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The economics of air pollution from fossil fuels

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Environmental quality, and notably the global climate, suffer from the "tragedy of the commons" – what is owned by everyone is looked after by no-one and the free market will fail to deliver the right environmental outcomes - there is a market failure. Clean air and greenhouse gases (GHGs) are public goods, in that if they are provided for one, they are available for all, and will be undersupplied by the free market. If we are to assess these claims and their implications for good energy and environmental policy, we need to probe more deeply in what economics has to say about markets, market failure and public goods, and the remedies that have been proposed.

Air pollution and GHGs are primarily caused by burning fossil fuels, although agriculture is responsible for a significant share of the total GHG emissions, primarily from other GHGs than CO_2. UK emissions of all major air pollutants declined substantially after 1990, with the exception of ammonia, one-third of which comes from agriculture.

The paper sets out conditions under which markets work well at allocating resources efficiently, why markets can fail to deliver efficiency, and what remedies are available for their improvement. There is no guarantee that markets will deliver outcomes that are considered fair, but in a well-ordered state, issues of equity and fairness are best left to the budget and can be ignored when designing energy and environmental policy. While this may seem utopian, it remains a useful guide to policy design, departures from which need careful justification.

The paper considers particular examples, starting with the problem of air pollution, the *Clean Air Act*, 1956, and subsequent attempts to quantify the impact and costs of road traffic pollution. The last part considers policies to mitigate damaging climate change, and the role and limitations of the EU Emissions Trading System in internalizing the external damage of greenhouse gas emissions.

The *Clean Air Act*, 1956 was primarily about smoke from burning coal, much alleviated by the rapid penetration of gas-fired central heating and reductions in particulate emissions from power stations (again, partly as a result of the "dash for gas")

but also driven by subsequent tighter emissions legislation such as the Large Plant Combustion Directive. Now that smog from domestic coal fires has largely ceased to be a problem, attention has turned to the health impacts of road traffic. The Royal College of Physicians (2016) estimated that air pollution is killing 40,000 a year in the UK, and the media have argued that this is because of the “dash for diesel”.

The cost of diesel emissions can be derived from the number of Quality Adjusted Life Years (QALYs) lost as a result of their emissions. COMEAP (2015) estimates the impact as 340,000 Life-years lost as a result of the 7 month shortening of life expectancy from air pollution (not quality adjusted, which might reduce it as the impact will largely be on those who are already suffering from a decreased quality of life through poor cardiovascular health). The UK’s National Institute for Health and Care Excellence considers expenditures of £20-30,000/QALY justified in a cash-strapped National Health Service, a figure that has not increased for many years. Transport estimates suggest a somewhat higher QALY of £40,000.

At £40,000/life year, the cost of all UK PM2.5 pollution would be £13.6 billion/yr, but transport might be responsible for 115,000 life years lost or £4.5 billion/yr. If 75% is attributable to the 30 bn litres/yr diesel used, the cost would be 15p/litre, whereas the excise tax on diesel in 2017 was 60p/litre. Part of that is for other pollutants, and a considerable part should be considered as a road user charge but a higher tax on diesel than petrol seems warranted.

The remainder of the paper discusses the choice of policy to address emissions, and whether to use taxes or charges, quotas, or to set standards. The choice depends on the source and type of emissions, and whether local, global, transient or persistent. Charging for CO_2 via the Emissions Trading System is taken as an example, while there is evidence that setting efficiency standards can accelerate cost reductions for some technologies.

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