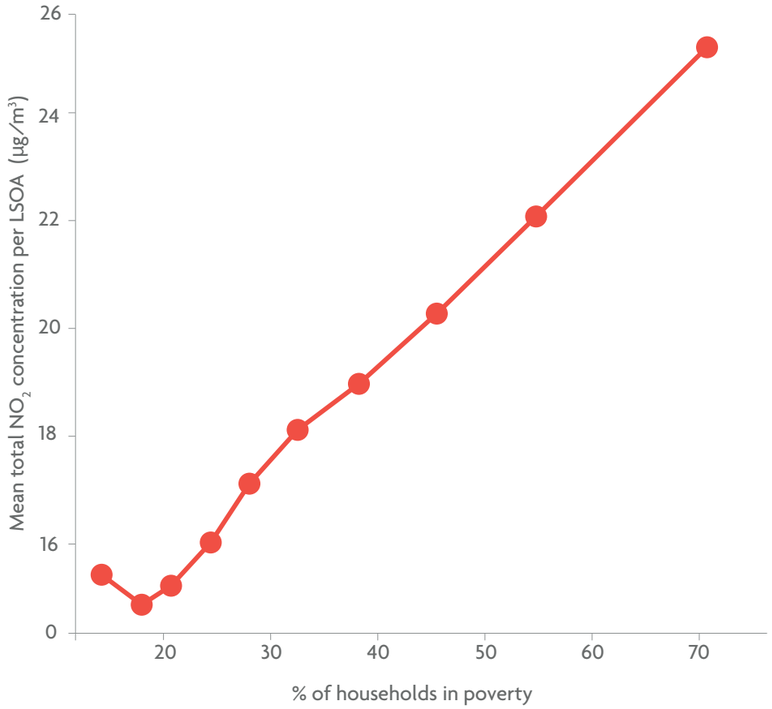
CASE STUDY

Air pollution: putting people at the heart of the issues

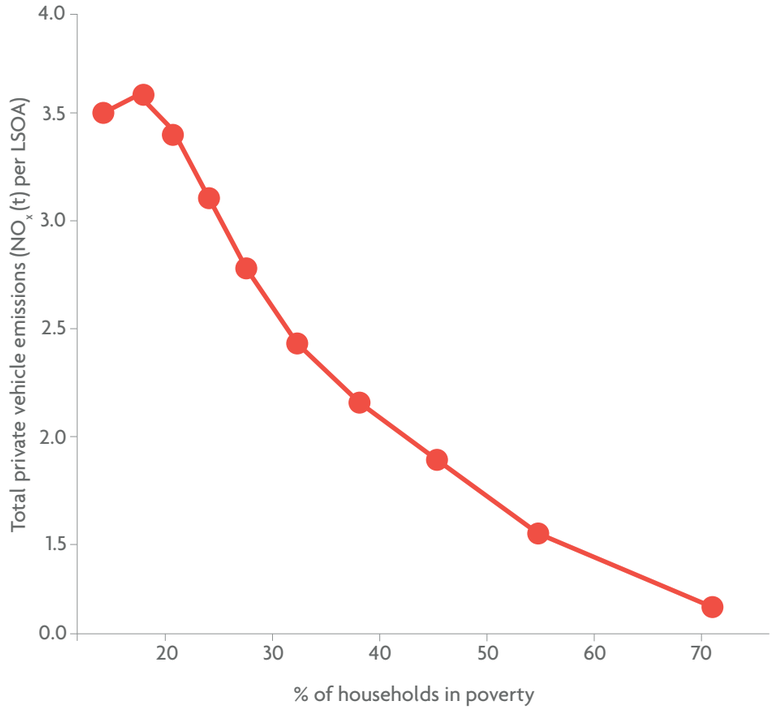
Dr Tim Chatterton considers the theory that the root causes of air pollution are social, not just technological.

It has been over two decades since the UK Environment Act 1995 and the European Air Quality Framework Directive (1996/62/EC) led to the establishment of air quality management (AQM) processes in the UK. AQM is understood here to differ from air pollution control insomuch as it focuses on achieving ambient pollution concentrations as opposed to emission limits. Eleven years have now passed since the UK comprehensively failed to achieve its own air quality objectives for nitrogen dioxide (NO_2), and a further five since we failed to comply with the European Limit Value for NO_2. Despite the Government's insistence that only five Clean Air Zones (and an Ultra Low Emission Zone in London) are required, over 60 per cent of Local Authorities in the UK have one or more Air Quality Management Areas (AQMAs) declared and the 'stack' of effective Air Quality Action Plans (i.e. those that have directly led to the ability to revoke an AQMA) is very slim indeed[1].

