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## The raise of Air Pollution as an Environment Focus

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Cities in the UK are cleaner than they have been since the industrial revolution. While we see stories from around the world of cities such as New Delhi and Beijing facing air pollution crises with very low visibility, acrid air, widespread use of facemasks and the resulting health implications, this is generally a memory in the UK dating back to the coal smoke issues of the 1950s and 1960s that led to the Clean Air Act.

However, perceptions are changing. Over the last thirty years various UK and European legislation has reduced the pollution from industry and vehicles many times. This has also lead to a much more widespread understanding of the issues, both environmental and health related, types of technology available to reduce pollution as well as general public perception of some of the issues.<sup>1</sup>

The standards have become tighter and tighter over the years and, for example, London continues to miss EU regulations that were agreed to be the UK government about overall air quality across the city<sup>2</sup>

Industry has been a focus for much of the debate about air quality and pollution in the UK and across Europe. The general decline in heavy industry has helped significantly to reduce much of the air pollution load in the cities across the UK as well as the move to cleaner forms of fuel – which is largely the result of a range of government policies to reduce carbon emissions as well as improve air quality. This includes the recent and

widespread moves to gas as a fuel for industry, households and electricity generation as well as the significant increases in renewable energy production and hence zero emission technologies.

It should be reflected upon that most people in the UK are experiencing cleaner air than they have historically experienced in their lives. Yet, perceptions change and the importance of higher sustainability and environmental standards become more acute. While the air may be cleaner than it was 40 years ago when coal power production was widespread, it may still not be clean enough to not be having a now understandable and measurable impact on the life chances of children or the ability to pleasurably enjoy cycling in your community. This shift is at the centre of a renewed expectation amongst the population that governments and industry will do more, much more, to ensure cleaner air and a healthier population

The European Union on 18 December 2013 adopted a Clear Air Policy Package 7 that updated existing legislation and further reduces harmful emissions from industry, traffic, energy plants and agriculture, with a view to reducing their impact on human health and the environment. The benefits to people's health from implementing the package are around €40bn a year, over 12 times the costs of pollution abatement, which are estimated to reach €3.4bn per year in 2030.

The major air pollutants are:

- **Particulate Matter (PM)** is fine dust, emitted by road vehicles, shipping, power generation and households, and from natural sources such as sea salt, wind-

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blown soil and sand. Health concerns focus on particles of less than 10 micrometres ( $\mu\text{m}$ ) in diameter ( $\text{PM}_{10}$ ) – especially those of less than 2.5  $\mu\text{m}$  across ( $\text{PM}_{2.5}$ ). It can cause contributing to respiratory disease, cardiovascular disease, and lung cancer. Black carbon is the sooty part of particulates emitted from combustion;

- **Ground-level ozone ( $\text{O}_3$ )** is a secondary pollutant produced by complex chemical reactions of  $\text{NO}_x$  and VOCs (including methane) in sunlight. It can decrease lung function, aggravate asthma and other lung diseases, and causes damage to agricultural crops, forests, and plants, by reducing their growth rates;

- **Sulphur dioxide ( $\text{SO}_2$ )** is emitted by power generation, industry, shipping and households. It harms human health through the formation of secondary PM and contributes to acidification of soils and inland waters;

- **Nitrogen Oxides ( $\text{NO}_x$ )** are emitted by road vehicles, shipping, power generation, industry and households. Like  $\text{SO}_2$ , they harm human health by forming secondary PM and contribute to acid rain, but it also causes eutrophication and also a key component in increased levels of ground-level ozone ( $\text{O}_3$ );

- **Ammonia ( $\text{NH}_3$ )** is emitted by activities linked to manure and fertiliser management in agriculture and the use of fertilisers in agriculture. It harms human health as a building block for secondary PM, and contributes to acidification and eutrophication;

- **Volatile Organic Compounds (VOC)** are emitted from solvents in products and industry, road vehicles, household heating

and power generation. VOCs are the key component in the formation of ground-level ozone;

- **Methane ( $\text{CH}_4$ )** is emitted by natural sources such as wetlands, as well as human activities such as leakage from natural gas systems and the raising of livestock. Methane is a key building block in the formation of ozone, as well as a powerful greenhouse gas.

The air quality standards and objectives are available on:

<http://ec.europa.eu/environment/air/quality/standards.htm>.

These apply over differing periods of time because the observed health impacts associated with the various pollutants occur over different exposure times.

