Breathing Clean Air

Introduction: Poor air quality – a persistent problem.

We need to breathe clean air to live. It is obvious, yet poor air quality remains a significant problem in the UK and across the world. The World Health Organisation estimates that almost all the earth's human inhabitants (99%) breathe polluted air and that a third of deaths from strokes, lung cancer, and respiratory disease are linked to pollutants inhaled daily.[1] 43,000 deaths a year are linked to air pollution in the UK.[2] Poor air quality is also a danger to wildlife – birds stop singing, bees leave their hives, and plants struggle to grow.[3]

There are different types of pollutants in the air in the form of gases, chemicals, and particles. These come from various sources like transport, power stations, industry, domestic fuel consumption, and agriculture. Indoor sources of air pollution include Volatile Organic Compounds (VOCs) that are found in paint and cleaning products, for example.[4] The mix of pollutants in our indoor and outdoor environments has changed over time. These changes relate to broader developments in the way we keep warm, how we get around, and what we do with our waste.

Historically, sulphur dioxide (SO_2) was the biggest contributor to poor air quality. This was directly related to burning coal. As coal burning declined and was replaced by natural gas by the end of the twentieth century (see Keeping Warm chapter for more details), SO_2 levels also declined. Since 1970, SO_2 levels in the UK have dropped by 97%. The dominance of coal has long ended, but poor air quality persists. Nitrogen (NO_x and NH_3) and particulate matter (PM10/PM2.5) are two of the main culprits of poor air quality today. These pollutants are primarily caused by motor vehicles and domestic fuel burning. Both sources are also major contributors to greenhouse gas emissions and the climate crisis.

Clean air initiatives and climate action can be mutually beneficial, as policies addressing carbon emissions can support better air quality. The Climate Change Act (Northern Ireland) 2022, for example, requires a minimum spend of 10% of the transport budget on active travel, improving air quality and benefiting public and environmental health. The Scottish Government planned to spend at least £320 million on active travel by 2025.[5] Beyond transport initiatives, policies aimed at curbing domestic energy emissions also impact air quality, such as the recent ban on burning bituminous coal (2023).[6]

[1] World Health Organisation, 'Air Pollution' (Online, 2024)
[2] Clean Air Hub, 'How much of a problem is Air Pollution in the UK?' (Online, 2024)
[3] Scottish Wildlife Trust, 'Clean Air Day: Exploring the Effects of Air Pollution on Wildlife' (Online, 2023)
[4] Public Health England, 'Indoor Air Quality Guidelines for selected Volatile Organic Compounds (VOCs) in the UK' (2019)
[5] Department for Transport, 'Transport and environment statistics: 2023' (2023)
[6] Department for Energy, Food, and Rural Affairs, 'Selling house coal for domestic use', (2023).

While these policies are new, concerns about air quality have been noted by contemporaries for over 400 years.[7] The history of clean air movements facilitates deeper understanding of the air pollution problem. It provides context to the challenges faced by governments, campaigners, and individuals who seek to improve the quality of the air that we breathe today. This chapter explores historical approaches to improving air quality in Britain through local and national campaigning and the development and impact of clean air policies. It begins by addressing the early history of smoke abatement and pollution politics to highlight the shift in public focus from industrial chimneys to 'the Englishman's fireside'. The connection between public health debates and interwar housing developments is important here. The chapter then recognises the significance of two milestone national events: the London Smog 1952 and the subsequent passing of the Clean Air Act 1956. The significance of local power within the national legislative and political landscape is then illuminated through two local case studies: Coventry (1948-1951), and Sheffield (1951-1972). Place-based factors that shaped the realities of implementing environmental policy are highlighted here. Finally, the chapter identifies commercial interests in 'clean air', particularly the vested interests of the gas industry and its expanding domestic markets from the 1970s onward, before considering the more recent impacts of car usage and other new ways of living on the air we breathe. The chapter concludes with reflections on how approaches to the old and persistent problem of poor air quality can embolden and benefit clean air initiatives now and in the future.

Early smoke abatement: Industrial chimneys to 'the Englishman's fireside'

During the industrial revolution, smoke produced by mass coal burning to power industry became associated with the work and wealth of the nation.[8] Smoke was seen as a sign of prosperity, a product of booming economies, particularly in the Midlands and the North of England.[9] Within the home, domestic chimneys were thought to promote healthier lives because of the circulation of air caused by the flue.[10] By the late Victorian period, however, scientists and physicians recognised smoke as a significant cause of ill-health and disease in British cities. Reformers and social commentators connected pollution with environmental, social, and even *moral* problems, linking pollution with societal degeneracy, especially among the poor. Scientific research, changing political and cultural ideas, and the visible impacts of coal smoke on buildings and vegetation fostered concerns about atmospheric pollution.[11]

[7] John Evelyn, *The Inconvenience of the Aer and the Smoak of London Dissipated* (London, 1661)
[8] P. Brimblecombe, *The Big Smoke* (London, 1987), pp. 101-113.
[9] P. Thorsheim, *Inventing Pollution* (Ohio, 2006), p. 122.
[10] S. Mosely, 'Fresh air and foul: the role of the open fireplace in ventilating the British home, 1837-1910', *Planning Perspectives,* Vol. 18 (2003), pp. 1-21.
[11] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018).

Local and national smoke-abatement campaigners played an important role in raising awareness of the damaging effects of poor air quality on human and environmental health. Both the Coal Smoke Abatement Society (1898) and the Smoke Abatement League of Great Britain (1909) were set up with the specific aim of addressing Britain's air quality problem. Merging in 1929 to form the National Smoke Abatement Society (NSAS), these campaigning organisations led the call for stricter regulations on air pollution. They carried out an impressive public information and persuasion campaign using the media outlets of the day. Newspapers, printed material, talks, and exhibitions promoted the clean air movement.[12] These organisations put smoke abatement on the political agenda, which led to the development of legal, technological, and social approaches to improving air quality in Britain.[13]

Early smoke abatement campaigns focussed on industry, but this alone could not solve Britain's smoke problem. 50% of national smoke emissions were caused by 'the Englishman's fireside'.[14] Despite this reality, politicians were reluctant to regulate the domestic hearth. This reluctance was rationalised by the expense of (then emerging) electric and gas alternatives and a 'technological bottleneck' in the production of smokeless solid fuels such as coke and anthracite. But their attitudes were also shaped by a 'sentimental attachment to the cheery glow of the old-fashioned grate.'[15] Social connections to solid fuel-fired heating systems remain a challenge to improving air quality today.[16]