The fact that air pollution seems to have only achieved the media and political profile it currently receives following threats of fines by the EU (and thanks to a great deal of work by lawyers ClientEarth), rather than the failure to comply with our own UK Air Quality Objectives in 2005, does not bode well for strong action post-Brexit. However, the recent High Court ruling demanding compliance "by the soonest date possible" may not be a good thing, particularly in the context of achieving a wider set of co-benefits which may require a more considered approach to maximise. This article argues that the AQM approach in the UK, but also more widely, has been flawed due to a failure to properly account for people as both the fundamental causes, and potential solutions to, the problem of air pollution. For the purposes of this article, the focus is placed primarily on transport related pollution, but this approach could be applied to other sources.



▲ **Figure 1a. Exposure to NO_2 by level of poverty[5].**



▲ **Figure 1b. Emissions from registered vehicles by level of poverty[5].**

IT'S NOT JUST ABOUT POLITICS

One of the key reasons why efforts to improve air quality have not been more successful across Europe has been the failure to elicit more political support for action at both national and local levels. This can be seen as being due, in no small part, to a failure to capture sufficient public engagement to create the democratic mandate for significant action on air pollution. The lack of public and political engagement is often cited as being caused by the 'invisibility' of current air pollution problems, although recent visible urban smog and 'Saharan Dust' events have captured some public interest. This issue of the tangibility of air pollution is worsened if we consider how visibility is linked to our political structures. Based on figures from the regular Census of Local Authority Councillors[2], in 2004 over 73 per cent of elected members had been alive during the time of the 1952 Great Smog; by 2013, this had only dropped to 60 per cent. It should be remembered that 'pea-soupers' were still occurring over a decade later[3] and so these decision-makers grew up in a world where air pollution literally meant not being able to see your hand in front of your face.

THE PROBLEM WITH NUMBERS

Within the wider public health community, air quality was often perceived (until recently) as a success story – having had both UK and EU legislation passed to enforce 'acceptable' levels of air pollution. However, although it is hard to argue that this legal recognition and definition is, in and of itself a problem, having a set of numeric µg/m³ limit and target values, whilst being based on health evidence, has led to approaches to AQM that fixate on abstract numbers rather than real-world impacts. This in turn has led to technical approaches to solving the problem which allow the presentation of estimated figures that fit the numerical framing of the problem; a techno-centric policy approach to mitigation has developed as a result.

In terms of the conventional emissions equation, where emissions equal activity multiplied by emissions factor, we end up concentrating on controlling the emissions factor (e.g. by emphasising higher Euro standards) rather than addressing the activity. This is arguably not AQM, but is instead simply conventional air pollution control applied to numerous dispersed sources.

A second reason for low levels of civic engagement may lie in the absence of people in models and scenarios used to estimate and predict air pollution concentrations. For example, these models generally represent flows of cars or other vehicles along roads, and source apportionment concentrates on which types of vehicles are contributing to the problem (cars, vans, buses, trucks etc.). This approach can be considered as a 'Where and What' approach. It tends to focus only on where concentrations are above the limits, and on what vehicles (or other equipment) are emitting pollution. This approach has also supported a technocratic approach to solving air pollution problems, and having had at least twenty years to try and achieve its aims, it is time to reflect on this approach and to consider changing it.

The rest of this article will describe work that the Air Quality Management Resource Centre (AQMRC) at the University of the West of England, Bristol, is involved in, which is helping to develop a view of air pollution that puts people back into the picture. In doing so, work is outlined that moves away from the where and what, towards questions of 'who' – who is causing the pollution and being exposed to it, and 'why' they are causing the emissions. In putting these ideas forward, it is not intended that the air pollution control type approaches used to date are discarded, but it is argued that although they may be necessary, experience now suggests that they are far from sufficient.

LOOKING AT THE 'WHO?'

