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Should electric vehicles be a priority for cities?

With the transport sector being the largest and fastest growing source of urban CO₂ emissions, cities across the world are looking into methods to reduce this pollution and provide more sustainable mobility.

Nick Michell explains how Bogotá and London are incorporating electric taxis and minicabs into their fleets and asks whether the move to electric cars will be embraced by citizens



Photo: BYD

The BYD e6 is being trialled by Bogotá taxi drivers

The Intergovernmental Panel on Climate Change (IPCC) predicts that the severe adverse impacts of climate change can only be avoided by a reduction of CO₂ gases in the range of 50-60 percent by 2050 compared to 1990 levels. However, by 2030 CO₂ emissions from the transport sector are projected to rise by 60 percent. Demand for oil is set to rise from 84.7 million barrels per day (bpd) in 2008 to 105 million bpd in 2030 and the transport sector is predicted to account for 97 percent of this increase with the global number of road vehicles predicted to double to 2 billion by 2020.

Cities are therefore looking keenly at how introducing more energy efficient vehicles and cleaner fuels can play a role in reducing the negative effects of climate change. London and Bogotá, two members of the C40 Electric Vehicle Network, an initiative where 15 of the world's largest cities have come together to commit to becoming more electric vehicle-friendly, have recently announced pilot projects to integrate electric vehicles into their minicab and taxi fleets.

“With C40 cities, a significant amount of CO₂ emissions comes from transport and it is an area where mayors often have a lot of power,” says Terri Wills, Director of Global Programs, C40, in partnership with the Clinton Climate Initiative. “Within the scope of transport, electric vehicles were identified as an area of opportunity by a number of cities, so in 2009 we launched the C40 Electric Vehicle Network. The network has shared practices among those cities involved, and in cities where we have people on the ground, we’ve provided direct support in areas of priorities expressed by those cities.”

In London, eco-oriented minicab firm Climatecars has introduced two Renault Fluence Z.E. electric vehicles to its fleet, in a pilot programme, that if successful, could play a role in London achieving its aims of reducing its CO₂ output by 60 percent before 2025. While the firm has previously offered low-carbon or hybrid vehicles, the Fluence’s introduction signals the first time that London has seen fully electric minicabs.

The minicabs will be based at Climatecars’ headquarters in Central

London, using the electricity charging stations championed by Mayor Boris Johnson, though Climatecars is also planning to install its own charging stations aided by a 50 percent funding subsidy from The Office for Low Emission Vehicles (OLEV).

vehicles on the road. We should not only be thinking in terms of carbon but air quality and noise as well.”

The Renault Fluence Z.E., which is now available for private purchase, ranges between €20,900 (US\$27,300) and €26,900 in price, depending on local



Gregory Barker, UK Minister of State for Climate Change with Nicko Williamson, Managing Director, Climatecars

The plan is to use the vehicles, for which Climatecars received a £5,000 (US\$8,000) purchase subsidy from the Greater London Authority, for shorter journeys, which are in close proximity to charge points.

sales tax rates and available tax incentive packages, although this excludes the battery, which customers will have to subscribe to on a monthly lease starting from €82 to cover the battery at a level of 10,000km/year for 36 months.

“With C40 cities, a significant amount of CO₂ emissions comes from transport and it is an area where mayors often have a lot of power”

Terri Wills, Director of Global Programs, C40, in partnership with the Clinton Climate Initiative

“The percentage of our fleet that are electric vehicles will be dependent on the outcome of our trial of the Renault Fluence,” says Nicko Williamson, founder and Managing Director of Climatecars. “Electric vehicles are essential to reducing London’s carbon footprint, as with zero tailpipe emissions they are the cleanest

“Providing that private hire operators can integrate them into their fleets the Fluence Z.E. can have a significant effect on reducing London’s carbon footprint,” says Andy Heiron, Head of Renault’s Electric Vehicles (EVs) Programme. “Well-to-wheels emissions for current Prius hybrids are 105g/km CO₂. By comparison the NEDC (New European Driving Cycle) ▶

combined figure of 185 kilometres in range for the Fluence Z.E. equates to 70g/km CO₂, representing a reduction of a third in emissions on a well-to-wheel calculation, with the added advantage of no particulates and therefore better air quality.”

As Heiron says, the question is whether private operators can integrate them into their fleets and in fact, the real issue is whether such vehicles are viable for such fleets. Taxi or minicab companies considering using electric vehicles are going to want reassurances on the battery life and driving range,

these charging points are the standard points which take anything from three to seven hours to fully charge a vehicle. Considering the dynamic nature of a busy minicab circuit, spending this amount of time inactive is not realistic or cost effective. At present there are no rapid charging points, which are able to fully charge a vehicle in under 30 minutes.

While range anxiety incorporates the additional pressure of time for a taxi driver given the need for charges during work hours, if this can be overcome with the right charging infrastructure then

experts, Bogotá has forged partnerships with several industry players in support of the pilot project. Electric vehicle suppliers BYD and Mitsubishi have expressed their commitment to provide e6 and i-MiEV electric cars, respectively. Their local distribution representatives, Praco-Didacol and Motorysa, have also expressed support for the pilot project, helping to secure the confidence of the participating taxicab companies which will be purchasing the new electric vehicles.

