Air Quality and Public Health

Reducing deaths and ill-health caused by poor air quality in Lancashire and Cumbria

21 June
CleanAirDay

Blackburn with Darwen Borough Council

Cumbria County Council

Lancashire County Council

Blackpool Council

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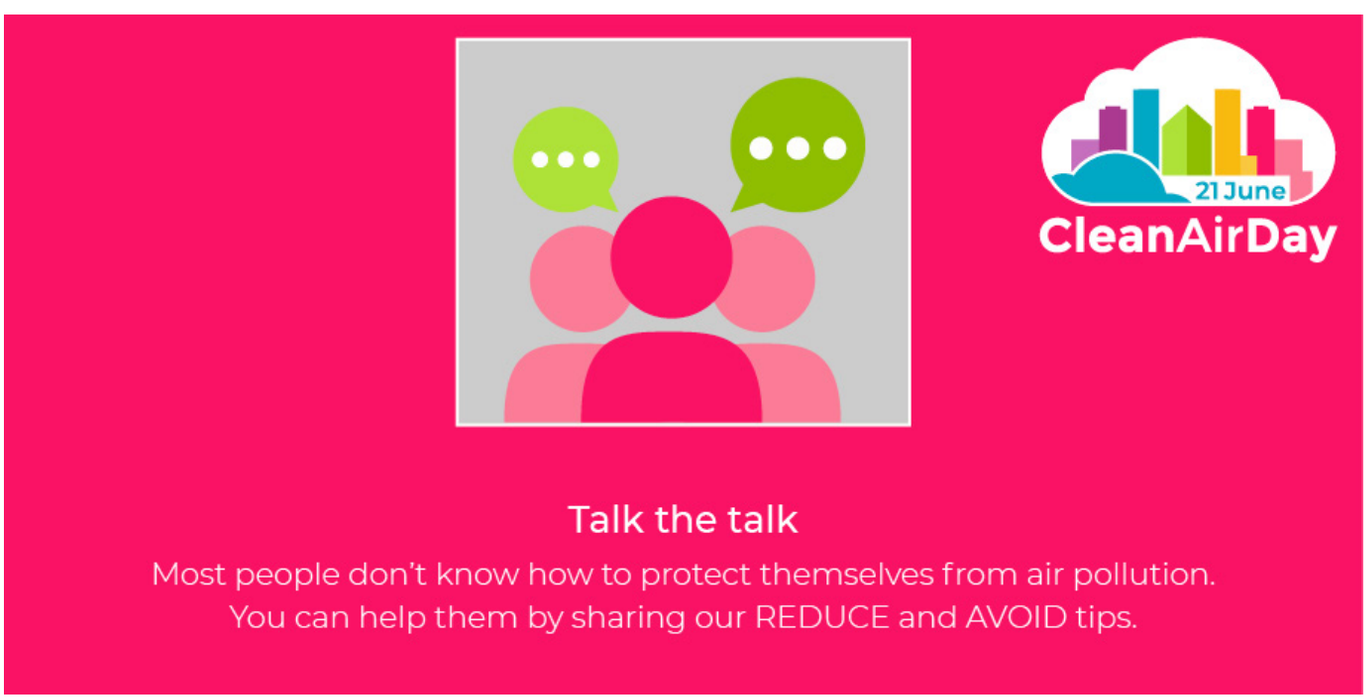

Foreword from the Lancashire and Cumbria Directors of Public Health

Dear Colleagues,

Despite massive improvements over the past 50 years, poor air quality is still harming the health of residents of Lancashire and Cumbria. It is estimated that long term exposure to particulate matter alone has an effect equivalent to 29,000 deaths a year in the UK increasing the risk of illnesses such as heart disease, stroke, respiratory disease and cancers. Public Health England (PHE) estimates that the poor air quality contributes to around 4% of all deaths across Lancashire and Cumbria.

Action to address the causes and mitigate the consequences of avoidable air pollution needs to be taken at all levels of society from Government through to the individual. Reducing air pollution to the point that its effects on human health are zero is probably impossible. The creation of air pollution is a consequence of our mobile lifestyles, our chosen patterns of production and consumption of goods and of our need to provide some of the basics of life such as food and shelter. The challenge then is for us to decide how much pollution and consequent health harms are socially and morally acceptable and how much of it we want to stop.

Many of the ways in which we could reduce air pollution involve costs – to the economy, to the personal freedoms we enjoy, to consumer choice, to planning regulations and to the industries whose profits are maintained by not having to contain their pollution effects on surrounding populations. Air pollution is thus a 'wicked problem' – everyone wants it reduced but considerably fewer of us are prepared to take the actions necessary.

For such complex problems there are distinct advantages to taking a 'social movement for health' approach, which involves mobilising action across the whole of society including the public and private sectors, individuals and communities. This is the approach that the Lancashire and Cumbria Directors of Public Health are recommending. We began to explore this further with our partners at the Lancashire and Cumbria Air Quality Summit on 28th February 2018. The Summit brought together a cross section of those with some responsibility for air quality to better understand the ways in which we can accelerate improvement and make a collective difference.

This approach involves multiple agencies and individuals all working to a common goal across diverse communities, in different public, private and voluntary sector bodies, frequently without extra funding or centralised command and control project planning. We will explore the list of suggestions generated at the Summit (see page 16) and work together with all stakeholders to turn them into appropriate action. We will do as much of this work together with the public as possible and be as transparent as we can about what we are doing and what difference it is making.

To work through how we might better mobilise the support of wider society in this challenge we are working with the NHS Leadership Centre to explore how to better create public health leadership outside of the health sector. This will be a critical success factor if we are to make a difference.

