

Science for Environment Policy

Wood burning in London undermines low traffic emissions' gains

Particulate matter (PM) emissions from domestic wood burning in London are higher than the PM reductions achieved through London's Low Emission Zone, finds a new study. The research suggests that increases in wood burning could risk undermining policies aimed at meeting EU PM₁₀ targets.

Through the Renewable Energy Directive¹ the EU has committed to generating 20% of its total energy from renewable sources by 2020. To achieve this, mandatory national targets have been set for Member States. In the UK an initiative was launched in 2011, providing financial rewards to encourage the use of renewable fuels for heating, including wood. Wood burning, although used throughout the world for heating and cooking, is a source of [air pollution](#), particularly PM, which is known to be damaging to health.

To improve air quality and reduce the adverse effects on human health, the EU has developed legislation for a series of Air Quality Standards². These set limits to average hourly, daily or annual concentrations of different pollutants, depending on their known health effects. For PM₁₀ (PM below 10 micrometres in size), the hourly limit is 50 micrograms per cubic metre ($\mu\text{g m}^3$), with a yearly limit of 40 $\mu\text{g m}^3$.

The researchers in this study assessed PM₁₀ levels caused by wood burning across a 38 km stretch of London, UK, using two methods. The first measured wood smoke pollution in the air every day for six weeks in the winter of 2010. The second was based on absorbance of light used to measure wood smoke pollution sampled over a three year period, between 2009 and 2011.

The sources of PM₁₀ pollution due to wood burning were mostly within London itself. Average annual concentrations from this source were 1.1 $\mu\text{g m}^3$, and wood burning was responsible for 5% of total PM₁₀ pollution. Levels of PM₁₀ varied seasonally, with total wood burning contributions of 10% in January and 2% in August. In winter, PM₁₀ pollution caused by wood burning ranged from 1.8 to 2.0 $\mu\text{g m}^3$, which was 8 to 10% of total PM₁₀.

The authors also noted that wood burning levels appeared slightly higher in suburban London compared to central areas. Levels were also higher at weekends than on weekdays. This suggests that wood burning is being used as a secondary domestic heating, rather than the main source. The researchers suggest that, as a secondary heating source, the public are unlikely to invest in specifically designed stoves, and probably burn wood in existing fireplaces originally designed for coal. Wood burning, unless in a specifically designed and authorised boiler or stove, was prohibited in much of Greater London by the 1956 Clean Air Act; this study suggests this legislation is not effective.

The researchers also showed that the amount of PM₁₀ pollution emitted by wood burning (1.1 $\mu\text{g m}^3$) was in fact greater than the reductions achieved through the first two phases of London's Low Emission Zone programme, implemented in February 2008 and July 2008 respectively. This programme had led to estimated reductions of 0.17 $\mu\text{g m}^3$. Although this study focused on a single city, similar effects may well occur in other urban areas in western Europe, highlighting the risk that increased wood burning can undermine other policies aimed at reducing PM₁₀ levels in line with EU Air Quality Standards.



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