide (NO₂). Diffusion tubes are easy to use and relatively inexpensive, so they can be deployed in large numbers over a wide area, giving good spatial coverage. They may also be used to complement detailed measurements made at automatic monitoring sites, or in circumstances where hourly measurements from automatic analysers are not required.

Although there is no longer a national monitoring network based upon NO₂ diffusion tubes, these samplers are still widely used by the District Councils for the purpose of Local Air Quality Management (LAQM). Moreover, Defra continues to provide a central web-based NO₂ diffusion tube data collation facility, together with QA/QC support for NO₂ diffusion tube monitoring.

The majority of Northern Ireland's diffusion tube sites (over 200 of them) monitor NO₂. As well as this pollutant, however, diffusion tubes are also used in the region to provide indicative monitoring of ozone, sulphur dioxide and a range of hydrocarbons including benzene.

2) Black smoke monitoring

As of January 2006, the former national network measuring black smoke and SO₂ was replaced by a smaller network, operated by NPL, monitoring black smoke alone at 21 sites in the UK. This includes three in Northern Ireland – at Belfast Centre, Strabane and Dunmurry. The first annual report for this new UK Black Smoke Network is available on the UK Air Quality Archive at:

www.airquality.co.uk/archive/reports/cat05/0706141352_2006_Annual_Report_final.pdf

3) Non-automatic Hydrocarbon Monitoring

Hydrocarbons are monitored at Belfast Centre and at Lisburn (Dunmurry) using an automatic Gas Chromatograph analyser. In addition, a pumped tube sampler for benzene (C₆H₆) and 1,3-butadiene is operated as part of the UK network at Belfast Roadside. Running annual mean concentrations for benzene and 1,3-butadiene in 2006 were significantly below the relevant UK Air Quality Strategy Objectives.



Figure 3 Traffic in Belfast *Motor vehicle emissions are the major source of most pollutants – including CO, NO_x, particulate matter and VOCs - in urban centres throughout the country.*