Foreword from the Lancashire and Cumbria Directors of Public Health

We look forward to continuing the conversation about imroving air quality in Lancashire and Cumbria. You can join us at **#AirQualityLandSC**

This report is being launched to coincide with **Clean Air Day 2018**. For more information on Clean Air Day and the Action that people can take to reduce pollution and their exposure to pollution visit the Clean Air Day website at www.cleanairday.org.uk or follow **#CleanAirDay**

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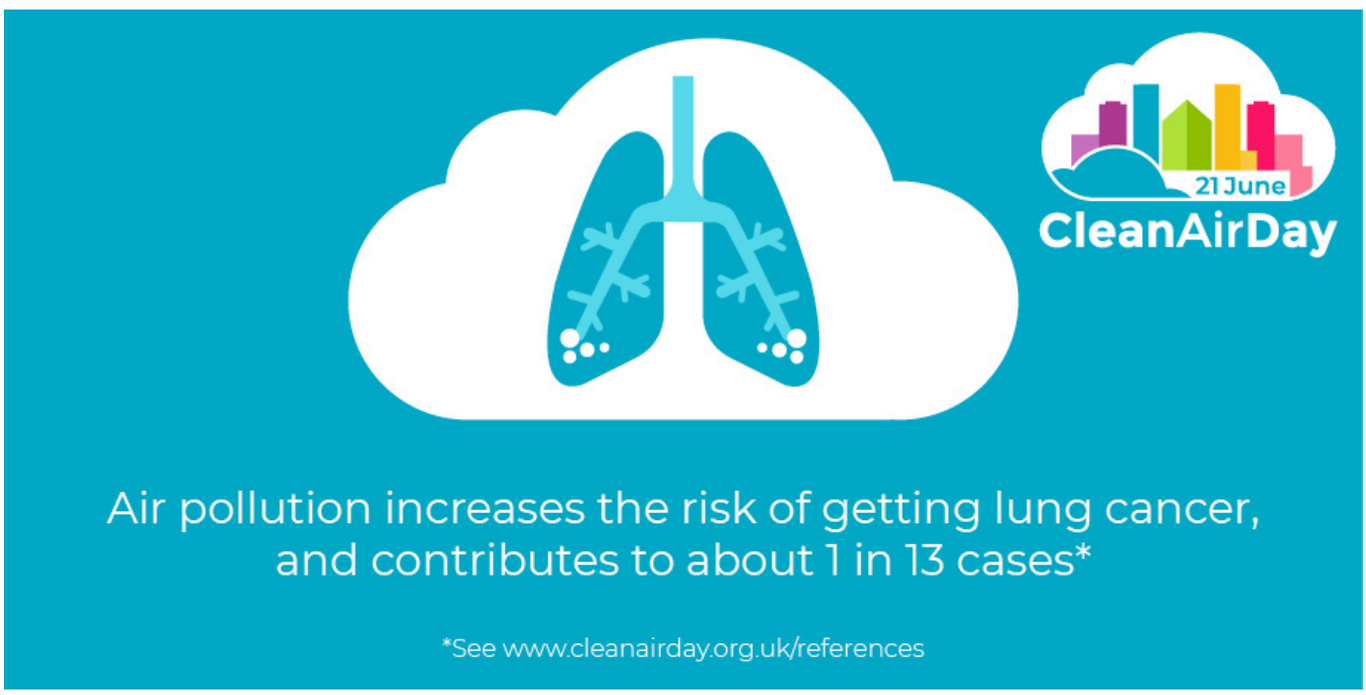


1 Purpose of the report

This is a collective report of the Lancashire and Cumbria Directors of Public Health highlighting air quality issues across the region and following on from the Lancashire and Cumbria Air Quality Summit held in February 2018. The purpose of the report is to;

- **Improve awareness and engagement for action on air quality and understanding of everyone's role in tackling air pollution, building on existing plans and strategies**
- **Start a conversation about the ways in which we can work together and hold each other to account for action to improve air quality**
- **Outline potential areas for further action to reduce population exposure to air pollution, as identified at the Summit.**

2 Understanding the problem

As recently as the nineties it was felt that air pollution was no longer a major health issue in the United Kingdom. Priority had been given to tackling the biggest individual sources of air pollution and legislation had made the great smogs of the fifties a thing of the past. As these major sources of emissions decreased, the relative contribution of smaller and more dispersed sources of air pollution has increased, which requires new types of action.

In more recent years evidence has emerged that small particles emitted to the air from various sources, such as road transport, industry, agriculture and domestic fires, are still having a considerable effect on health. This type of air pollution is so small that it can't be seen by the naked eye, but can get into our respiratory system.

The Department of Health's Committee on the Medical Effects of Air Pollutants (COMEAP) estimated the burden of particulate air pollution in the UK in 2008 to be equivalent to nearly 29,000 deaths and an associated loss of population life of 340,000 years by increasing the risk of diseases such as heart disease, stroke, respiratory disease and cancers. Indeed diesel engine exhaust, outdoor air pollution and particulate air pollution have been classified by the World Health Organization as carcinogenic.

