

The EV way to clean up our cities

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Electric vehicles could play a key role in driving down pollution in our cities after it was revealed daily levels of atmospheric Nitrogen Dioxide regularly exceed the recommended safety limits.

Now experts leading a major three-year trial into the impact of electric vehicles and the role they could play in our transport systems of the future, have shown that rolling them out across our city's roads would protect both our health and the environment.

Outdoor air pollution causes approximately 1.3 million deaths every year worldwide. In 2011, the House of Commons Environmental Audit Committee Report highlighted that [poor air quality](#) reduces life expectancy in the UK by around eight months and that up to 50,000 [premature deaths](#) in the UK every year are attributable to air pollution.

Data gathered and analysed by transport experts at Newcastle University

shows that daytime [air pollution levels](#) in our towns and cities regularly exceed the Government's recommended $40\mu\text{g m}^{-3}$ (21 parts per billion) for prolonged periods - putting people's health at risk.

Now the SwitchEV study – the first of its kind in the UK - has shown that not only could electric vehicles reduce transport-related pollution in our cities, they also produce less CO₂ per km than a [combustion engine](#), even when the pollution associated with [electricity generation](#) at power stations is taken into account.

Funded by the UK's innovation agency, the Technology Strategy Board, the three-year investigation is part of a major £10.7million trial investigating the impact that electric vehicles could have on the environment, our transport systems and driver behaviour.

Using in-vehicle loggers, details such as distance travelled, route, driving behaviour and re-charging times have been recorded and analysed for over 71,600 electric vehicle journeys and 19,900 re-charging events.

The team found that for all the electric vehicles in the study, their carbon efficiency was better than an equivalent internal combustion (IC) engine vehicle. An average new build IC produces around 140g CO₂/kg (not counting CO₂ produced during fuel production / transport, which adds around 15% to the total emissions), while the average carbon output for the EV's used in the trial was 85g CO₂/kg (based on a UK electricity grid mix).

Charging during off-peak times - when less carbon intensive and renewable energy sources are being used to power the grid – together with more efficient driver behaviour would reduce this carbon output even further.

And because electric vehicles produce zero exhaust gases, introducing

more of them to our cities' roads would drive down pollution in the most congested – and often highly populated – areas, such as city centres and around schools.

Presenting their findings today, the team led by Future Transport Systems and Newcastle University together with Nissan, Avid Vehicles, Simon Bailes Peugeot, Smith Electric Vehicles and Liberty Electric Cars, say the study has proved that electric vehicles are set to play a key role in our transport systems of the future.

Phil Blythe, Professor of Intelligent Transport Systems at Newcastle University, said: "This has been a huge undertaking over the past three years, involving almost 200 volunteer drivers from across the North East to help us build up the first true picture of what a low carbon transport system might look like in the future.

"And what we've demonstrated is that EVs are a viable alternative to combustion engine vehicles for many drivers and would help us tackle rising pollution levels. Local authorities should look at policies that will encourage electric vehicle adoption to reduce traffic related pollution in their urban areas."

Ian Shepherd, Nissan ACVE (Assistant Chief Vehicle Engineer) for the SwitchEV project highlighted the value of the project to the consortium partners.

"For Nissan it was extremely valuable to have the Nissan LEAF in the hands of real-life EV drivers within this project. Together with data that can be collected from the Nissan LEAF through Nissan's Carwings telematics service, feedback from drivers in this type of trial has directly influenced the development of the new Nissan LEAF that is now being built in Sunderland, and has enabled the car to be refined for the European market."

Since its launch in November 2010, the SwitchEV project has involved almost 200 drivers from across the region making over 71,600 trips. The 44 EVs involved in the trial have travelled a total of 403,000 miles – equivalent to driving around the world 16 times – have been charged 19,900 times and have saved 76,000 kg CO₂ being released into the atmosphere.

There are now more electric vehicles per head of population in the North East than anywhere else in the country and the region has the UK's most extensive charging network with over 500 public charging points.

The key findings of the project were:

- In the UK, 93 per cent of all car journeys we make are under 25 miles and well within the battery range for current EVs
- The charging infrastructure in place across the North East makes EVs a viable option as a standard mode of transport
- The carbon efficiency of [electric vehicles](#) is better than an equivalent combustion engine car
- The longest journey made in an EV during the trial was 132km

One of the businesses involved in the project, both in terms of trialling the cars and the installation of the charging infrastructure, is intu Properties PLC who manage Eldon Square and the Metrocentre.

Dr Yvonne Huebner, from Newcastle University, explains: "The aim was to change people's misconceptions of EVs. "Before the trial, most of our drivers over-estimated the distance they travelled each journey.

"But we've shown that 93 per cent of all car journeys are less than 25 miles. This means that an EV would easily fit into our current lifestyles without any changes to our normal driving habits. For longer journeys then we might have to use a second car, or use alternative modes of

transport.

"In the North East we have also introduced 12 "quick charge" points which will charge the battery from 0-80 per cent in 20 minutes. These were used by our volunteers to make the journey from Newcastle to Edinburgh and back."

Pollution levels in Newcastle were analysed using data from the air pollution monitoring station outside Newcastle Civic Centre.

More information: Bell, M. et al. A novel approach for investigating the trends in nitrogen dioxide levels in UK cities, *Environmental Pollution* (2013). [dx.doi.org/10.1016/j.envpol.2013.03.039](https://doi.org/10.1016/j.envpol.2013.03.039)

Provided by Newcastle University

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