

# Green light signalled for air quality improvement

Traffic signals in urban areas may soon be synchronised in the interests of improving air quality.

Motorists could soon be forced to wait for longer at certain traffic signals in order for their vehicles to consume less fuel and generate fewer emissions.

But the approach should not lead to delays: once permitted to proceed it is hoped that a motorist will pass through a series of signals set to green and arrive no later at their destination than expected.

Trials are set to begin shortly in two urban locations in England under the watch of consultant Hydrock, and the energy consultant Aardvark EM will monitor the environmental impacts of the proposal.

Meanwhile, psychologists from Exeter University will use a driving simulator to study the behavioural impact on those behind the wheel of being held for longer at traffic signals.

Allowing groups of vehicles on popular routes to pass through a series of traffic signals set to green is not in itself a new idea; many local authorities already use 'greenwave' technology to reduce journey times and cut congestion.

But using greenwaves to improve air quality is said to be an innovative concept and one which could have huge potential across many towns and cities, says the consultant's air quality engineer Blaise Kelly.

He also points out that optimising traffic flow to reduce emissions was



*"Software can be used to properly consider acceleration and braking."*  
Blaise Kelly



*"Motorists will need to be urged not to race away when they see green."*  
James McKechnie

↓ Microsimulation software was used to test the greenwave theory



↑ Traffic lights could be held for longer on green to reduce emissions

one of the recommendations of the Government's recent Air Quality Plan.

"What we are saying is let's set up a traffic signal network with the principal aims of reducing emissions and improving fuel consumption. We think the best way to do this is to use greenwaves," he says.

"Many traffic networks in major cities are set using average speed models, based on the assumption that cutting journey times will lead to fewer emissions. These models represent traffic movement in an overly simplistic way and largely ignore important phases such as acceleration and braking," he adds. "If software is used which can properly consider these phases, a completely different set of results is achieved."

Microsimulation software PTV Vissim was used to test the greenwave theory and compare the fuel consumption and journey times of vehicles in two scenarios along a 2.8km stretch of road with seven sets of signals spaced at 400m apart.

In the first test, cars were held at each set of lights for five seconds and accelerated steadily to an average speed of 40MPH in between signals. Vehicles completed the journey in just under five minutes.

But in a second test, cars were held at the first signal for two and a half minutes before being allowed to pass through the next six sets of lights on

green at a steady speed. The overall journey time was similar, but crucially emissions were found to reduce by up to a third and fuel consumption was down by up to three quarters.

The challenge now is to scale up the simulation to see what impact changing signal timings and introducing greenwaves could have on air quality across a large and complicated network.

Hydrock's transportation director James McKechnie FCIHT says that the greenwave principle would only need to be set in motion when sensors placed at the roadside – or other indicators such as traffic volume – show that air quality is starting to deteriorate.

He adds that new signs may be needed to inform drivers why they might be held for longer at a red light and to reassure them that their journeys should not end up being slower.

One idea may be to introduce countdown timers at traffic signals to tell drivers when the lights will turn. "But we have to be careful," he says.

"A motorist who sees a 5,4,3,2,1 might suddenly think they are at Brands Hatch and race away when they see green, which would defeat the purpose of holding them at red in the first place. There will clearly be a need to encourage learning and behavioural change." **MW**