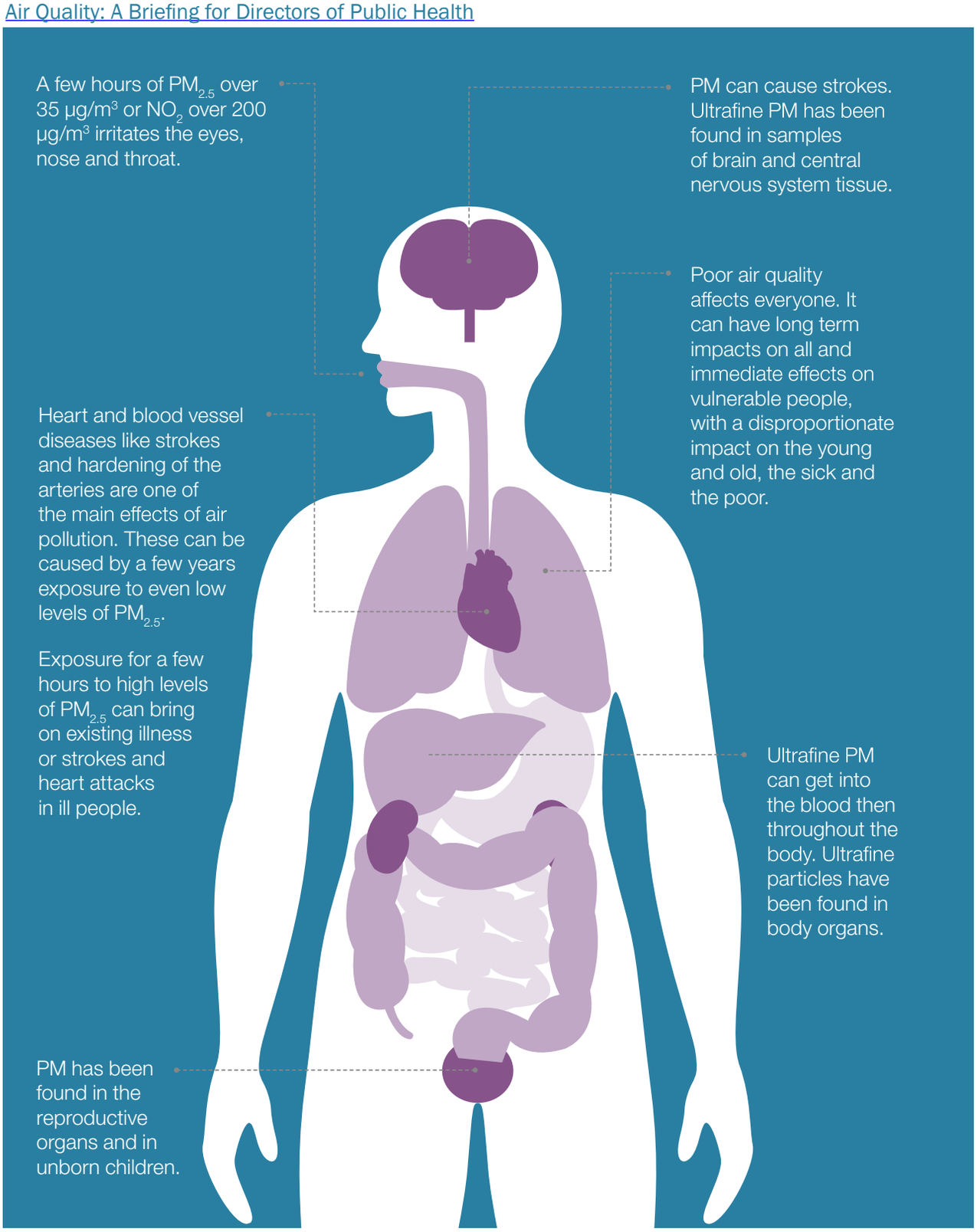
The Department for Environment, Food and Rural Affairs (Defra) has estimated the effects of nitrogen dioxide (NO_2) on mortality to be equivalent to 23,500 deaths in the UK annually, although this figure will include some overlap with the impact from exposure to other pollutants. It is difficult to reliably estimate the combined health burden of multiple pollutants from the same source, but a report by the Royal College of Physicians (RCP) in February 2017 estimates that all forms of air pollution account for around 40,000 deaths annually with an associated annual social cost of £22.6 billion.

Air pollution can have a short term impact over a single highly polluted day as well as long term impacts from low level exposure over a longer period of time. Evidence suggests that short-term exposure to air pollution increases the risk of death, but the numbers affected are thought to be lower than for long-term exposure. That's because most people will not be affected by short-term peaks in ambient air pollution but some, such as those with existing heart or lung conditions, may experience increased symptoms such as wheezing, coughing, and exacerbations of asthma and chronic bronchitis.

The majority of health problems result from long-term exposure to air pollution, which can cause breathing problems and other conditions mainly affecting the heart and lungs. In addition, air pollution can reduce lung development in children, which may increase symptoms in those young people who develop conditions like asthma.

2 Fig 1: Where air pollutants go in our bodies and what they do

Air Quality: A Briefing for Directors of Public Health



2 What is air pollution and where does it come from?

The graphic below highlights the most common sources of air pollution and where people are exposed:

Air pollution is a mixture of particles and gases than can have adverse effects on human health as described in the table below:

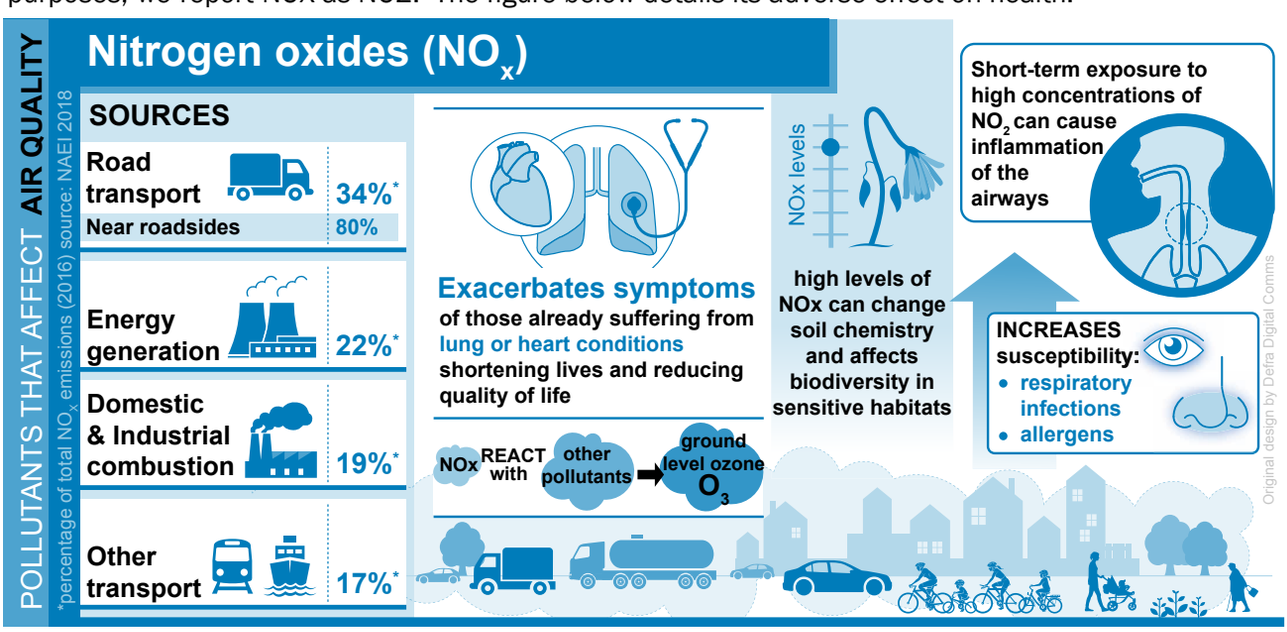
Oxides of nitrogen (NOX)	• A cover term for nitric oxide {NO) and nitrogen dioxide (NO_2) • A mixture of naturally occu ring and man-made gasses, often at a peak in rush hour traffic and strongly associated with diesel vehicles
Particulate matter (PM)	• A complex mix of substances wbich are mainly man-made • Can be coarse or very fine material and therefore possible to breathe into the lungs and pass into the bloodstream
Carbon dioxide (CO_2)	• A natural gas but considered a pollutant when man-made • Widely associated with climate change and global warming
Carbon monoxide (CO)	• Naturally present in the atmostphere but very harmful in enclosed environments • Man-made sources linked largely to combustion engines
Sulphur dioxide (SO_2)	• A gas which is present in the air mainly due to burning fossil fuels and oil. Power stations are a key source in the UK. • SO_2 emissions have successfully been reduced over previous decades

2 What is air pollution and where does it come from?

The most important types of pollution in terms of population health impacts are nitrogen dioxide (NO2) and particulate matter (PM), described below.

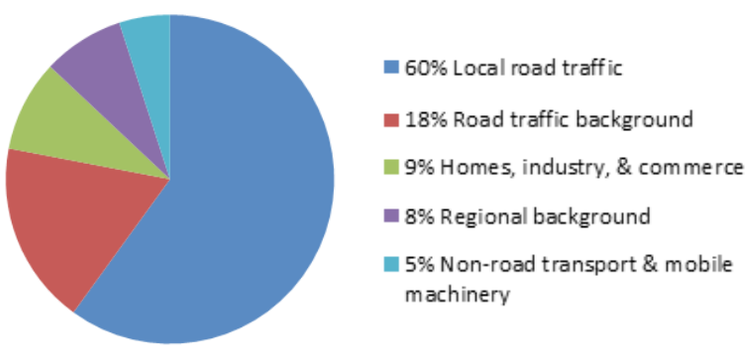
Nitrogen Dioxide (NO_2)

Nitrogen oxides (NOX) are a group of gases that are mainly formed during the combustion of fossil fuels. NO (nitrogen oxide) coverts to NO2 (nitrogen dioxide) very quickly and vice versa. It is therefore usual practice to refer to the two gases together as NOX. For reporting and measurement purposes, we report NOX as NO2. The figure below details its adverse effect on health.



The chart below shows the breakdown of roadside NO_2 sources across the UK but is representative of the sources in our Lancashire and Cumbria pollution hotspots.

Sources of Nitrogen Dioxide at Roadside Locations



These hotspots are locations where people are exposed to nitrogen dioxide levels in excess of the UK air quality standard of 40µg/m3 and where road vehicle emissions make a much more significant contribution to pollutions levels. Exposure is highest closest to the roadside.

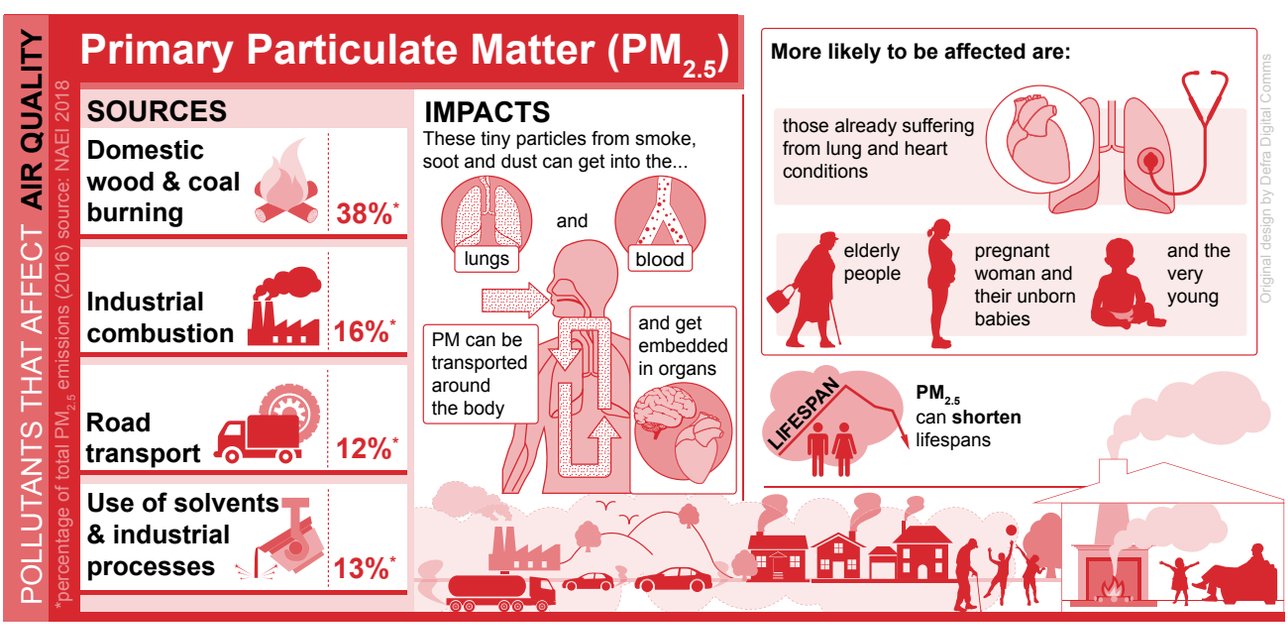
2 What is air pollution and where does it come from?