[12] Stephen Mosely, Policy Paper: 'Clearing the air: can the 1956 Clean Air Act inform new legislation?', History and Policy, 2017.
[13] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018).
[14] U.K Parliamentary Papers, House of Commons, 1920, Departmental Committee on Smoke and Noxious Abatement, Ministry of Health, Interim report of the Committee on Smoke and Noxious Vapours Abatement, Cmd. 755, XXV.
[15] Eric Ashby and Mary Anderson, *The Politics of Clean Air* (Oxford, 1981), pp. 89-99
[16] Aimee Ambrose, Kathy Davies, Becky Shaw, Sally Shahzad, George Jiglau, Andreea Vornicu, Anca Sinea, Denise Lobont, Jenny Palm, Jenny von Platten, Ram Krishna, Sofie Pelsmakers, Sarah Kilpeläinen, Raúl Castaño-Rosa, Henna Aho, 'Interim Report of the JustHeat project: a social and cultural history of home heating' (2023).

Advertisement for Smokeless Appliances by Yates and Haywood (London and Rotherham), 1882.

Public health and housing

The importance of tackling smoke pollution to improve public health was recognised after the First World War. In 1920, a special committee of the newly-formed Ministry of Health identified domestic coal burning as a 'serious danger' to public health, as well as having severe detrimental effects on nature, agriculture, and urban buildings.[17] Indeed, bronchitis was the most common cause of death in England, responsible for the loss of up to 70,000 lives per year, and directly connected to the inhalation of coal smoke.[18] A key recommendation from this committee was the installation of smokeless heating systems in future public housing projects, with the intention of reducing indoor and outdoor pollution. Unfortunately for air quality's sake, this was rejected as economically impractical due to the urgent need for affordable working-class housing.[19]

The subsequent Public Health (Smoke Abatement) Act in 1926 gave local authorities some powers to set standards and requirements, including enforcement of smokeless heating systems in new buildings. These powers did not, however, extend to 'dwelling-houses'. It was argued in the House of Lords that such regulation would 'not be compatible with the rapid and inexpensive provision of working-class houses, which are still so urgently needed... [and] no cheap form of smokeless fuel is at present available for domestic consumption.'[20] Availability of smokeless fuels and the need for housing eclipsed political will to clean up the air. The Public Health Act 1936 also increased the powers of local authorities to tackle pollution. Again, however, this focussed on industry when domestic sources also needed real attention.

After the Second World War, the new Labour government's domestic fuel policy highlighted the negative impacts of atmospheric pollution. This was part of its wider strategy to increase domestic energy efficiency and national energy security. The war had highlighted the vulnerability of Britain's fuel and power industries because of their dependence on coal. Even after the war, coal output could not meet demand, so coal continued to be rationed in Britain until the late 1950s. The 1945 report for the Ministry of Fuel and Power that outlined this new policy maintained that air pollution made 'life in our great cities unpleasant, depressing and unhealthy' and cast the open fire as 'the greatest sinner' against air quality. It was officially recognised that 'there is no solution to the smoke problem in our cities till the old-fashioned open coal grate is abolished'.[21] This

[17] U.K Parliamentary Papers, House of Commons, 1920, Departmental Committee on Smoke and Noxious Abatement, Ministry of Health, Interim report of the Committee on Smoke and Noxious Vapours Abatement, Cmd. 755, XXV.
[18] Stephen Mosely, Policy Paper: 'Clearing the air: can the 1956 Clean Air Act inform new legislation?', History and Policy, 2017.
[19] U.K Parliamentary Papers, House of Commons, 1920, Departmental Committee on Smoke and Noxious Abatement, Ministry of Health, Interim report of the Committee on Smoke and Noxious Vapours Abatement, Cmd. 755, XXV.
[20] Hansard, House of Lords Debate, 'Public Health (Smoke Abatement) Bill, 23 March 1926, vol. 63 cc. 714-726.
[21] Ministry of Fuel and Power, *Domestic Fuel Policy Report: Report by the Fuel and Power Advisory Council* (London, 1945), p. 33.

identification of the domestic fire as a chief polluter was welcomed by the National Smoke Abatement Society, which saw postwar reconstruction as a prime opportunity to replace inefficient, smoke-producing appliances.

NORMAL LUNG

GOOD CITY LUNG

SMOKE GETS INTO YOUR LUNGS

These photographs are taken, by permission, from a new booklet, 'Britain's Burning Shame,' published by the National Smoke Abatement Society. In view of the importance of this book copies have been made available free at your Gas Showrooms. The booklet tells the whole horrible story of domestic smoke and the damage it does, inside and out.

Frightening photographs? Yes. But the facts are frightening too. The dirty air and frequent grimy fogs in big cities are, in their own way, mass murderers. If you study the graph of weekly deaths due to lung-diseases in London with the graph of winter fog-days, you will see that every fog-period is followed by a rise in deaths.

70% of a city's fog and grime come from home chimneys burning smoky fuel. *Is your chimney adding to the 'aerial sewage' of England's towns?*

Every smoky chimney is contributing to general ill-health because that kind of smoke gets into the lungs and stays there. It breaks down immunity to infection and disease.

Can anything be done about it? Yes. Every time someone decides to do away with an old-fashioned smoke-making fire in his house and burn a smokeless fuel (such as gas or coke), it means an extra minute, perhaps, of sunshine somewhere.

Gas and coke are working miracles to make homes clean inside. Eventually there will be an air fit for children and old people to breathe. Gas and Coke will have helped to bring that miracle to pass.

Where you want warmth quickly for short periods—a gas fire! Choice of many colours. Abundant heat, and it ventilates a room automatically.

NO SMUTS NO SMOKE WITH

The open coke fire burns without smoke. Saves 2d. in the 1/- on your fuel bills. Gas-lighted on tap. Very convenient, very modern.

GAS AND COKE

The fuel of clean homes and clean cities

★ *The above facts and many others as to the injurious effects of smoke may be found in publications of the National Smoke Abatement Society, Chandos House, Buckingham Gate, London, S.W.1. By joining the Society, which is an independent body, you will keep up to date and help the campaign for cleaner cities.*

Issued by the British Commercial Gas Association, Gas Industry House, 1 Grosvenor Place, London, S.W.1

National Smoke Abatement Society, 'Smoke Gets into Your Lungs', *The Times*, 20 October 1938.