4 Air quality trends

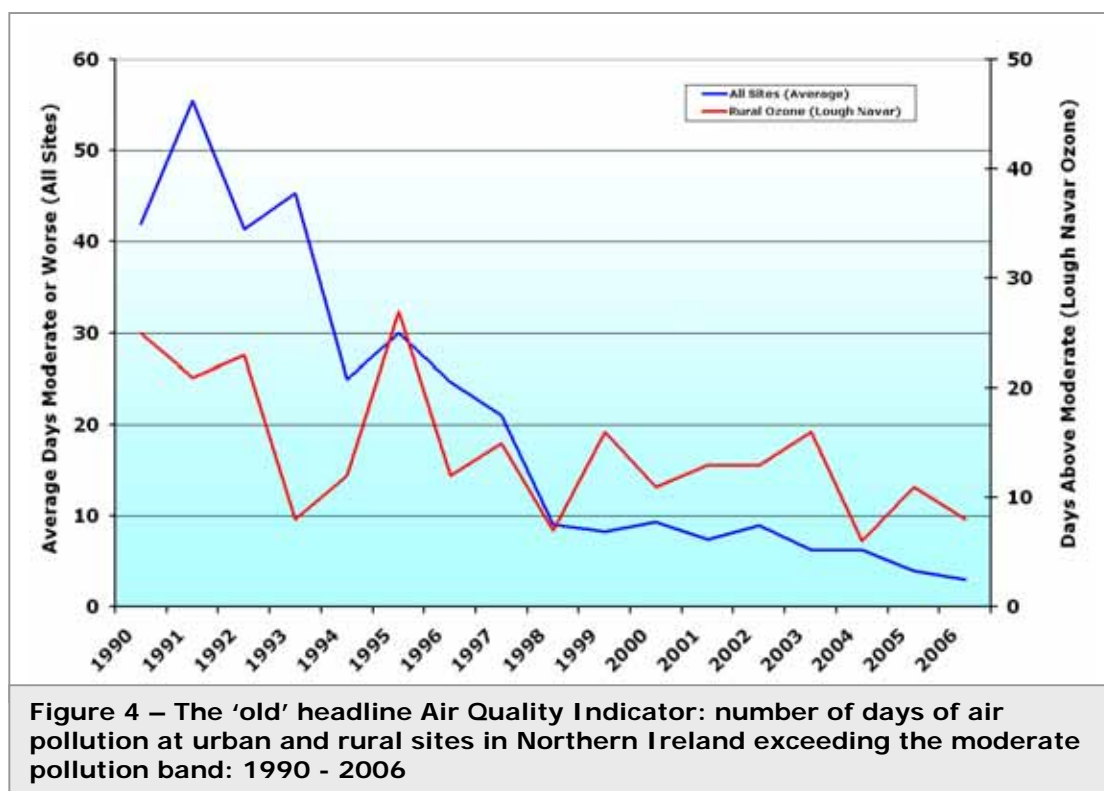


As highlighted in the introduction, recent years have seen a marked improvement in Northern Ireland's air quality. In particular, levels of pollutants associated with coal and oil combustion have reduced significantly over the past decade.

Here we examine how overall pollution levels in Northern Ireland have changed over the last 20 years. To an extent, these analyses are affected by changes in monitoring site numbers. Since these were relatively low up to 2000, trends in the earlier years should be regarded with caution.

In 1999, a first air quality 'headline' indicator was introduced in support of the UK Sustainable Development Strategy. In 2005, a new indicator was added, better reflecting the effects on health of long-term exposure to lower levels of pollution.

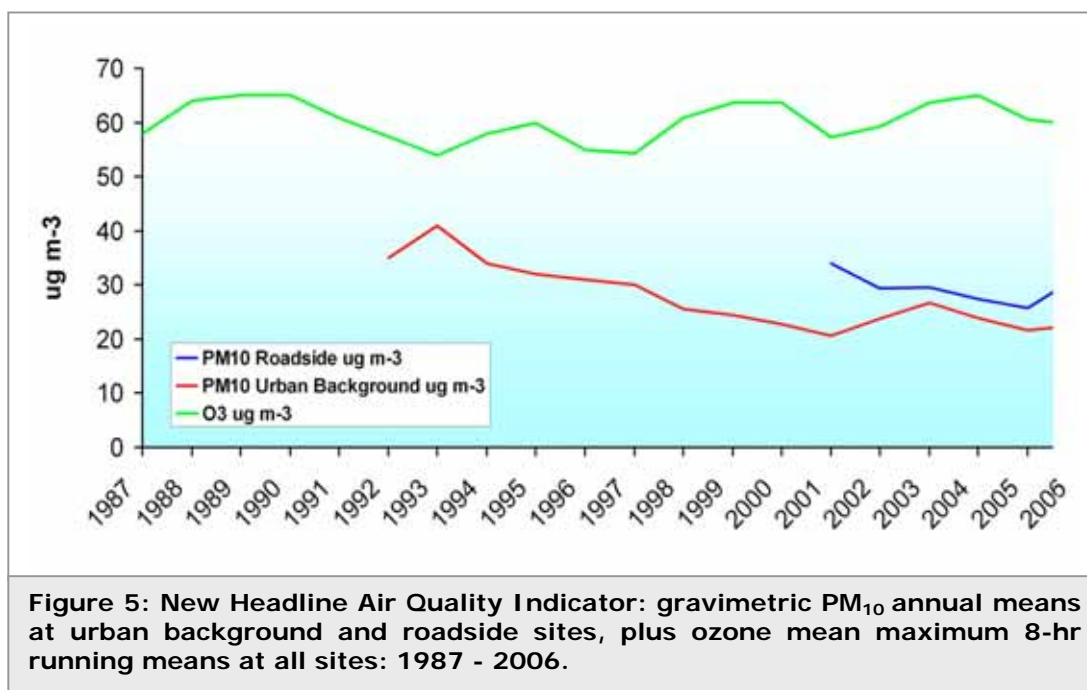
The earlier air quality 'headline' indicator (Figure 4) measures days of moderate or higher pollution according to the Air Pollution Information Service bandings used in the national forecasting service. At the 'moderate' level, the effects of pollution may start to be noticeable to sensitive people. Figure 4 shows the average number of days when air quality was 'moderate' or worse, for all sites, and for rural ozone, for years 1990 onwards. There is a clear downward trend in the 'headline' indicator for all pollutants: less so for rural ozone measured at Lough Navar.



The new (2005) indicator (Figure 5) shows trends for annual exposure to particles and ozone. These trends are important because there is considerable evidence suggesting long-term exposure to even low levels of particles may have a significant effect on public health. Figure 5 shows annual mean concentrations of PM₁₀ (all roadside and urban background sites), and ozone (all sites, rural and urban) in Northern Ireland during the period 1990 to 2006.