Particulate Matter (PM)

Particulate matter is everything in the air that isn't a gas. It is the suspended solids and liquids that come from natural sources such as pollen, sea spray and desert dust, and human made sources such as smoke from fires, emissions from vehicle exhausts, dust from tyres and brakes, as well as emissions from industry. Particulates are emitted directly from these sources, and can also be formed by chemical reactions in the atmosphere.

Additionally, the recent rise in the popularity of wood burning stoves and open fires is making a significant contribution to particulate matter. It is estimated by Defra that around 40% of particulate pollution comes from burning of domestic solid fuel.

Fine particulate matter (PM2.5), with a diameter of 2.5 µm or less (a µm is 1/1000th of a millimetre) has the strongest link to health outcomes. At this size the particles can be inhaled deep into the lungs. The figure below highlights the main sources and impacts of PM2.5.

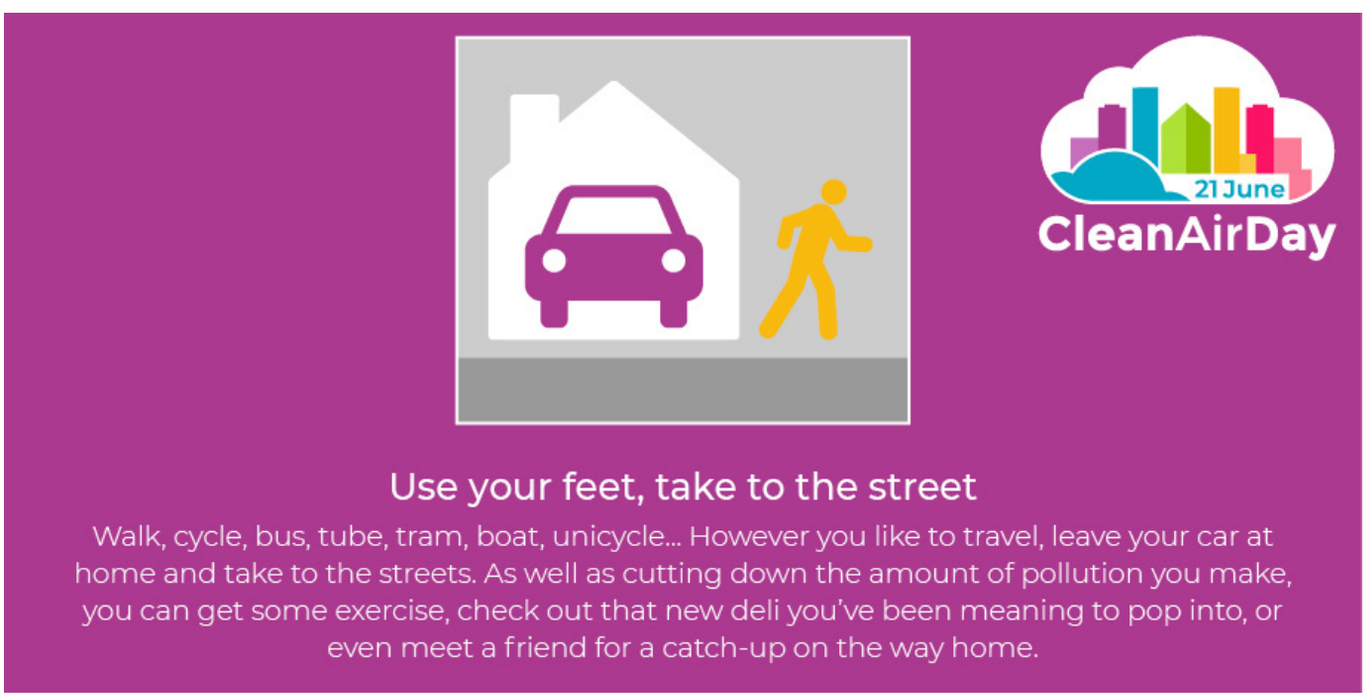


2 Who is most at risk?

We are all affected by air pollution. However, the impact of air pollution on health is not distributed equally within a population, often falling on the most deprived communities and the most vulnerable individuals.

There is a larger risk to health for young children and older adults, for whom air pollution causes more harm than passive smoking. Air pollution reduces life expectancy by increasing deaths from heart disease, lung disease and circulatory problems. For example, the effect from long-term particulate matter exposure is greatest in those with heart disease, strokes or with lung cancer (COMEAP, 2010).

There is a disproportionate impact from poor air quality to those who live close to heavily, congested roads and other major sources of air pollution; factors which are more likely to affect people living in poorer communities.



3 Air Quality in Lancashire and Cumbria

Local air quality can be quantified in terms of compliance with specific air quality objectives for key pollutants. Since December 1997 each local authority in the UK has been required to carry out a review and assessment of air quality in their area. This involves measuring air pollution and trying to predict how it will change in the next few years. The aim is to make sure that the national air quality objectives will be achieved throughout the UK. These objectives have been put in place to protect people's health and the environment.

Monitoring and modelling of air quality is undertaken across Lancashire and Cumbria to fulfil the requirements of the Local Air Quality Management regime, and to report on compliance with EU air quality targets. Local authorities report the outcome of this work in an Annual Status Report, which is usually published on each Local Authority website.