An interactive infographic published by the EC on the following webpage:

[http://ec.europa.eu/environment/air/cleaner\\_air/](http://ec.europa.eu/environment/air/cleaner_air/) where it is possible to select each of the air pollutants and read its effects on humans and environment.

One of the largest remaining sources of air quality issues both in cities as well as often in the suburban and rural areas is transport.<sup>3</sup> The UK's air quality is illustrated in this Defra website.<sup>4</sup>

Over many years diesel technology was seen as a solution to reduce carbon emissions from vehicles, in particular  $\text{CO}_2$ , as well as a means of increasing fuel efficiency. The majority of vehicle sales became diesel powered. However, diesel continued to have issues of particle emissions and certain other gaseous emissions and this has become a key concern regarding the local impact of transport and air pollution on people's lives.

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The VW Emissions scandal in 2015 opened up this debate amongst the government as well as the public and showed that many assumptions about technology and the role of the OEMs in furthering clean air policies were incorrect, or at least flawed. “Clean diesel” while a technical possibility, was not being delivered and not in a way that policy leaders had envisaged. Furthermore, this high profile scandal fundamentally raised awareness in the UK, across Europe and around the world of the impact that a major shift to diesel technology was having on air quality and that transport was having a major impact on the local air quality issues.

During this rising awareness of air quality issues, the transport industry has been buffeted by an increasing range of industry and business model disruptions and these are expected to further increase. This includes ridesharing, car sharing, new propulsion technologies, autonomous operation, personalisation, greater investment in high speed rail, etc. The potential to make a significant alteration in the entire basis of personal transport and move away from internal combustion engine technology (or defined as embracing only “zero emission” vehicle technology) is increasingly seen as the “game changer” in the air pollution debate. This potentially will eliminate much of the challenge of trying to make petrol and diesel vehicles sufficiently clean to meet to the ever increasing expectations of the population. It will also radically alter the entire business and industrial landscape of the vehicle production, distribution, servicing and disposal supply chain.

This industrial re-invention and the new business models and technologies this will stimulate are clearly of quite a lot of interest to public thinkers.

In the early summer of 2017, the new French government of Emmanuel Macron announced that as part of the efforts to support the 2015 Paris Climate Change deal as well as deal with French urban air quality concerns, that from 2040 petrol and diesel vehicles will be banned and the transport industry will become carbon neutral.<sup>5</sup>

The UK government also in the summer of 2017 came forward with policies to also in 2040 enforce the use of only zero emission vehicles.<sup>6</sup>

Note that the two governments have chosen the same target dates but have slightly differing definitions of the objective. The Dutch government is also debating setting an earlier date in 2025 for banning polluting vehicles. The trend is spreading globally and cities across the world are moving forward with various types of bans or severe penalties for polluting vehicles including Stuttgart<sup>7</sup> and London’s “Toxicity Charge” (a.k.a. Emissions Surcharge)<sup>8</sup>, introduced on 23 October 2017, in addition to the Congestion Charge and involving all pre-Euro 4 vehicles.

Large emerging economies such as India and China are also announcing plans to transform their vehicle fleets from fossil fuel to electric/zero emission technologies.<sup>9</sup>

In summary, this is a short exploration of some of the issues that have taken us to the primacy of air pollution in local thinking. There are other issues that have also reinforced this focus such as the current trend of increasing populations in urban centres.

While, this is a major challenge for most local authorities as combatting air pollution is a complex and long term issue. In an earlier era of large industrial sites, it was perhaps easier

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to focus in on a relatively few industrial sites and enter into a dialogue about remediation measures. In current world where is source is the ubiquitous motor vehicles and delivery lorry that are pervasive across how many people live in society immediate solutions will be more complex.

However, the opportunities are also, perhaps, also much larger. This is the age of disruption and innovation. While national policies will assist in this challenge, the air pollution challenge not only requires priority thinking from local government, but embracing innovative thinking from the range of new businesses that are inventing new technologies, ways of behaviour and living that can progressively deal with these challenges. This includes technologies such as better and localised air quality reading devices, improved building design and design approaches and devices that remove air pollution as well as proactive means of realistically encouraging sustainable transport.

#### Footnotes:

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Stefano Mainero is Founder & CEO of EPN Consulting Limited (<http://epnconsulting.eu/>), a London-based consultancy assisting clients in assessing and shaping their ideas to find the best EU funding scheme (e.g. Horizon 2020) and build a suitable consortium partners in Europe. He has worked in the UK and Italy and has 20+ years of experience in European projects and deep knowledge of Intelligent Transport Systems, Sustainable Transport and Smart Mobility in Smart Cities.

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