A national 'sense of shame'

The impact of poor air quality, particularly in relation to coal smoke, was well established by the 1950s. The need for increased regulation of domestic coal burning was also recognised by government officials. And yet, national legislation targeting domestic fireplaces continued to be avoided. Inaction was justified by the decades-old argument that there were inadequate supplies of smokeless fuel. The *Guardian* newspaper suggested that it would take a 'sense of shame' to 'produce the necessary legislation' that would tackle pollution on a national scale.[22]

The Great Smog 1952 was the environmental and human catastrophe that finally mobilised Parliament to address the threat of poor air quality on a national scale. Caused by a combination of weather conditions and a high concentration of air pollutants, the thick fog that descended on London in December 1952 reduced visibility to almost zero. Initial news coverage of the smog failed to recognise the severity of the phenomenon, but by the end of the week, *at least* four thousand people had died. Less conservative estimates placed the death toll at over eight thousand – more recent prognoses on the longer-term damage of such an event on human life are even higher.[23] Seven months after the smog and after persistent public pressure, the Beaver Committee was assembled to investigate. The committee was keen to ensure their inquiry and subsequent findings recognised the much bigger issue of smoke pollution in Britain, rather than focussing solely on this singular event.[24]

The final report of the Beaver Committee on Air Pollution was published in November 1954.[25] It focussed on the public health and the economic impacts of industrial pollution, transport emissions (railways and motor vehicles), and domestic smoke. The Committee estimated that around £250 million of damages per year was caused by 'the smoke, grit, dust and noxious gases, emitted into the air from domestic dwellings and industrial plants.' A further £25-50 million of heat was also wasted through excessive smoke.[26] These economic arguments for improving air quality bolstered existing discourse on public health. The report maintained that air pollution 'is injurious to both physical and mental health. It fosters disease and can cause death.'[27] This was not new information, scientists and campaigners had known and maintained this for decades, but it was effectively reiterated in the report, which ultimately provided the catalyst for large-scale government regulation.

The Committee also compared the UK to its European neighbours to highlight *how bad* the problem really was. The report listed figures on bronchitis related deaths in England and Wales. For example, it noted 171 deaths from bronchitis per 100,000 in England and

[22] 'Stopping Smoke Pollution, Sense of Shame Needed', *Manchester Guardian*, 02 October 1948.
[23] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018), pp.163-165.
[24] UK Parliamentary Papers, House of Commons, 194, Committee on Air Pollution Report, Cmd. 9322.
[25] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018), pp. 166-167.
[26] Hansard, House of Commons Debate, 'Air Pollution (Committee's Report), 25 January 1955, vol.536 cc.38-42.
[27] UK Parliamentary Papers, House of Commons, 194, Committee on Air Pollution Report, Cmd. 9322.

Wales in 1951, compared to just 9 in Sweden.[28] The difference in population size and the national industrial landscapes of each country at this time (and indeed today) must be noted here – a direct comparison is somewhat misleading. Nevertheless, drawing on this data painted Britain as 'the dirty man of Europe', an unfavourable reputation and phrase popularised in later decades.

In response to the national pollution problem as identified throughout their report, the Beaver Committee developed ambitious proposals designed to reduce atmospheric pollution by up to 80% over a 15-year period. The recommendations designed to achieve this target included criminalising dark smoke emissions; ensuring that new industrial plants 'prevent the emission of grit and dust'; empowering local authorities to designate Smokeless Zones; and significantly, regulating domestic chimneys in smoke-restricted districts by only permitting the use of smokeless fuels.[29] With this final point in mind, the Committee insisted that the cost of converting domestic fireplaces should be covered, for the most part, by local authorities and the national Treasury.[30]

The Clean Air Act 1956

After the Beaver Committee Report was released, mounting public pressure finally forced the government to legislate against air pollution on a national scale. The Clean Air Act 1956 received Royal Assent four years after the London Smog and over seventy years since the first smoke abatement campaigns launched in Britain. The Act set national standards for air quality, established the Clean Air Council to monitor emissions and lead research into pollution, and finally, regulated the domestic hearth as well as industry.[31] The Clean Air Act was the first national legislation to enforce smoke-controlled areas, which banned bituminous coal for domestic use in specific zones. Gas, electric, and solid smokeless fuels such as coke and anthracite had to be used instead. This equated to a huge shift in domestic energy use.

The Clean Air Act 1956 initiated the most significant domestic energy transition since the industrial revolution. The widespread introduction of smoke-controlled areas meant the conversion of millions of appliances or the installation of new ones across the country, and financing this effectively was imperative. Converting the average coal grate to burn coke cost between £3 and £5. Gas and electric appliances cost between £10 and £20.[32] Skilled labour was also required to do the job.[33] The Clean Air Act established grants to support the conversion to smokeless fuelled systems, however, the government grants only covered 40% of the overall costs. Local authorities were required to cover a further

[28] UK Parliamentary Papers, House of Commons, 1954, Committee on Air Pollution Report, Cmd. 9322, p.8.
[29] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018), p.175.
[30] Hansard, House of Commons Debate, 'Air Pollution (Committee's Report), 25 January 1955, vol.536 cc.38-42.
[31] Catherine Mills, 'Coal, Clean Air, and the Regulation of the Domestic Hearth in Post-War Britain', in Mark Jackson (ed.), *Health and the Modern Home* (Oxford, 2007), p.224.
[32] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018), p.54.
[33] J. W. Batley, 'Smoke Free Cities', *Financial Times*, 1968.

30% and householders paid the final third of the cost. This disadvantaged poorer households and presented a challenge for less affluent local authorities who were usually in the most polluted areas of the country. This contributed to the slow uptake of conversion in the Midlands and the North in comparison to areas in the South of the country.[34] In 1964 the government extended the grant scheme to include more expensive gas and electric appliances, which was crucial to the longer-term energy and clean air strategies and the successful reduction of domestic coal burning.[35]

There was localised resistance to Clean Air legislation in mining areas where the economic impacts were felt distinctively. Mining families received concessionary coal as a part of miners' wages (retired miners and widows also received this). The scheme was fundamental to the household economy in coalfield regions. The National Coal Board implemented a 'buy back' scheme in smokeless zones at a rate of £2 per tonne, an annual payment of £42, or equal weight of smokeless fuel in place of coal. But the value of these offers in real terms was around half of the usual allowance. It also meant that no 'spare' coal was left over to sell or share with family or neighbours. Non-mining households in coalfields were also reluctant to change, as buying coal from a miner cost half the standard price of buying coal from merchants.[36] There was also concern that clean air legislation would weaken the political position of mineworkers.[37] Regulating the hearth was not just an attack on the purse – for some, it represented an attack on a way of life.