Air Pollutions Hotspots:

If a local authority finds any places where the national air quality objectives are not likely to be achieved, it must declare an Air Quality Management Area (AQMA). Where an AQMA is declared the local authority will put together a plan to improve the air quality - a Local Air Quality Action Plan.

Air Quality Management areas have been declared at 33 locations across Lancashire and Cumbria. They have all been declared as a consequence of raised levels of nitrogen dioxide.

Air Quality Management areas in Lancashire and Cumbria

Authority	No. AQMAs	Air Quality Standard exceeded in AQMAs
Allerdale	0	
Barrow	0	
Blackburn	7	Nitrogen dioxide
Blackpool	1	Nitrogen dioxide
Burnley	0	
Carlisle	6	Nitrogen dioxide
Chorley	0	
Copeland	0	
Eden	0	
Fylde	0	
Hyndburn	0	
Lancaster	3	Nitrogen dioxide
Pendle	1	Nitrogen dioxide
Preston	5	Nitrogen dioxide
Ribble Valley	1	Nitrogen dioxide
Rossendale	2	Nitrogen dioxide
South Lakeland	1	Nitrogen dioxide
South Ribble	4	Nitrogen dioxide
West Lancs	1	Nitrogen dioxide
Wyre	1	Nitrogen dioxide
	33	

3 Air Quality in Lancashire and Cumbria

An interactive map of Air Quality Management Areas can be found here:

AQMAs interactive map - Defra, UK

The majority of the Lancashire and Cumbria AQMAs cover relatively small areas and are centred on one or two busy urban junctions where the dispersion of exhaust emissions from slow moving vehicles at congested junctions and/or adjoining roads is hindered by the proximity of nearby buildings. A few AQMAs cover larger areas in urban areas such as parts of Kendal, Lancaster, and Blackpool. It is important to bear in mind that AQMAs are 'hotspots' for air pollution but health impacts are not confined to these areas.

Nitrogen dioxide levels in the City of Lancaster AQMA are in the region of 60 to 66µg/m^3, whereas concentrations in the other AQMAs tend to be at or slightly above the objective threshold of 40µg/m^3.

Air Quality Elsewhere

Air pollution doesn't just affect people living in AQMAs. It is evident that the Local Air Quality Management Regime and UK ambient air quality standards haven't adequately protected public health . For example, no AQMAs have been declared in Lancashire and Cumbria because of particulate levels, yet the fraction of mortality attributable to man-made particulates is significant. Action taken to reduce the impact of air pollution should not be limited to measures designed to address problem in AQMAs.

The impact on health

The Public Health Outcomes Framework (PHOF), estimates the fraction of all-cause adult mortality attributable to man-made fine particulate (PM2.5) air pollution for the four local authorities as: Lancashire 4.4%; Blackburn with Darwen 4.7%; Blackpool 4.3%; and Cumbria 3.4% (PHOF, 2016: 3.01 - Fraction of mortality attributable to particulate air pollution).

There are no local or national measures of NHS usage that can be directly attributed to air pollution. Whilst local information exists for conditions that poor air quality contributes to or exacerbates, such as asthma and COPD, it is difficult to make any direct links with air pollution. Indeed, the recently published draft Clean Air Strategy identifies the need to gather better information on where, when and how patients report and are treated for air quality related health conditions. We will continue to work to build a picture of the health impact on our communities in Lancashire and Cumbria.

4 Action on air pollution

Everyone has some responsibility for reducing air pollution and will need to do their bit if we are to significantly improve air quality. The impact of the individual household or business may be small, but the combined impact of actions taken by national and local government, large and small businesses and individuals will improve the air we breathe.

Much of the action required to make a difference in Lancashire and Cumbria will need to be taken by people without any specific statutory role to improve health and wellbeing. Creating a social movement for health is, therefore, an act of deliberative democracy – going as far as people are willing to support – either by personal behaviour change, changes to environments or changes to the legal frameworks.

Below is a summary of some of the key organisations and opportunities for action on air quality.

4.1 National Government

In the UK we have already adopted ambitious, legally-binding international targets to reduce emissions of the most damaging air pollutants by 2020 and 2030 and reduce the harm to human health by half.

The UK Government published its detailed UK plan for tackling roadside nitrogen dioxide concentrations in July 2017. The plan aims are to:

» Achieve statutory limit values for the whole of the UK within the shortest possible time

» Transform the UK's most polluted towns and cities into clean and healthy urban spaces, supporting those most directly affected

» Ensure that vehicle manufacturers play their part to improve the nation's air quality

Actions to reduce road transport emissions include those intended to:

» Reduce emissions from the current road vehicles in problem locations now, including through promoting public transport, cycling and walking; and

» Accelerate the turnover to cleaner vehicles to ensure that the problem remains addressed and does not move to other locations

The UK Government are now also proposing new goals to cut public exposure to particulate matter pollution and have very recently produced a Draft Clean Air Strategy 2018 for consultation setting out the comprehensive action that is required from across all parts of government and society in order to achieve these including new powers to take action in areas where air pollution is a problem. The strategy sits alongside three other important UK government strategies: the Industrial Strategy, Clean Growth Strategy and 25 Year Environment Plan and includes chapters covering:

4 Action on air pollution

» our understanding of the problem
» protecting the nation's health
» protecting the environment
» securing clean growth and innovation
» reducing emissions from transport
» reducing emissions at home
» reducing emissions from farming
» reducing emissions from industry
» international, national and local leadership

4.2 Public Health England

Public Health England (PHE) is an executive agency of the Department of Health and Social Care; a distinct organisation with operational autonomy. PHE provides local and national government, the NHS, industry and the public with evidence-based, professional, scientific expertise and support.