This figure demonstrates that there has been a general reduction in urban background PM₁₀ concentrations since 1990. For roadside sites, this parameter can only be calculated

from 2001 onwards, due to the lack of roadside PM₁₀ sites before that year. This indicator appears to show a decreasing trend from 2001 to 2005, but with an increase in 2006: however, this should be interpreted with caution as it may be due to the fact that several new roadside PM₁₀ sites were set up in 2006, at locations where particulate concentration were likely to be high. By contrast, mean ozone concentrations in Northern Ireland do not appear to show any clear overall trend over the same period, although there is distinct year-to-year fluctuation.



The above headline indicators are based on automatic monitoring data, and so can only be calculated back to 1990, due to the limited number of automatic monitoring sites prior to that year. However, non-automatic monitoring of particulate (as “black smoke”) and of sulphur dioxide has been carried out since the early 1960s by the former Smoke and SO₂ Network, which closed down at the end of 2005. Figures 6 and 7 - showing SO₂ and smoke respectively - compare the annual mean concentration based on all sites in Northern Ireland, with that based on the UK Network as a whole. Also shown are the annual means at three long-running sites in Belfast.

Northern Ireland’s SO₂ trends, shown in Figure 6, are particularly interesting. Until 1980, Northern Ireland’s urban SO₂ concentration was typically lower than the UK average, and followed approximately the same declining trend. However, from 1980 to 1987, average concentrations in Northern Ireland rose, overtaking the UK average, before the downward trend continued again from the late 1980s. A possible explanation for this rise in the early 1980s is the phasing out of ‘town gas’ use over this period. With natural gas not widely available in Northern Ireland as an alternative, a rise in coal and oil burning is thought to have resulted.

Until recently, Northern Ireland’s ambient smoke and SO₂ levels remained considerably higher than those in most other UK regions. However, since 2000, the increasing availability of natural gas – together with other factors - substantially closed the gap. When the UK Smoke and SO₂ Network ceased operation in 2005, the difference in mean SO₂ concentrations was just 3 µg m⁻³; for the first time since the early 1980s, Northern Ireland’s SO₂ levels were once again similar to those in England, Wales and Scotland.