The cultural challenge was not just felt in mining towns. As the Chief Smoke inspector for Sheffield, J. W. Bately, explained in 1968: "It was no small task to set about converting fireplaces to burn smokeless fuel and to alter the habits of citizens brought up for generations to accept smoke and dirty air as "one of those things".[38] A cultural shift was needed for effective change. The combination of these practical, cultural, economic, and political challenges was significant. In 1959 the Ministry of Housing and Local Government instructed 325 local authorities to draw up 10-year plans to tackle 'Black Areas' in Britain due to insufficient progress. Only 12 met these plans by 1970.[39] Domestic coal consumption did, however, decrease from 37.5 million tonnes in 1956 to 19 million in 1970.[40] This decline was directly connected to Clean Air legislation, which was extended in 1968, and followed by the Control of Pollution Act (1974). The Clean Air Act

[34] Stephen Mosely, Policy Paper: 'Clearing the air: can the 1956 Clean Air Act inform new legislation?', History and Policy, 2017.
[35] Stephen Mosley, 'Clearing the air: can the 1956 Clean Air Act inform new legislation?', *History and Policy* (2017).
[36] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018), pp. 65-66.
[37] Lynda Nead, "As snug as a bug in rug": post-war housing, homes and coal fires', *Science Museum Group Journal* (April 2018).
[38] J. W. Batley, 'Smoke Free Cities', *Financial Times*, 1968.
[39] Stephen Mosely, Policy Paper: 'Clearing the air: can the 1956 Clean Air Act inform new legislation?', History and Policy, 2017.
[40] C. Mills, 'Clean air, coal, and the regulation of the domestic hearth in post-war Britain', in M. Jackson (ed.), *Health and the Modern Home* (London, 2007), p. 225.

laid the foundations for the broader national energy transition, and the extension of this legislation propelled the transition to gas to the end of the twentieth century.

Local power – national context

The Clean Air Act may have been a national policy, but local efforts were crucial to improving air quality before and after the legislation was in place. These efforts offer inspiration for tackling air pollution within localised settings, while also illuminating place-based sensitivities to air quality regulations – an important consideration in the present. The proactive work of local councils and communities in Coventry during postwar reconstruction, and in Sheffield following the Clean Air Act, are examples of this.

Case study 1: Coventry (1948-1951)

Coventry was heavily bombed during the Second World War – the shell of the old Cathedral remains a standing symbol of this damage today.[41] While no less disastrous and terrifying for those who suffered in the air raids on the city, the resulting damage did present an opportunity for the local council to take leaps forward in terms of urban planning. Coventry Council leveraged postwar reconstruction narratives around clean, modern urban domestic space to lead the way in its air quality initiatives. Coventry ultimately became the poster child for postwar reconstruction *and* the first city to establish smokeless zones in the UK, despite resistance from national government.

In 1948 the local Labour Council moved a Parliamentary Bill to create smokeless zones within the city centre as part of their postwar reconstruction programme. This was opposed by the government. In response, the council held a local referendum on the issue, which revealed that public opinion supported smokeless zones in the town.[42] Despite the capital costs of converting to smokeless heating systems, the people of Coventry voted in favour of air quality action by 27,990 votes to 11,302.[43] These zones made it a fineable offence to burn bituminous coal in domestic and industrial buildings. The proposals were part of broader plans for the city, which also included 'a district heat scheme for the projected new city centre.'[44] Coventry established smokeless zones in March 1951 *without* the support of national government using previous legislation (Public Health Act 1936) that had little impact nationally. Coventry Council advanced their own air quality agenda at a time when national government action continued to be slow and inadequate.

[41] Historic England, 'Blitz Stories: Coventry Cathedral', https://historicengland.org.uk/whats-new/features/blitz-stories/coventry-cathedral/
[42] 'Coventry to test Public Opinion', *Manchester Guardian,* 13 January 1948.
[43] Eric Ashby and Mary Anderson, *The Politics of Clean Air* (Oxford, 1981), p. 99.
[44] 'Coventry to test Public Opinion', *Manchester Guardian,* 13 January 1948.

Five years later, *Smog News*, a publication that reported air quality-related stories, reflected on Coventry's 'promising example'. It highlighted that residents of the smokeless area now found it cheaper to live and work, and encouraged readers to help their own town follow Coventry's lead.[45] Indeed, many cities already had. Manchester, Salford, Bradford, Bolton, and other local authorities announced their intentions to implement smokeless zones in 1951.[46] Manchester's smokeless zone was enforced from March 1952-3 after first stocking up on supplies of smokeless fuel. The zone was only across 104 acres but people living in central Manchester, England's third biggest city, noticed the difference. These initiatives helped to inform the Beaver Committee's recommendations for smoke control areas in the most polluted parts of the country.[47]

Coventry's reconstruction programme aligned with the strategy of the National Smoke Abatement Society. From 1942, the Society looked to reconstruction as an opportunity for the mass installation of smokeless home heating systems. Through public reports and policy documents, it urged government to have foresight in its plans to rebuild Britain. The society published *Smoke Prevention in Relation to Initial Post-War Reconstruction* that argued for the installation of 'modern technology' to ensure that the entire rebuilding process was 'smokeless in operation'.[48] In 1943, air quality activist Clough Williams-Ellis asserted that 'the most favourable time for winning an anti-smoke war will be almost immediately after the anti-fascist war, and it is for that zero hour that our maximum forces must be ready.' Rationing coal, however, was the main point of debate at this time, and ordinary households were more concerned about access to fuel rather than cutting emissions.[49] But when the war was finally over, improvements in air quality *were* included in local plans for towns in Britain.

