Public Health England

PHE Board Paper

Title of meeting	PHE Board
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Title of paper	Health burden of air pollution in England

1. Purpose of the paper

1.1 The purpose of the paper is to inform the PHE Board about the nature and scale of the effect of air pollution on public health in England and discuss the role that PHE can play in encouraging actions to improve air quality and mitigate climate change.

2. Recommendation

2.1 The Advisory Board is asked to **NOTE** the public health burden of air pollution in England and to **COMMENT** on PHE's role in stimulating, supporting and levering actions to reduce this health burden and promote health co-benefits associated with climate change mitigation and increased physical activity.

3. Introduction

3.1 Despite improvements in air quality over recent decades, air pollution has a significant effect on public health in England. Short-term episodes of elevated levels of air pollution are associated with immediate health effects, particularly on individuals with pre-existing heart or lung conditions. However, the biggest health burden is understood to be from long-term exposure to particulate air pollution: an annual effect in England estimated as equivalent to 25,000 deaths.

3.2 The Department for Environment, Food and Rural Affairs (Defra) has the lead responsibility for air quality in the UK, but many of the policy and regulatory levers to address emissions of air pollutants rest with other Departments and Agencies (e.g. Department for Transport (DfT), Department of Energy and Climate Change (DECC), Department for Communities and Local Government (DCLG), Environment Agency) and local authorities. PHE can play an important role by highlighting the scale of the public health problem associated with air pollution, and encouraging public health professionals to support local, national and international initiatives to reduce emissions of pollutants and to reduce exposure of the population to these emissions. A focus on measures that have co-benefits for air pollution along with other public health priorities such as increased physical activity, climate change mitigation and adaptation, and community cohesion and road safety would be appropriate.

4. Background

4.1 In recent weeks, there was a widespread increase in air pollution across England that peaked on 3 April 2014. "High" levels of air pollution occurred quite widely and in some places (particularly in London) "Very High" levels (the highest pollution

category in the UK Daily Air Quality Index) were reached. PHE's syndromic surveillance systems detected increases in indicators of asthma and difficulty breathing over the same period. There was also an increase in ambulance calls reported in the media.

4.2 Short-term exposure to elevated levels of air pollution can cause a range of adverse health effects including exacerbation of asthma, effects on lung function, increases in hospital admissions and mortality. Air pollution episodes typically occur several times a year in the UK. Public-facing information on air quality is provided by Defra, and is accompanied by advice to both at-risk individuals and the general population on proportionate actions that can be taken to reduce health risk (e.g. restricting strenuous activities outdoors) when pollution levels are higher than usual. Both the Daily Air Quality Index and the accompanying health advice are based on recommendations from the Committee on the Medical Effects of Air Pollutants (COMEAP) for which PHE's Centre for Radiation, Chemical and Environmental Hazards (CRCE) provides the scientific Secretariat.

4.3 Studies have shown that long-term exposure to air pollution reduces life expectancy by increasing deaths from cardiovascular and respiratory conditions and from lung cancer. The evidence suggests that exposure to fine particulate pollution may be the main cause. A report published by CRCE on 10 April 2014 estimated the annual mortality burden in England of long-term exposure to particulate air pollution arising from human activities as equivalent to 25,000 deaths with an associated loss of life of 265,000 years. Long-term exposure to air pollution is likely to be a contributory factor, along with others, in the initiation, progression and exacerbation of disease.

4.4 Particulate air pollution arises from many sources and can include many components. Considerable research effort has been directed towards trying to understand which sources and components of airborne particles are responsible for adverse health effects. Ultrafine particles, diesel particles, black carbon, metal content, and secondary sulphates have variously been suggested as particularly important. However, most authoritative bodies regard the mass of particles of sizes that can enter the airways and/or lungs (PM_{10} and $PM_{2.5}$) as the most appropriate basis for quantification and regulation.

4.5 Other air pollutants also have adverse effects on health. Ozone, which is also a greenhouse gas, is formed in the air from other gases by reactions that can take place over long distances and timescales. This means that, as well as locally generated ozone, much of the ozone experienced in the UK is due to emissions of its precursors in other areas of the world. International approaches will therefore be needed to achieve reductions. NO_2 is emitted from the same sources as particles – notably traffic. WHO (2013) noted that there is increasing evidence linking outdoor NO_2 with adverse health effects at or below the current EU air quality standards.

4.6 Traffic is an important source of pollutants in urban areas and pollutant concentrations are elevated near busy roads. Historically, emissions of particles were much higher from diesel vehicles than from equivalent petrol cars, whilst emissions of volatile hydrocarbons (e.g. benzene) were higher from petrol engines. With the exception of higher NO_2 emissions directly emitted from diesel vehicles, emissions from modern light diesel and petrol engines are becoming more similar. However, such technological changes take some time to be reflected in reductions

in emissions, as the turnover of the vehicle fleet is gradual. The increased proportion of diesel-fuelled traffic in the UK, and the failure of Euro emission standards for diesel cars to deliver the expected emission reductions of nitrogen oxides, have resulted in difficulties meeting EU air quality limit values for NO_2, prompting infraction proceedings by the European Commission against the UK.

4.7 Diesel cars generally emit less carbon dioxide (CO_2) than equivalent petrol cars. However, it is not clear whether the shift from petrol to diesel cars would be effective as a climate mitigation measure, when account is taken of other emissions, including nitrogen oxides and black carbon that may also play a role.

5. Discussion

5.1 PHE's role is in developing and interpreting the available evidence on the health effects of air pollution and climate change, and on assessing interventions to reduce exposure to air pollution, adapt to climate change and improve health and wellbeing. PHE also has a role in advising those who are in a position to take action to improve air quality and mitigate climate change at local, national and international level.

5.2 Defra is the Government Department with the lead responsibility for air quality in the UK. However, many of the policy and regulatory levers to address emissions of air pollutants rest with other Departments and Agencies. These include traffic-related policies (DfT), energy generation and climate change mitigation policies (DECC), indoor air quality, heating and ventilation standards (DCLG), and regulation of emissions from industry (Environment Agency). Local authorities have a responsibility to ensure compliance with certain EU limit values under the Local Air Quality Management regime. A number of options to improve air quality and mitigate climate change are available, including low emission strategies, active travel policies, intelligent traffic control, and approaches to local planning which reduce the need for motorised travel and improve the design of green spaces.

5.3 The new public health arrangements for England provide an opportunity to join up national-level research and advice on air pollution and climate change from CRCE with local-level influencing and action from other parts of PHE working with local public health professionals. The Board is asked to consider the role that the different parts and functions of PHE can play in encouraging actions to reduce the health effects of air pollution at local, national and international levels, particularly those which have co-benefits for other public health priorities.