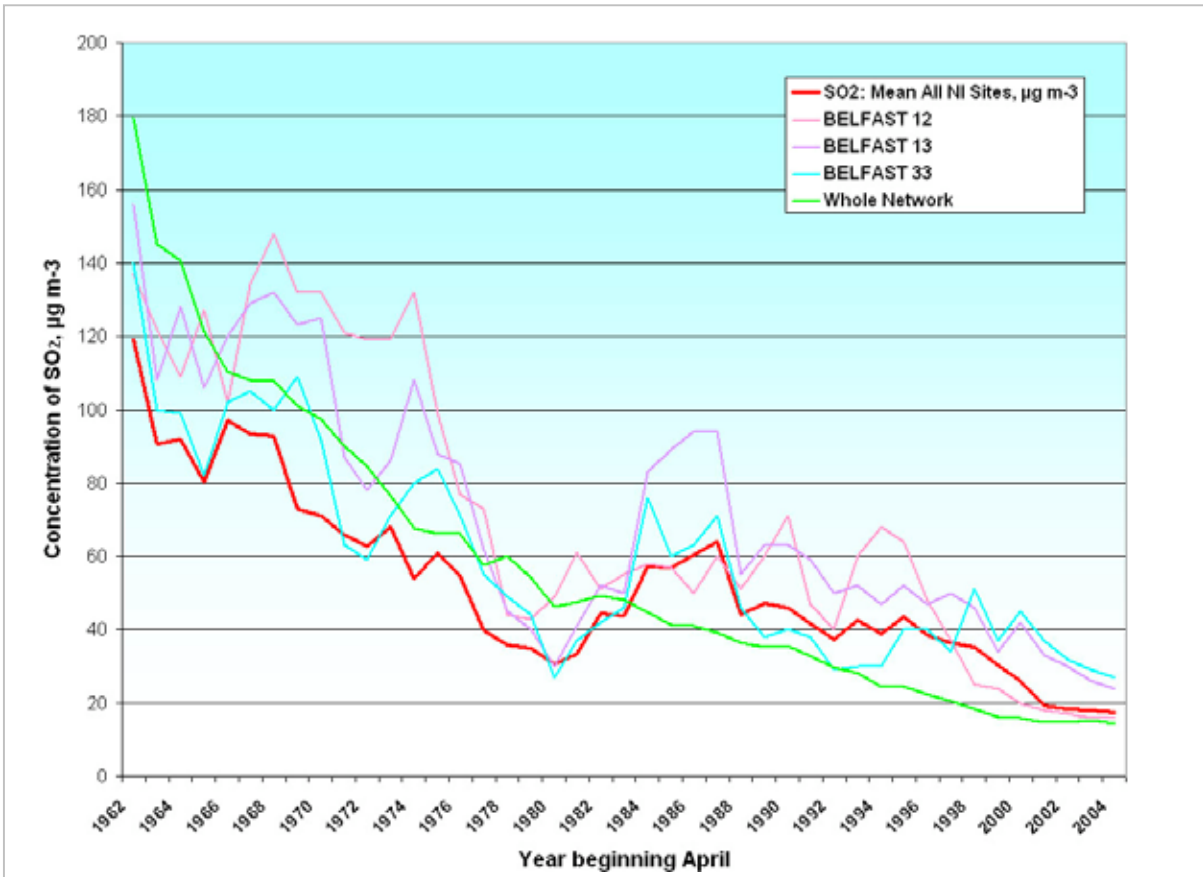


Figure 6 Annual Mean SO₂ Concentrations in Northern Ireland from 1962: Northern Ireland average, UK Network average and three long-running Belfast sites.

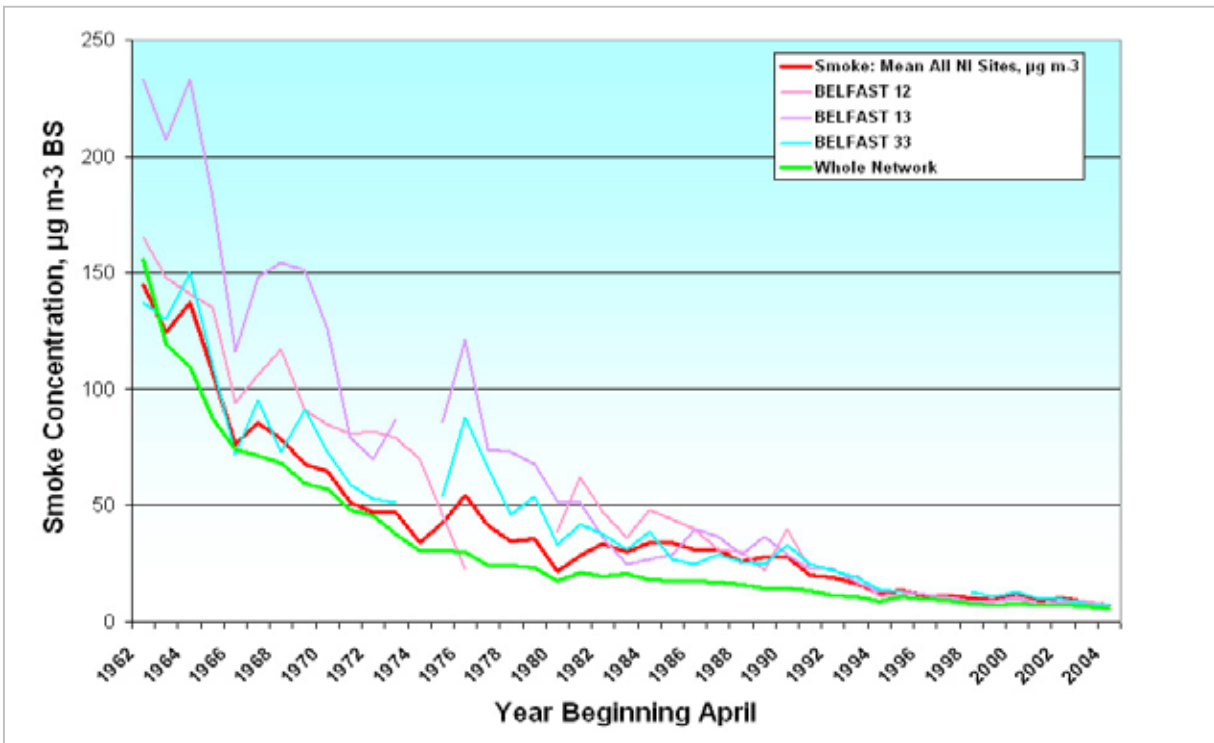


Figure 7 Trends in Black Smoke Concentrations from 1962: Northern Ireland. Northern Ireland average, UK Network average, and three long-running Belfast sites