Within an Engineering and Physical Sciences Research Council (EPSRC)- funded project "Motoring and vehicle Ownership Trends in the UK"[4], AQMRC has been using new datasets from the Department for Transport to map emissions from road transport based not on the point of use, but on the location of the vehicles' registered keepers (as a proxy for drivers' homes). The core dataset extracted from the 'MOT' vehicle inspection records provides periodic odometer readings for every vehicle less than 3.5 tonnes in Britain. Then, using these to calculate estimates of annual mileage alongside emission profiles of the vehicles (using age or Euro standard, fuel type and engine size), emissions can be attributed to small areas (termed Lower-layer Super Output Areas, containing around 700 households) on the basis of the registered keeper. This allows a wide range of analyses to be carried out regarding patterns of car ownership and usage, but most relevant to the issue of air pollution is the ability to compare how these areas vary in terms of the amount of pollution they emit from driving, compared to the levels of pollution that those areas are exposed to in terms of concentrations. The results indicate that in general there is a strong inverse relationship between these, with areas where people are exposed to the highest concentrations being responsible for the lowest emissions and vice versa. However, when this is analysed in combination with levels of poverty, a stark picture of inequality emerges where those areas with the greatest poverty are responsible for emitting the least pollution, but are exposed to the highest concentrations (and the converse for least poor areas); see **Figure 1.**

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LOOKING AT THE 'WHY?'

In another EPSRC funded project, "Disruption: Unlocking Low Carbon Mobility"[6,7], the problem of moving to more sustainable patterns of transport was looked at, not in terms of conventional views of travel being an individual 'choice', but instead by focusing on the activities (or in terms of social science, the 'practices'[8]) that travel is embedded within. Over three and a half years, the project undertook a wide range of research including following over thirty families in order to understand why people make the travel decisions they do. The findings showed that people do not, for the most part, make free choices about how they travel. Instead, people undertake and carry out a wide range of activities or practices, for example working, shopping, caring or learning, which often are felt to necessitate the use of a car. The way that we, as a society, have structured our transport system, our land-use planning and a range of other factors means that in order for most people to participate in these activities which constitute normal everyday life, an assumption is made about free and unlimited movement on the part of participants. This puts a burden of mobility on individuals which can often only be met through driving. It was surprisingly common in the research to encounter people who felt 'trapped' into driving because they felt expected to do certain things for which a car was the only practical option.

If we are really serious about tackling our transport problems and the air pollution that arises from this, we urgently need to move away from believing that decisions about how and when people travel are simply about personal choice. Instead we need to really consider how we can shape our societies in a way which reduces pressure on people to travel, not just by providing much greater support for non-car modes, but by looking at localising rather than centralising key services, ensuring that housing and land use policies minimise travel distances, by questioning social and economic drivers towards the need for dual income households, or even for some people to need to have more than one job.

LOOKING FORWARD

The full extent of the UK's air pollution problem is not going to be solved quickly even if, thanks to ClientEarth, the government is forced to "achieve compliance [with the EU Directive] by the soonest date possible". This means that there is good sense in aligning efforts to reduce air pollution emissions from transport alongside longer term efforts to reduce carbon emissions. The vast majority of work on future greenhouse gas emission reduction scenarios, however, suffer from the same problem outlined above with regard to AQM; they focus almost entirely on the deployment of new or cleaner technology, pay scant regard to individual behaviours, and almost never take a broad view of how society is organised. To address this point in particular, AQMRC is providing the technical/academic lead in a four year EU Horizon 2020 funded project called ClairCity[9] (Citizen-led air pollution reduction in cities). This project, involving ten research partners and six European city or regional governments, is developing a range of ways in which both citizen engagement and quantitative air pollution analysis and modelling can be recalibrated so as to put people (as citizens not as individuals) at the centre of plans for emission reduction. Through doing this we hope to both stimulate greater public engagement with air pollution issues and to allow the development of policies at a city scale, addressing the way in which air pollution results from day to day activities, not simply from exhaust pipes.

THE ONLY THING CONSTANT IS CHANGE

If society is to achieve significant, long-term and sustainable solutions to air pollution and other environmental challenges (including resource management with respect to new electric vehicles), we are going to have to go beyond technology substitution and change how society is organised. The good news is that despite discussions about 'behaviour change' often implying that people's habits are rigid, stubborn and difficult to shift, our research suggests that the opposite is true; people are generally highly flexible and adaptable. What makes them appear fixed is actually the structures imposed by their surroundings that force them into particular ways of acting. We have also shown that these structures can and do change, and they will continue to do so; however, we have to decide to make them change in the right direction. ES

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