Case study 2: Sheffield (1959–1972)

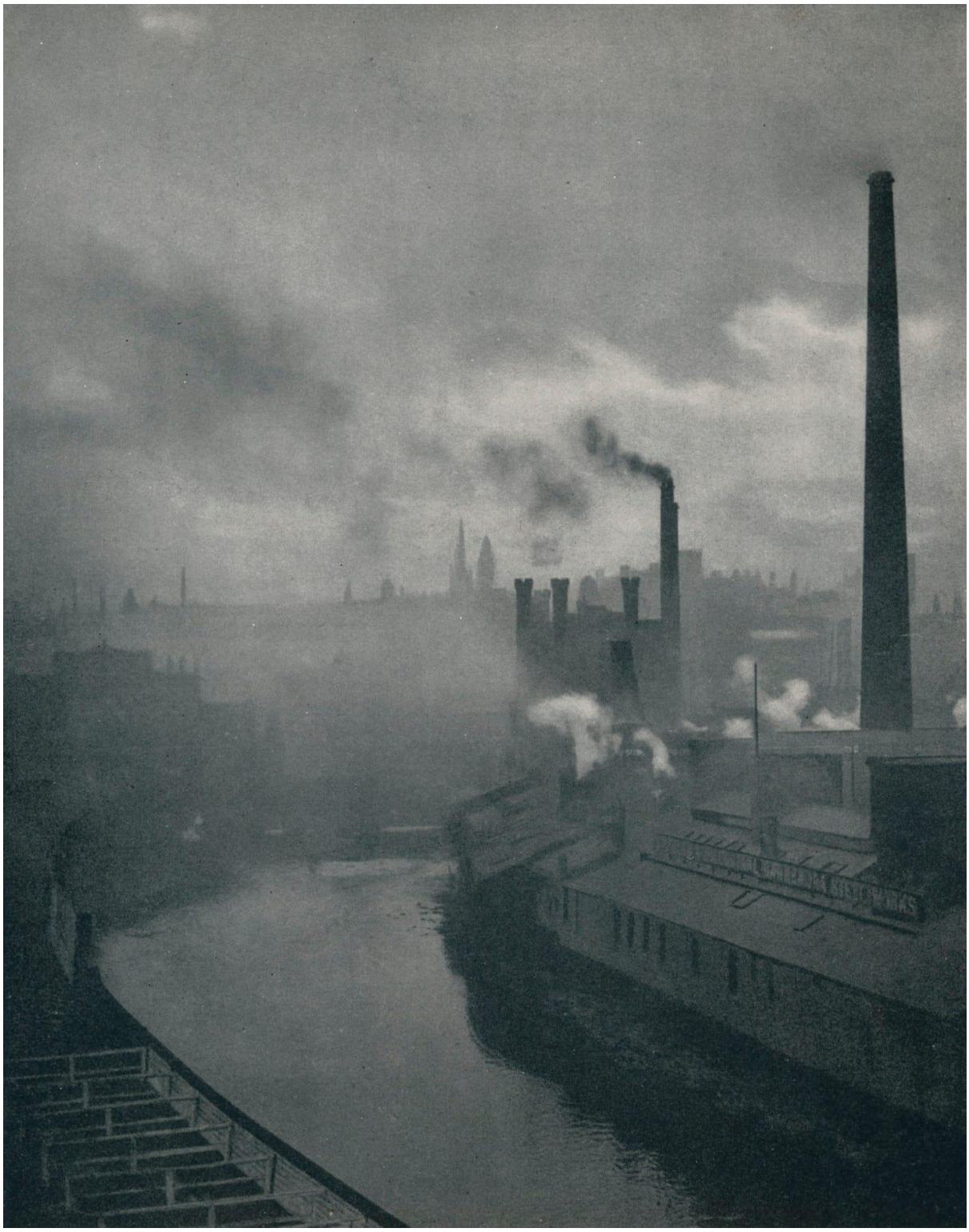
Sheffield is a case where national legislation was harnessed by local authorities to dramatically improve air quality. The city has a long history of campaigning for smoke abatement, being one of the first local authorities to introduce bylaws against smoke in 1853.[50] In 1889 over 5,000 people signed a petition seeking

[45] Wellcome Collection, SA/EPU/G/5/6, 'A Pat on the Pack for Coventry' in *Smog News*, 1956.
[46] News Correspondent, 'No-Smoking Tale of Two Cities', *Daily Mail*, 02 January 1951.
[47] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018), p.175.
[48] National Smoke Abatement Society, *Smoke Prevention in Relation to Initial Post-War Reconstruction* (London, 1942), quoted in Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018), pp.129-130.
[49] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Ohio, 2018), pp.160-161.
[50] Sheffield Local Studies Library/ 352.042/ Local Byelaws, vol. 1 no. 6 (1853)

prosecution for industrial pollution.[51] In 1906 a letter to the *Sheffield Daily Telegraph* argued that the Council 'wants waking up' to air pollution.[52] In 1909, Sheffield hosted a clean air exhibition and established the Smoke Abatement League of Great Britain with northern cities including Manchester and Glasgow. The first national survey measuring atmospheric pollution was conducted in Sheffield in 1914, and in 1927, the Sheffield, Rotherham and District Smoke Abatement Committee was formed to tackle South Yorkshire's pollution problem.[53]

Despite these efforts, the legislative structures and national leadership needed to implement effective change remained lacking. In 1952 the city's smoke abatement officer Mr. James Law admitted that the city was 'dirtier than ever before'. Higher levels of pollution in the postwar period were connected to poor grades of house coal (regulating the hearth remained a point of contention) and the extensive steel production needed to meet postwar demands. This pollution would blow 'eastward down the Don valley to dirty Rotherham, Mexborough, and Doncaster.'[54] The pollution problem in South Yorkshire remained.

[51] Sheffield Archives and Local Studies Library, Timeline of smoke abatement initiatives in, 'Sources for the Study of Sheffield's Battle for Clean Air' (Online, 2015).
[52] 'Council wants waking up', *Sheffield Daily Telegraph,* 23 July 1906.
[53] Sheffield Archives and Local Studies Library, Timeline of smoke abatement initiatives in, 'Sources for the Study of Sheffield's Battle for Clean Air' (Online, 2015).
[54] Wellcome Collection/ SA/EPU/H/1/2/1/6, Smokeless Air: The Smoke Abatement Journal, 1952.



Reginald Bellfield, Where the Shells Came From (Sheffield), c. 1927.[55]

[55] In Sophie Atkinson, 'Why George Orwell Hated Sheffield', *The Tribune,* 24 October 2021.