For air pollution the specific role of PHE is to act as expert advisors providing:

» The evidence base for interventions to reduce air pollution
» The evidence base for the impacts of air pollution
» The sources of air pollution in the environment

More specifically, PHE provides:

» Local support to stakeholders concerned with reducing air pollution
» Educational materials to highlight the effects of air pollution or raise awareness of its impacts
» Experts from the Centre for Radiation Chemicals and Environmental Hazards (CRCE) to facilitate developments in support of these aims
» National advocacy to identify the impacts of air pollution and the importance of effective remediation
» Support to central government in attaining European standards required for air quality
» Identification and sharing of best practice

4 Action on air pollution

4.3 Local Authorities

Local authorities have a central role in achieving improvements in air quality; their local knowledge and interaction with the communities that they serve mean that they know the issues on the ground in detail. They are well placed to decide local priorities and work with partners to implement the appropriate solutions in regards to local transport, smoke control, planning and public health. District and unitary councils have responsibilities around monitoring air quality and reporting on the action being taken to improve areas of poor quality.

All district and unitary councils are required to submit an Air Quality Annual Status Report (ASR) to Defra each year giving an overview of air quality in their area and actions planned, in progress or completed to improve air quality. Examples of these measures may include:

- Initiatives to increase uptake in cycling and walking
- Travel planning information – identifying alternatives to car use
- New roads – bypasses and link roads
- Intelligent traffic light systems
- HGV bans on specific roads
- Camera systems providing information for transport/air quality action plans
- Electric vehicle charging points – on-street, at homes and at new commercial developments
- Cheaper parking for less polluting vehicles
- Bus and rail improvements
- Living green walls
- Planning guidance – improving the assessment of air quality impact and identifying mitigation
- Targeting of vehicle fleets – e.g. increasing the number of low emission vehicles

There is a role for **Public Health in local government** in assessing the health impacts of poor air quality on the population, providing advice and guidance on appropriate policies and action, raising awareness and working with local authority air quality officers and other partners.

Action to address the health impacts of air pollution on local populations can play a critical role in supporting other public health priorities such as active travel and physical activity, health inequalities, sustainability, growth and regeneration and community engagement.

4 Action on air pollution

4.4 Businesses and industry

Clean growth means growing our income whilst tackling air pollution. Cleaner air leads to increased productivity through improvements in public health, leading to reduced sickness absence and through creation of an environment that is appealing to businesses and the public alike. Much of the action to generate clean growth is driven at a national level and is set out in the Governments Clean Growth Strategy but locally we can encourage business and industry to take steps to improve air quality for example by encouraging walking and cycling, minimising emissions from fleet vehicles and introducing flexible working polices that reduce the number of car journeys made by staff.

4.5 Individuals and communities

As citizens we can all help improve air quality, for example by learning more about and acting as advocates for air quality, trying alternatives to car travel or taking the active option (walking and cycling), asking local authorities and MPs to take action and aiming for greater energy efficiency in our homes.

5 About the Lancashire and Cumbria Air Quality Summit:

The Lancashire and Cumbria Directors of Public Health identified action on air quality as a sub-regional priority and hosted a Lancashire and Cumbria Air Quality Summit on 28 February 2018 to explore ways in which we can accelerate action and make a collective difference. The aims of the summit were to;

- Improve participants' understanding of air pollution, the health risks of air pollution and the scale of the problem
- Improve participants' understanding of what actions could be taken to reduce population exposure to air pollution with additional co-benefits to health, economy, sustainability
- Share good practice including national and local examples of air quality improvement work
- Strengthen participants' understanding of their own and each other's' roles in tackling air pollution
- Consider ways of improving public awareness and engagement for action on air quality
- Define the agenda for collective action to prevent air quality attributable deaths across Lancashire and Cumbria

The event was attended by over 60 people including Elected Members, Local Government Public Health, Planning and Transport and Environmental Health, Public Health England, special interest groups, citizen representatives and academics.

The Programme included an opening from Cllr Brian Taylor (Executive Member for Health and Adults, Blackburn with Darwen Council) and County Councillor Charlie Edwards (Lead Member for Health and Adult Services, Lancashire County Council). Further presentations included a UK overview from Public Health England and Prof Barbara Maher (Lancaster University Environment Centre) talking about emerging evidence of particulate matter in the brains of patients with Alzheimer's disease. Paul Cartmell from Lancaster City Council and Andrew Hewitson from Lancashire County Council went on to outline local approaches and Matthew Clark from Shropshire County Council talked about the importance of coordinated action. The final presentation was from Prof John Whitelegg (Liverpool John Moores University) who challenged participants regarding how much more we need to do to improve air quality in the region.

Attendees put forward ideas and suggestions of ways in which we can encourage and mobilise action on air quality as outlined in the following section.

6 Areas identified for potential action following the Summit

The suggestions put forward at the Summit are captured below under a number of key themes. This list is not intended to be exhaustive but will act as a guide for further discussion.

Theme	Suggested areas for future work on reducing air pollution across Lancashire and Cumbria,
Leadership at all levels:	Strengthen and improve local leadership for action on air quality including. Suggestions included; • Elected Member and officer Air Quality Champion roles • Inclusion and consolidation of air quality in strategic plans, such as Health and Wellbeing Strategies, Joint Strategic Needs Assessment, Walking and Cycling, Public Health, Transport and Economic plans. • Extension of professional networks to include wider partners and help facilitate sharing of best practice and knowledge.
Public Awareness and Engagement:	Encourage greater public transparency about local air quality and empower local people to understand how air pollution can affect their health, how they can reduce air pollution, protect themselves and understand the opportunities, tools and powers available in support of this including. Suggestions included; • Making information about local air quality more accessible to members of the public in a range of formats • Community Air Quality Champions • A simple but coordinated set of messages for different audiences and coordinated communications plan linked to Clear Air Day and beyond
Planning Policy:	Adopt a common set of principles/guidance for planning policy and ensure these are considered as part of (any) new application. A Supplementary Planning Document (SPD) is the strongest form of guidance needed to compete with other planning issues and priorities.
Green Infrastructure	Collaborate across Lancashire and Cumbria to understand and develop best practice in relation to green infrastructure / barriers, for example type of species and locations, and their potential to mitigate against air pollution National air quality grant funding could be accessed collectively to develop green barrier projects in suitable pollution hotspots.