5 Maps of Air Quality



Data from the air quality monitoring sites in Northern Ireland have been combined with pollutant emissions data from the UK's National Atmospheric Emissions Inventory (NAEI) to produce detailed maps - at 1km resolution - of average or peak background pollutant concentrations across the country. These maps (Figures 8.1, 8.2, 8.3 and 8.4) illustrate that ambient air quality in Northern Ireland is generally good.

Figure 8.1 shows peak (99.9th percentile) 15-minute average concentrations of sulphur dioxide (SO₂). The main sources of this pollutant are industrial and domestic fuel burning (particularly coal and oil). While peak concentrations are very low over most of Northern Ireland, there are clusters of elevated peak SO₂ concentration around Belfast, Derry and the Craigavon and Portadown area south of Lough Neagh. There are also isolated "dots" of higher concentration throughout the rest of the region. These may indicate small pockets of high domestic coal or oil use in rural small towns and villages. However, it is also likely that this is (to some extent) a feature of the emissions inventory used in the model, as monitoring data at corresponding locations indicates that measured concentrations of SO₂ in Northern Ireland are lower than these estimates suggest.

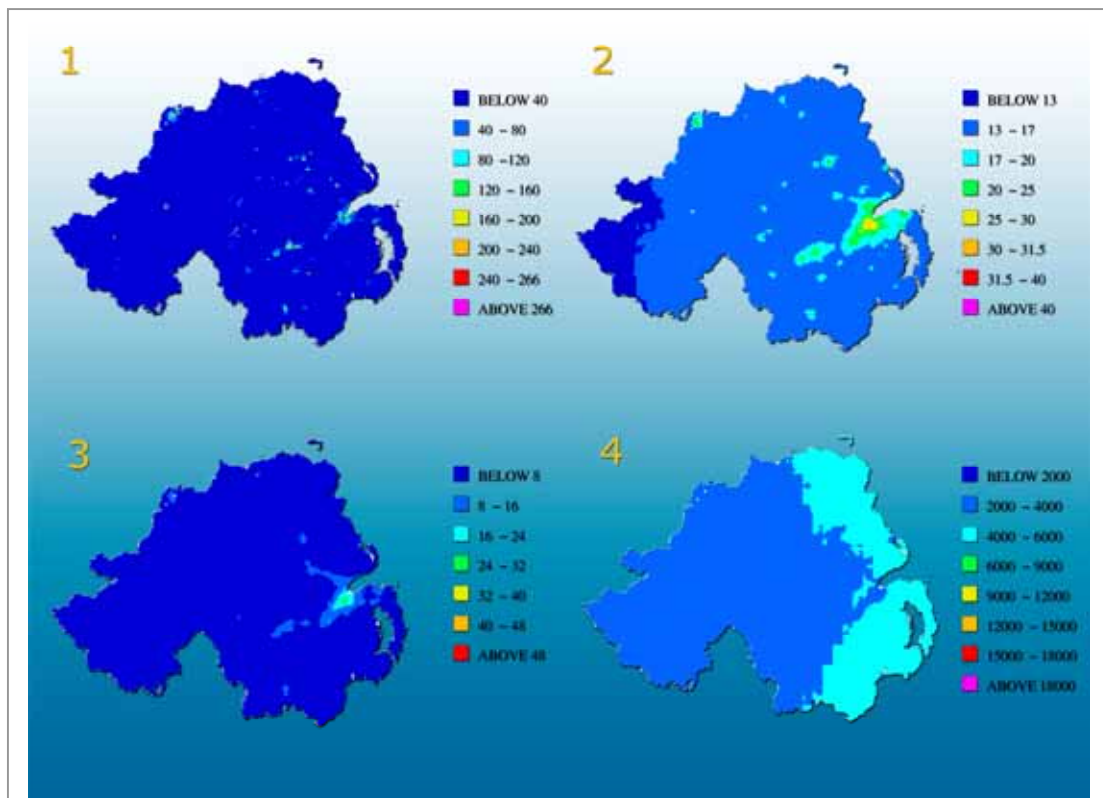


Figure 8 Maps of air quality in Northern Ireland for four key pollutants:

8.1 Estimated 99.9th percentile on 15-minute mean SO₂ μgm^{-3}

8.2 Estimated annual mean PM₁₀ μgm^{-3}

8.3 Estimated annual mean NO₂ μgm^{-3}

8.4 Estimated O₃ AOT40 $\mu\text{gm}^{-3} \cdot \text{hours}^*$

*Accumulated hours Over Threshold of 40 μgm^{-3}

The gravimetric PM₁₀ map (Figure 8.2) is the most interesting one for Northern Ireland, showing the highest concentrations around Belfast and Londonderry, with smaller and less significant areas of elevated concentrations located around Lough Neagh. These areas match the areas of elevated peak SO₂ concentrations shown in Figure 8.1. It is likely that solid fuel combustion associated with domestic heating, accounts for the geographic distribution of elevated concentrations in both pollutants shown by these maps.

Like the other pollutants represented in these maps, estimated background NO₂ concentrations modelled for Northern Ireland in 2006 (Figure 8.3) are low. The highest concentrations are limited to Belfast, although Derry can also be seen as an area of marginally elevated concentrations in the map.

The map of ozone concentration (Figure 8.4) is based on the 'AOT40' statistic on which the EU target value is based. The map presented here shows low concentrations throughout Northern Ireland. The apparent east-west divide, with slightly higher concentrations in the north-eastern and south-western corners, is likely to be an artefact of the interval scale used, related to wider-scale spatial patterns associated with ozone precursor emissions from continental Europe.