In 1959, the national government pushed local authorities to implement 10-year clean air plans, and Sheffield took decisive measures to clean up its air. The city's clean air plan centred on the widespread implementation of smokeless zones and the conversion of over 10,000 homes to smokeless heating systems at a cost of £250,000 per year. Six years later, Sheffield was 'winning the war against smoke' with over 16,000 acres of the city under smoke control.[56] 90% of the city was smokeless by 1972, costing £2 million in total.[57] That same year, Chief Smoke Inspector J. W. Bately who oversaw the air quality programme was recognised with an honorary degree by the University of Sheffield.[58]

The success of Sheffield's air quality programme centred on its unique funding structure and a large-scale public engagement initiative. Unlike other local authorities, Sheffield Council paid appliance conversion grants directly to the contractors who did the work. This helped householders who otherwise would have to pay the difference and wait to be reimbursed.[59] Local promotional campaigning was also key to gaining public buy-in. This included an exhibition on The Moor in central Sheffield launching the clean air programme in 1959. The exhibition was attended by over 20,000 people.[60] Public information films and documentaries followed.[61] These campaigns and the local media coverage played a key role in shifting attitudes and fostering a community-wide commitment to mitigating air pollution.[62] 1950s figures indicate that 90% of urban residents were either uninterested in or opposed clean air reform.[63] By 1974, most Sheffield residents agreed that smoke control regulations were necessary.[64]

Residents of South Yorkshire still remember the "dreadful fogs in Sheffield": "thick impenetrable fog" which stopped transport in the city centre.[65] Reflecting on changes to air quality, a Rotherham resident recalled that it "was quite alarming that your atmosphere can change just like that" adding that it is "something you forget about nowadays with clean air".[66] Memories of smog offer an important reminder of the strides made in air quality, as well as the need to recognise that the problem of air pollution did not disappear with the coal smoke. It insidiously

[56] 'Sheffield winning the war against smoke: Halfway to ending the problem', *The Guardian*, 28 August 1965.
[57] J. W. Bately, 'Smoke Free Cities', *Financial Times,* 1968.
[58] 'Clean air honour', *The Guardian,* 22 December 1972.
[59] 'Sheffield winning the war against smoke: Halfway to ending the problem', *The Guardian*, 28 August 1965.
[60] 'Interest in clean air exhibition', *Sheffield Telegraph,* 04 December 1959.
[61] For example, British Film Institute Archive, 'Clean Air City', and British Film Institute Archive, 'Clean Air for Handsworth', Coal Board public information film (1973).
[62] F. Rowntree, 'Sheffield's Clean Air Campaign', *Health Education Journal* 18:1 (1960), p.45.
[63] C. Mills, 'Clean air, coal and the regulation of the domestic hearth in post-war Britain', in M. Jackson (ed.), *Health and the Modern Home* (London, 2007), p.229.
[64] G. Wall, 'Public Response To Air Pollution In Sheffield, England.' *International Journal of Environmental Studies* 5 (1974), pp.267-270.
[65] Lissa Higgins, JustHeat Oral History Collection (Sheffield Hallam University, 2023/4).
[66] Graham Bell, JustHeat Oral History Collection (Sheffield Hallam University, 2023/4).

and invisibly remains, primarily due to emissions from transport and gas-fired heating systems, and more recently, log-burning stoves.

Selling 'Clean Air' and 'Clean' Gas

Public messaging was imperative to 'selling' Clean Air to the public, and the local press played an important part in this.[67] The campaigns in the 1920s, 1930s and 1940s used newspapers, pamphlets and public exhibitions to bring the cause to the public. Even in the Victorian period, smoke abatement campaigners used the media outlets of the day to spread the word about the ills of poor air quality and the benefit of smokeless fuel. The messaging was delivered to the public in a way in which they could and would engage.

Television was a key medium for sharing information and building public consent for clean air initiatives locally and nationally from the 1950s onward. 'Clean Air for Handsworth', for example, was a Coal Board-sponsored public information film that promoted the 'Homewarming Scheme', 1967. This offered no deposit, low interest loans to cover the capital costs of solid smokeless fuel appliances.[68] The electricity industry also produced films that promoted clean air by raising awareness of the impacts of coal smoke on public health and the environment.[69] These marketing materials were industry sponsored, and the smokeless industries that produced them benefited from public investment in clean air.

It was the gas industry that had the greatest vested interest in promoting smokeless technology and living. Clean air initiatives were intimately connected to the national transition to gas, and the Gas Council promoted the 'environmental benefits' of its industry. Even prior to the Clean Air Act, the Council capitalised on discourse around smoke abatement. In 1954, following the Great Smog and the publication of the Beaver Committee Report, a public film titled 'Guilty Chimneys' denounced the coal fire.[70] Following the extension of Clean Air legislation, Sir Kenneth Hutchison, a significant player in the management of the gas industry, was elected President of the National Clean Air Society, delivering the presidential address of the national Clean Air Conference in 1969.[71] It is unsurprising, therefore, that the gas industry remained a strong advocate for national 'Clean Air' policies over the subsequent decades.[72] This also

[67] G. Wall, 'Public Response to Air Pollution In Sheffield, England.' *International Journal of Environmental Studies* 5 (1974), p.260.
[68] British Film Institute Archive, 'Clean Air for Handsworth', Coal Board public information film (1973).
[69] Yorkshire Film Archive, 'No Barrier to the Sun', Yorkshire Electricity Board, 1956.
[70] British Film Institute Archive, 'Guilty Chimneys', Gas Council, 1954.
[71] Churchill Archives Centre, GBR/0014/HTSN/B.68, Sir Kenneth Hutchison, 'The Presidential Address of the Clean Air Conference', Eastbourne, 21 October 1969.
[72] Churchill Archives Centre, GBR/0014/HTSN/B.68, Sir Kenneth Hutchison, 'The Presidential Address of the Clean Air Conference', Eastbourne, 21 October 1969.

exemplified the importance of harnessing the media landscape of the day to ensure the message was heard.

3

GIVE UP SMOKING?

I NEVER STARTED! *says Mr. Therm*

Gas burnt in Mr. Therm's gas-heated appliances never produces the slightest smut or smoke. It is so clean in operation that gas equipment is kept hard at it with complete success in many places where surgical cleanliness is essential; and the maintenance of equipment is confined to an easily handled minimum. The other advantages of gas as a fuel—flexibility, ease of control, rapid heating from cold and high efficiency — are so well known that Mr. Therm's face is familiar all over Britain.

MR. THERM BURNS TO SERVE YOU!

The Gas Council · 1 Grosvenor Place · London · SW1

Wellcome Collection, SA/EPU/H/1/2/1/6, Gas Council Advertisement in *Smokeless Air: The Smoke Abatement Journal*, 1952.

