Stop-start driving in city centres creates higher pollution levels

December 12 2014

Traditional methods of modelling traffic pollution could be under-estimating emissions by as much as 60%, particularly in areas where congestion occurs for a large part of the day, a team at Newcastle University has concluded.

Previously, traffic emissions models have only looked at the average speed of traffic as a whole and assumed traffic was travelling at the same speed at the same time, ignoring the stop-start related vehicle emissions often associated with congestion.

Now, the team have devised an improved way to model traffic pollution – which is helping local authorities gain a better understanding of whether schemes to alleviate city centre congestion will improve air quality.

The new technique, called PITHEM (Platform for Integrated Traffic, Health and Environmental Modelling), looks at congestion emissions based on individual vehicle type, its speed and acceleration and, crucially, takes into account meteorology and local terrain, such as hills and nearby buildings – both of which can constrain the dispersal of pollution in an urban environment.

Anil Namdeo, Senior Lecturer in Transport and Sustainability at Newcastle University, said:
"Whereas previous models looked at 'steady state' traffic conditions, in reality, during peak hours congestion vehicles often decelerate and accelerate and move at different speeds, especially when the road goes up or down hills.

"Our new model has shown that by looking at congestion emissions rather than average speed emissions, we can gather more accurate information about emissions and air quality. This could help traffic planners understand the impact of a proposed scheme before the money is committed.

"By gaining a better understanding of how road networks are influencing emissions, councils can make more effective decisions about how to deal with congestion in our city centres and help reduce the 50,000 premature deaths in the UK each year that are associated with traffic emissions."

Working with Durham County Council the team used this new method to assess potential traffic scenarios in Durham City Centre, including the proposed schemes to introduce signals at Gilesgate and Leazes Bowl roundabouts to improve traffic flow and increase the reliability of public transport.

The findings, which have been published in the International Journal of Environment and Pollution, showed that these schemes produced a slight reduction in overall emissions of nitrogen dioxide (NO2). The research concluded the proposed schemes in isolation would not significantly improve air quality, due to the critical location of where congestion was occurring. Instead, the research team helped the council to confirm that additional measures would need to be considered to reduce the volume of traffic in the city centre.

Dave Wafer, Durham County Council's Strategic Traffic manager, said: "This has been an excellent example of academics and practitioners working together to help deliver both short term solutions and better plan longer term interventions.

"We believe this work helps reaffirm our commitment to promoting more sustainable modes of transport, in combination with infrastructure projects, to take traffic away from the city centre.

"Alongside these major changes, the research also confirms that our planned traffic management to make journeys easier for motorists will have the added benefit of a slight increase in air quality."

The improved modelling platform is now being used by Newcastle, Gateshead, and Leeds local authorities in testing the effectiveness of some of their traffic management schemes.

More information: "A congestion sensitive approach to modelling road networks for air quality management" by James O'Brien; Anil Namdeo; Margaret Bell; Paul Goodman was published in the *International Journal of Environment and Pollution*, 2014 Vol.54, No.2/3/4, pp.213 – 221 www.inderscience.com/info/inar … icle.php?artid=65122

Provided by Newcastle University