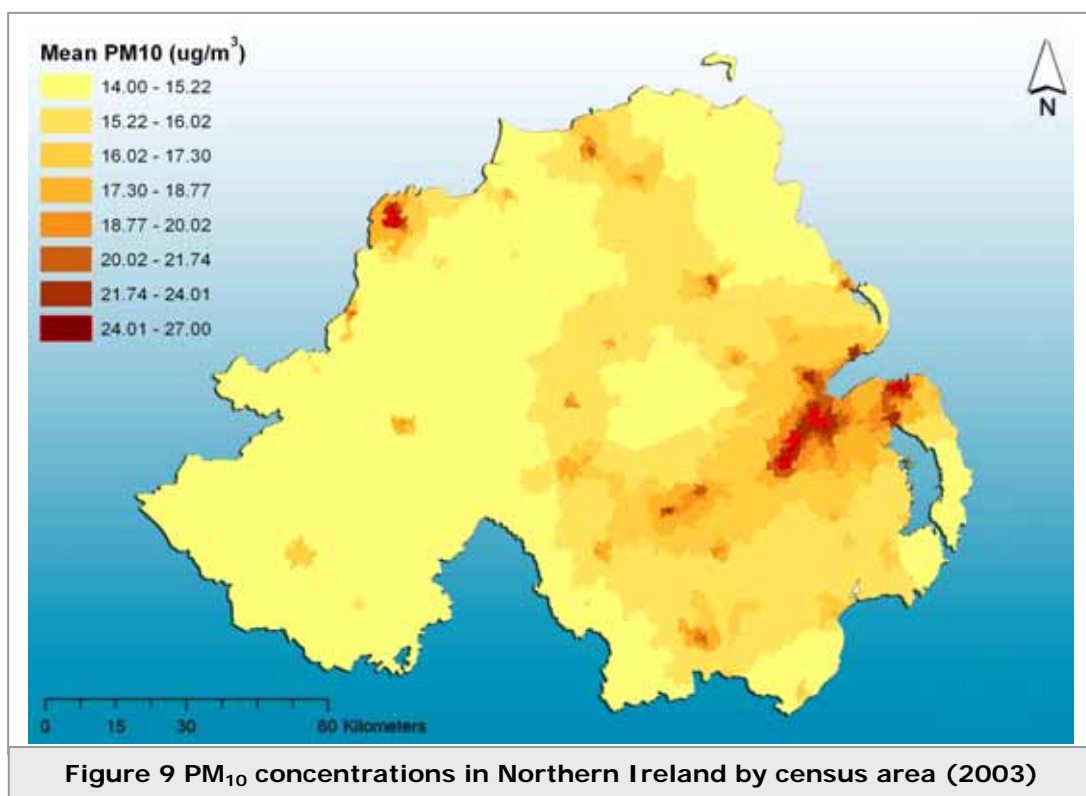
6 Social aspects

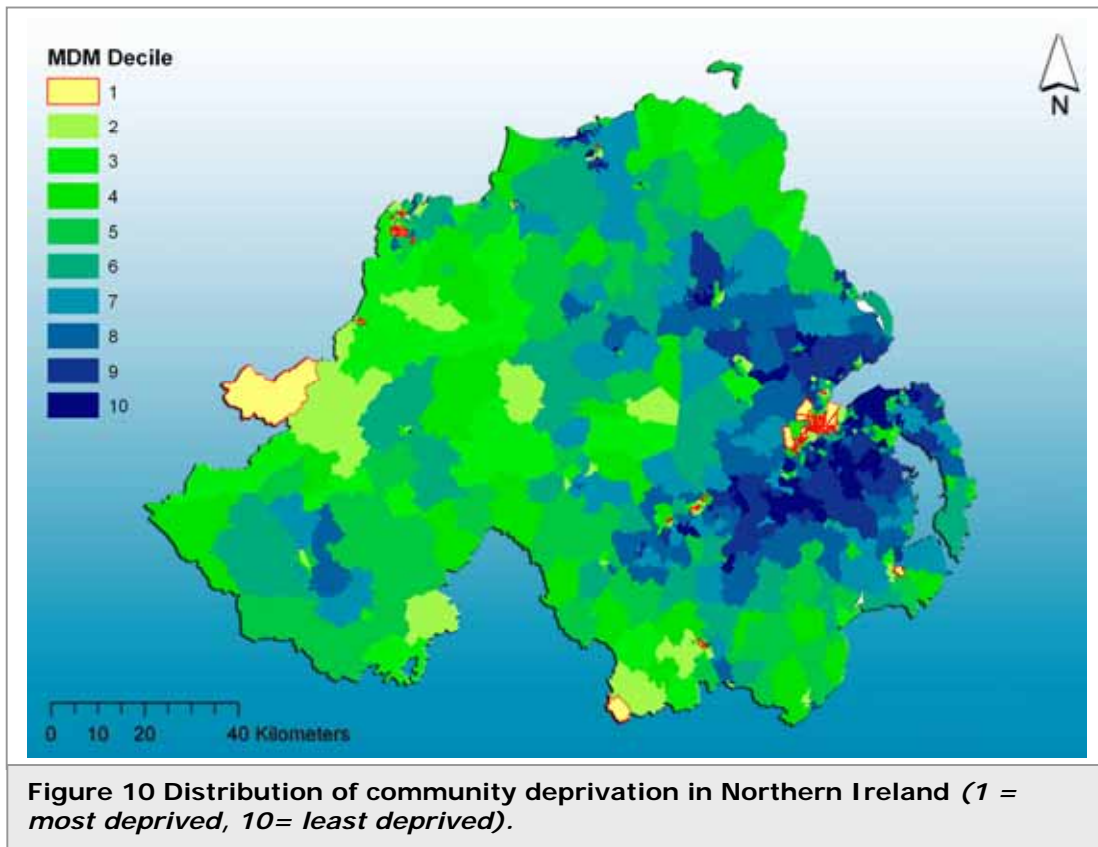


In recent years, there has been increasing recognition of the importance of identifying and tackling environmental inequalities. An environmental inequality arises where one community's access to a certain standard of environmental quality differs from another. This can be measured by assessing the different levels of air pollution, water quality, proximity to industrial facilities, noise levels or access to green spaces experienced by different communities.

Environmental inequalities have gained increasing recognition by policy makers in recent years. A recent wide-ranging report* was prepared by AEA Energy & Environment for Defra and the Devolved Administrations, to assess inequalities associated with air quality. In this section, we summarise the key findings relevant to Northern Ireland, assessing the differences in levels of pollution experienced by different population groups.

Figure 9 shows a map of PM₁₀ concentrations across Northern Ireland, with PM₁₀ being shown as an example pollutant. The matching Figure 10 shows the corresponding distribution of community deprivation levels across the region: this is based on 'multiple deprivation' a statistic incorporating different aspects of deprivation such as low income, unemployment, poor housing etc. This measure is represented in Figure 10 on a scale of 1 to 10, with 1 representing the *most* deprived and 10 representing the *least* deprived.