Different infrastructure, behaviours, and pollutants

Clean air initiatives and the national energy transition from coal to gas led to a significant decrease in coal burning and a reduction in some of the most harmful pollutants in our atmosphere. Figure 1 shows how levels of SO_2 and organic carbon fell steadily from the 1960s. However, despite the claims made by the gas industry at the time, the problem of air pollution was not resolved by the gas transition. As the graph below shows, the prominence of other pollutants in the atmosphere significantly increased around that same time. Ammonia, non-methane volatile organic compounds (NMVOCs), and Nitrogen oxide (NOx) dramatically increased during the same period of the national energy transition. Sources of Ammonia and NVOCs include petrol cars, landfill sites, and burning biomass. NOx is mainly attributed to fossil fuel combustion, including gas-fired power plants and gas fuelled domestic appliances that are used day-to-day for cooking and heating.

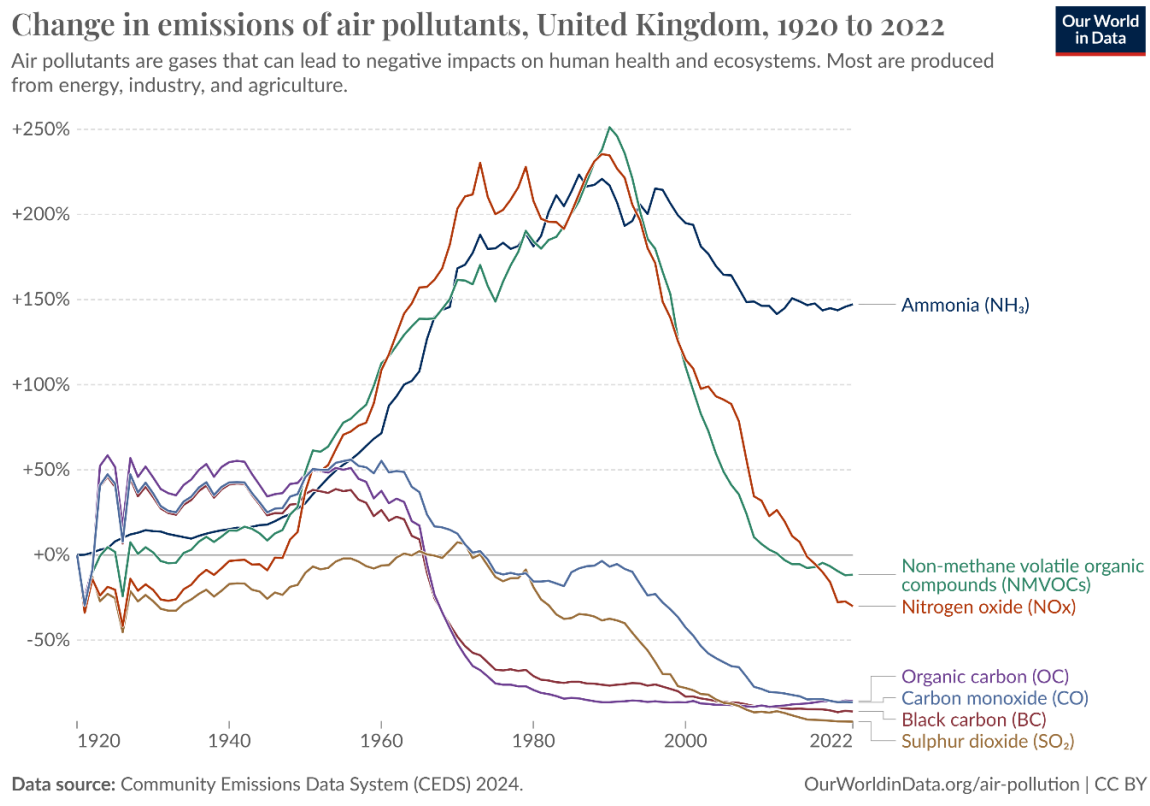


Figure 1: Our World in Data, Change in emissions of air pollutants, United Kingdom, 1920 to 2022, Community Emissions Data System (CEDS) 2024.

Smoke abatement, rooted in the nineteenth century and given legislative effect after the Second World War, reduced levels of Sulphur Dioxide (SO_2), which causes respiratory illness *and* greenhouse gas emissions that contribute to climate change. Despite the marketing campaigns of the gas industry from the 1950s to the 1970s, it is now well established that 'natural gas' is damaging to the natural world, not 'clean' and 'friendly' and good for people and environment, as the campaigns claimed. As a fossil fuel, burning gas is also an unsustainable energy source (see Keeping Warm chapter).

Historical campaigns, policies, and public support have had a positive impact on air quality, overcoming long-term complex challenges in many cases. But as use of the coal fire declined, car ownership took a sharp upturn. Car ownership increased twofold between 1949 to1957, from two million to four million, rising to six million cars in the UK by 1961. As domestic smoke emissions were finally being addressed, another source of pollution was popularised on a mass scale.[73]

A more recent trend affecting air quality is wood burning. Around 1.9 million households in the UK have wood burning stoves. Wood burning culture declined along with our national forests during the Early Modern period. Coal then became the national fuel of choice from the eighteenth century to the late twentieth century. Emblematic of middle-class success and increasingly a popular lifestyle choice in many homes, the wood burner is a new challenge to air quality. A recent study at the University of Birmingham called out log burners as *even more* detrimental to air quality than traffic emissions.[74] This is an increasing concern for local residents in Sheffield, for example, where significant progress in improving air quality has been made historically.[75] The daily average indoor concentration of particulate matter increases by 500% when a stove is lit in the home.[76] Asthma UK and the British Lung Foundation recommend only using a wood burner if there is no alternative.[77]

[73] Rorie Parsons and Geoff Vigar, 'Resistance was futile' Cycling's discourses of resistance to UK automobile modernism 1950-1970', *Planning Perspectives*, vol.33 (2017) p.164.
[74] BBC News, 'Wood burners more polluting than traffic – study', 10 December 2024.
[75] Sam Gregory, 'Toxic wood-burning remains unenforced in Sheffield, despite hundreds of complaints and a serious threat to children's health', *Now Then: A Magazine for Sheffield*, 24 January 2025.
[76] Rohit Chakraborty, James Heydon, Martin Mayfield, Lyudmila Mihaylova, 'Indoor Air Pollution from Residential Stove: Examining the Flooding of Particulate Matter into Homes during Real-World Use', *Atmosphere*, vol. 11 (2020).
[77] Mathew Taylor, 'Avoid using wood burning stoves if possible, warn health experts', *The Guardian*, 01 January 2021.