6 Areas identified for potential action following the Summit

Theme	Suggested areas for future work on reducing air pollution across Lancashire and Cumbria,
Travel and Transport:	A number of suggestions were put forward at the summit for action on travel and transport including: • Helping people to be less reliant on their cars and change travel habits by giving them other options, such as reliable public transport and introducing more walking and cycling routes.School and business Travel Plans – working with large employers • Making it easier for people to drive in the most efficient, least polluting way by providing them with information and training. • No idling zones, around schools, hospitals for example • Facilitating the uptake of elective vehicles and other clean alternatives to petrol and diesel vehicles • Improving vehicle emission standards for taxis and private hire vehicles consistent with neighbouring authorities • Reducing emissions from public transport and improving the public transport experience. • Action on these areas is underway at a local level through air quality actions plans, however, some interventions could be more effective when considered on a Lancashire and Cumbria footprint, such as facilitating EV infrastructure, for example.
Non transport pollution sources	The focus is often on emissions from vehicles, however there are a number of other pollution sources often overlooked, in particular from activities around the home such as wood burning stoves, open fires and cleaning with certain solvents. It is important to clarify and communicate the health messages and advice available to inform choice and behaviour to reduce personal exposure. Other non-transport pollution sources include farming and industry, such as from commercial biomass boilers, the impact and health messages need to be communicated.
Growing the evidence base and evaluation of actions	Interventions should be based on the evidence of what works and be evaluated before and after to ensure fully considered action plans are in place, including the cumulative impacts of pollution sources, and anticipated reductions are realised. Currently many actions are not fully evaluated or monitored so we have little information on their impact and whether actual improvements are achieved. There are opportunities to work across Lancashire and Cumbria to assess and evaluate actions that are best delivered large-scale such as on the highway network, for example the use of intelligent traffic systems and real time monitoring could be explored.

7 Next Steps

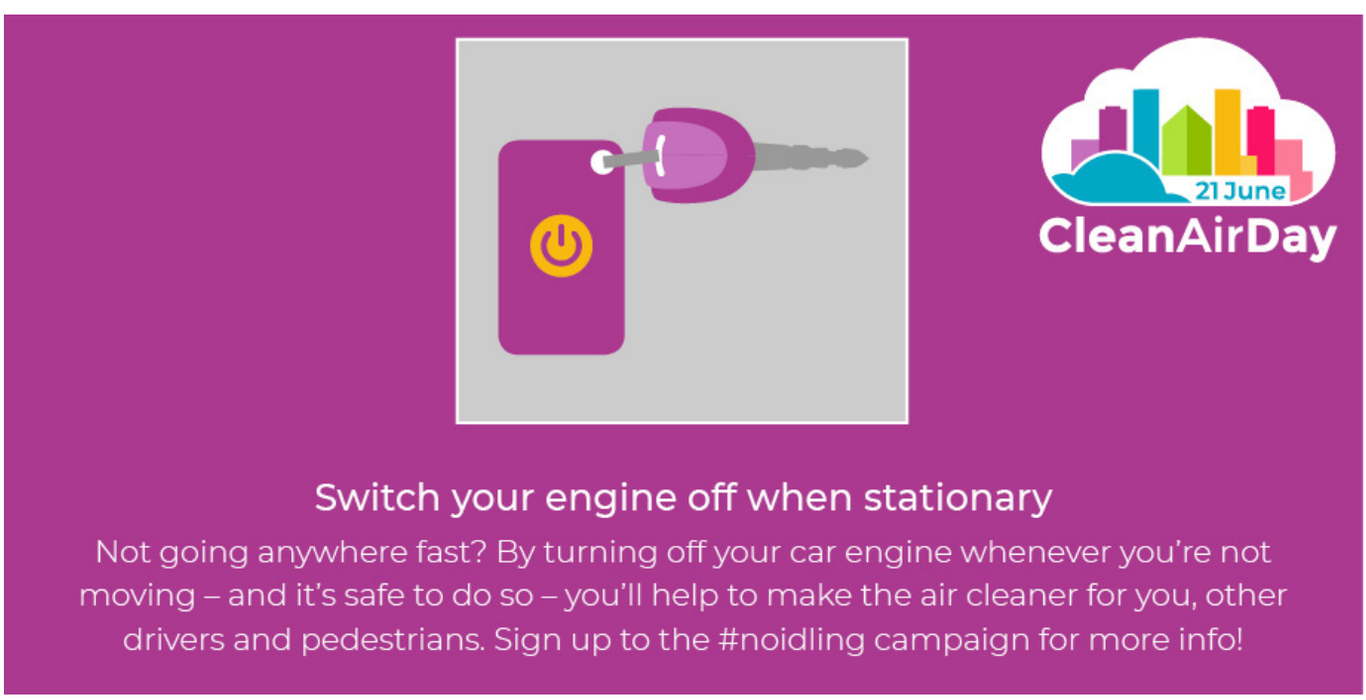
This report is intended help start a wider conversation about the action we need to take collectively to improve air quality.

We will further explore the list of suggestions generated at the Summit and work with all stakeholders to turn them into appropriate actions. We will do as much of this work in collaboration with the public as possible and be as transparent as we can about what we are doing and what difference it is making.

To work through how we might better mobilise the support of wider society in this challenge will work with the NHS leadership Centre to explore how to better create public health leadership outside of the health sector. This will be a critical success factor if we are to make a difference.

This report is being launched to coincide with Clean Air Day 2018. For more information on Clean Air Day and the Action that people can take to reduce pollution and their exposure to pollution visit the Clean Air Day website at www.cleanairday.org.uk or follow **#CleanAirDay**

We look forward to continuing the conversation about imroving air quality in Lancashire and Cumbria.
You can join us at **#AirQualityLandSC**



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of the year

CleanAirDay

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