As can be seen in the above figure, the most deprived areas of Northern Ireland are concentrated in Greater Belfast (Belfast and Lisburn) and Londonderry. These are also the areas where concentrations of NO₂, PM₁₀ and SO₂ are highest.

Investigation of the correlation between average pollutant concentrations and deprivation found that concentrations of PM₁₀ and SO₂ were typically higher in areas where the deprivation measure was highest: poorer air quality is experienced in more deprived areas. This distribution is primarily driven by the burning of solid fuels.

Northern Ireland is a particularly interesting case – with very high air pollution levels particularly associated with the burning of solid fuels in the domestic sector. The housing stock with the highest proportion of solid fuel burning is social housing; this contributes significantly to the distribution trends observed above. During the 1970s and 1980s, solid fuel systems were put into public sector properties. Oil was not used due to high prices on the worldwide market.

However, recent years have brought significant changes to fuel use in Northern Ireland's domestic sector. Natural gas is now available to large areas of Greater Belfast, reducing the use of solid fuels and oil. In addition, the Northern Ireland Housing Executive, which has responsibility for the public housing stock, has been running a conversion programme since 1996, to replace central heating systems in properties with oil or gas.

Since 2000, only oil (where gas is not available) and gas have been offered as the replacement fuel. At the end of 2006, only 13,000 homes still used solid fuels; however approximately 5000 properties a year are being converted to oil or gas, and it is hoped that solid fuel may have been completely phased out in the public sector housing stock by 2010 (Northern Ireland Housing Executive).

** Reference: S Pye, K King & J Sturman "Air Quality and Social Deprivation in the UK: an environmental inequalities analysis" Report prepared for Defra and the Devolved Administrations by AEA Energy & Environment, Jun 2006. Report reference number AEAT/ENV/R/2170.*

7 More information



1) The Northern Ireland Air Quality Website

The air quality website, 'Northern Ireland Air' at www.airqualityni.co.uk - has been created to provide a 'one stop shop' resource for information covering all aspects of air pollution in Northern Ireland.

This site is part of a family of air quality websites covering UK, Wales, Scotland and Northern Ireland.



The site is funded by the Department of Environment in Northern Ireland. It was designed from the outset to be:

- ▶ Comprehensive
- ▶ User-friendly
- ▶ Easily navigable
- ▶ Interactive
- ▶ Able to meet the needs of the general public as well as technical, local government and regulatory user communities.

The website provides information on:

- ▶ Latest up-to-date air quality levels across Northern Ireland
- ▶ Reports and analysis of trends and historical data
- ▶ Information on both national air quality policy and the work of Northern Ireland's District Councils
- ▶ Descriptions of what causes air pollution, how it is measured, and relevant health, amenity and ecosystem impacts

The site contains a map showing where Northern Ireland's automatic monitoring stations are located. By clicking on the map, users can view details of each monitoring site, a photograph of its location, and a list of the pollutants monitored. An 'Air Pollution Index' is used to provide a simple indication of current pollution levels.

2) Current and forecast air quality (national and local)

In addition to the Northern Ireland Air Quality website, this information is rapidly available from:

- ▶ Teletext page 156
- ▶ The Air Pollution Information Service on freephone 0800 556677
- ▶ The UK Air Quality Archive on www.airquality.co.uk

3) General information on Air Quality

- ▶ The DoENI website at <http://www.doeni.gov.uk/>
- ▶ The Environment and Heritage Service website at <http://www.ehsni.gov.uk/>
- ▶ The UK Air Quality Information Archive on www.airquality.co.uk
- ▶ The National Atmospheric Emissions Inventory on www.naei.org.uk
- ▶ The Defra air quality information web resource on www.defra.gov.uk/environment/airquality/index.htm
- ▶ The Northern Ireland Air Quality website at: www.airqualityni.co.uk

4) Local Air Quality Issues

For further information on air quality issues in your area, please contact the Environmental Health Department at your local District Council office. Further information on Local Air Quality Management may also be found at:

www.defra.gov.uk/environment/airquality/laqm.htm

www.airquality.co.uk/archive/laqm/laqm.php

and the Local Authority support site at: <http://www.laqmsupport.org.uk>.



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