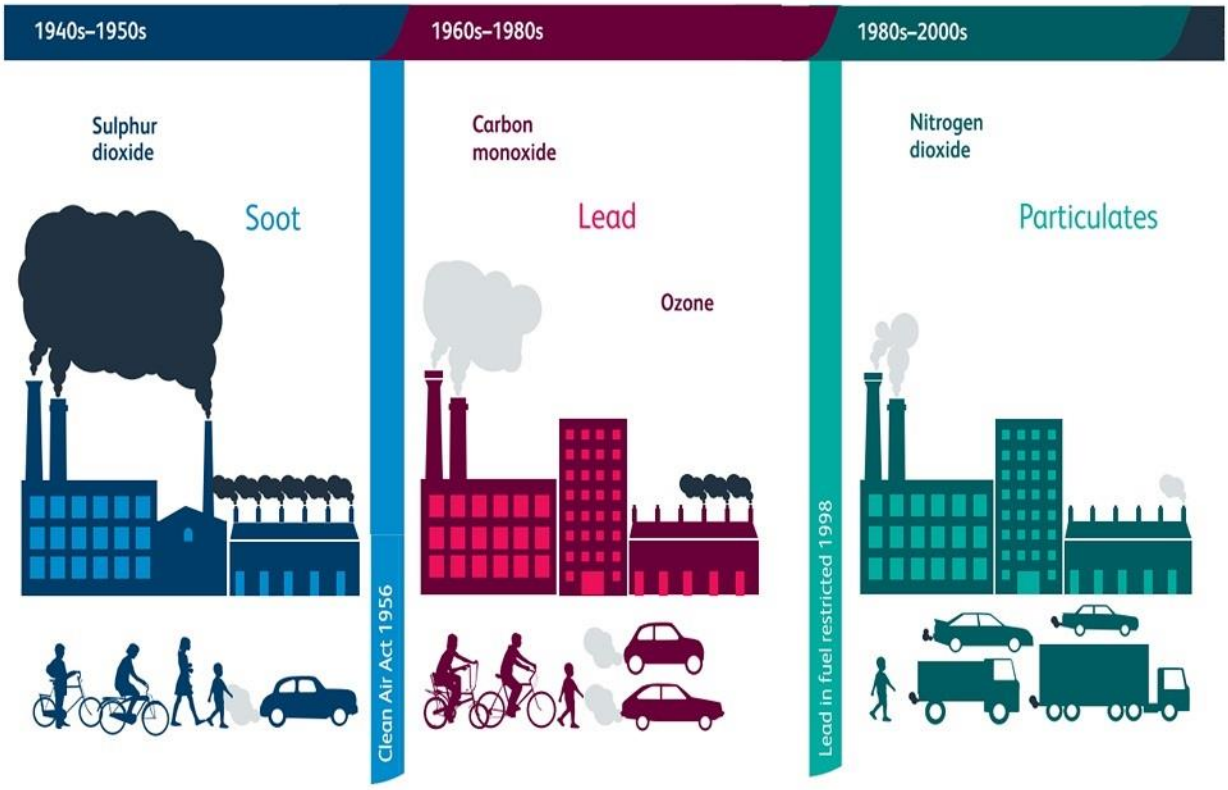


Figure 2. Department of Environment and Rural Affairs, Infographic illustrating the changing nature of air pollution in the UK (2017)

Conclusion:

Air quality – old problem, new atmosphere

The problem of poor air quality in Britain has a long chronology. Campaigns to address concerns about air pollution date back to the nineteenth century when 'smoke abatement' focussed on industrial pollution. The focus shifted in the inter-war period, when industrial and domestic fuel consumption was increasingly recognised as damaging to public health and the environment. But it still took a national catastrophe, the London Smog 1952, to force action. The resulting Clean Air Act provided the legal, financial, and political basis for air quality change and was crucial to the transition to gas from the late 1960s to the end of the twentieth century.

Whilst it was national legislation and leadership, through the Clean Air Act, that provided an important turning point in the history of air quality, the significance of local initiatives cannot be overstated. In the post-war era, Coventry Council used older public health legislation to challenge national government and implement its own smokeless zones, setting an example to UK towns and cities. The council recognised that the necessary reconstruction offered potential to rebuild in a way that was socially and environmentally engaged. Sheffield, too, with effective leadership, financial support from national

government, and importantly, public buy-in cultured through excellent PR and media campaigns, dramatically improved air quality in the city.

Improvements in air quality were intimately linked to national energy transition. As coal-burning declined following Clean Air initiatives and the uptake of gas-fired energy systems and domestic technologies increased, the atmosphere also changed. SO_2 levels significantly decreased. The gas industry used the prospect of cleaner air to promote the change through effective marketing campaigns that used the media outlets of the day, and in turn, the shift to gas did reduce *some* of the harmful pollutants in the air. Simultaneously, however, increased car use combined with the uptake of gas led to the increase of different, but also harmful, pollution. More recently, log-burners have become another culprit of poor air quality. This demonstrates, as also discussed in the Keeping Warm chapter, the interconnectedness of home heating and air quality, as well as the need for air quality improvement to be considered in tandem with climate action. While it may appear that air quality has improved hugely in the UK since the 1950s, this is a relative position. The mass coal burning of the past was unsustainable, and this has all but ceased. But the dynamics of the air quality problem have only changed – it has not gone away. Wood burning is an emergent issue and transport decarbonisation still has a long way to go, as highlighted in the chapter on 'Getting Around'.

By recognising the history of air quality this chapter has drawn out important themes that speak to present day problem of poor air quality and vital moments for learning. Firstly, national leadership with an agenda to legislate to improve air quality is essential to effect change. Although it took over seventy years for the first legislation to be passed, subsequent Acts followed in relatively quick succession, which had a marked impact on improving air quality in the second half of the twentieth century. Secondly, local initiatives are invaluable in shaping how publics and governments can make change happen. The historical case-studies of Coventry and Sheffield shed light on the importance of local efforts to attain public buy-in, and that improvements to clean air can only be achieved with forward thinking and financial investment. The evidence from Sheffield attests to the significance of appliance conversion grants which were paid directly to the contractors, taking the financial burden off the homeowner and facilitating public support. People are more able and willing to convert to using forms of non-polluting energy that subsequently improves air quality, if it is subsidised. Although the types of pollutants – and indeed the visibility of pollution – has changed since the mid-twentieth century, the problem of pollution persists. Now, however, it is less visible *literally*, and in the media outlets that engage the wider public today. Change does happen, as this chapter has shown, but clean air in the twenty-first century will only be achieved with interconnected action from all levels of government and communities bolstered by pride, and by utilising commercial powers. Perhaps most importantly, however, change must be desired and actioned by us.