“The total number of cars in Bogotá is around 1.5 million and taxi cabs account for 3 percent of this,” says Manuel Olivera, Bogotá City Director, C40 Cities-Clinton Climate Initiative. “Private cars are the main sources of CO₂ emissions in the transport sector but importantly taxi cab CO₂ emissions per passenger are the highest in the city, at around 3,400 gCO₂/pax.”

The City of Bogotá has enacted Decree No. 677 to support the project removing circulation restrictions and permit requirements for electric vehicle taxis. The National Government through the Ministers of Environment, Transportation and Finance also approved a zero duty import tax allowance for 50 electric taxicabs, compared to the usual 35 percent and recently enacted the possibility to exclude these vehicles from 16% VAT.

The pilot project aims to determine precise figures in relation to energy use, maintenance costs, battery endurance, as well as other factors. Initial figures indicate that maintenance costs are 50 percent below the normal taxicabs running in the city, while equivalent energy consumption is less than 30 percent of the cost of a petrol vehicle.

“For a US\$50,000 cab, the payback period is estimated to be between 3 and 5 years based on lower maintenance and operation (energy) costs, although the full financial figures will be evaluated during the pilot,” says Olivera. “One full, 2-3 hours charge overnight will cost about US\$10. The estimated daily maintenance savings compared to a petrol cab are about US\$3, and savings in just petrol are estimated at around US\$25 a day. Even in a worst-case scenario we should see daily costs savings of US\$28.”

In London, Mayor Boris Johnson has set ambitious targets for the roll out of 100,000 electric vehicles in the city as soon as possible through commercial fleets as well as through private citizens using their own electric cars

which of course relate directly to the availability of fast charging points, especially considering the high costs of the vehicles and replacement batteries.

“Our trials indicated that running a fleet of electric vehicles is operationally impractical at the present time due to lack of fast charging points,” says Lee Wickens, corporate social responsibility and environmental manager for Addison Lee, London’s biggest minicab company. “Current EV’s have a range of around 100 miles [160 kilometres]. This compares to over 500 miles in range from a fully fuelled Ford Galaxy. The level of mileage our drivers travel each day means that they would need access to an EV charging point up to twice a day.”

As Wickens admits, as long as you can plan journeys with these charge points accounted for, in theory electric minicabs could be used. “In practice we have found this not to be the case due to the amount of wasted time spent travelling to, and charging at the charging points,” says Wickens.

There are currently around 400 electric vehicle charging points in London and in terms of running a minicab fleet, the challenge is the majority of

such vehicles can afford savings in terms of emissions and cash. Mayor Johnson launched Source London in May 2011, which aims to create 1,300 charge points by 2013 though it is not clear how many will be rapid charging points.

“I think there is a case to be made for electric vehicles as fleet vehicles, such as taxis,” says Philippe Crist, economist for the International Transport Forum at the OECD. “The advantages for high travel vehicles are that costs are going to be lower per kilometre, you get an image boost if your clientele is sensitive to that, and of course if your energy source is clean, then emissions will be very low, though certainly not zero.”

Bogotá trials electric taxis

London is not the only member of the C40 Electric Vehicle Network to announce a pilot project involving electric vehicles, with Bogotá, Colombia, launching an innovative programme to introduce 50 electric taxis into the city fleet.

Through its participation in the C40 Electric Vehicle Network, and by working with C40 and Clinton Climate Initiative technical and market development

Switching consumers to electric

In London, it is not just private taxi companies, like Climatecars, that are forging ahead with electric vehicles. Mayor Boris Johnson has set ambitious targets for the roll out of 100,000 electric vehicles in the city as soon as possible through commercial fleets, as well as through private citizens using their own electric cars. The vast majority of London's emissions from transport come from private vehicles and road freight with 72 percent of emissions from such vehicles compared to just 5 percent from taxis and

how their vehicles are performing, the challenges they face and how they can work together. We have been very excited about this group, with there now being 20 members and it is growing.”

At 2,400 vehicles, London has less than 0.08 percent of its fleet on electric wheels. Even with Mayor Johnson's target of increasing this to 100,000 vehicles, this would only make up a tiny proportion of the total London fleet of 3 million.

For Philippe Crist, the future of the electric vehicle should lie away from

Autolib' in Paris is a shared hire scheme which reflects the features Crist describes (see box). On 5 December 2011, Autolib' was introduced in Paris and 45 surrounding towns as the only 100 percent electric car sharing network, generating zero emissions, zero smell and zero engine noise. Autolib' is a 'point to point' public rental service with no obligation to return the vehicle to the point of departure. At launch, 250 stations were operational and 250 cars available to rent. The vehicle fleet is being expanded by around 300 cars a



There are 400 Autolib' stations in Paris serving over 1,000 citizens per day

minicabs. Cash incentives of up to £5,000 are being offered to get companies and private citizens to go electric.

“London has a group called the Electric20, where we at the C40 Clinton Climate Initiative have been working with Transport for London to scale up the number of companies that have joined this group,” says Terri Wills. “These are companies that are essentially piloting electric vehicles in their commercial fleets and we are bringing them together as a group to share information about how they are doing,

replacing like-for-like vehicles and should move towards creating a new type of city vehicle that makes sense for that technology; one that gets a lot of use, is a lighter, smaller, more agile vehicle, one that really benefits from the advantages of electric mobility, without having the disadvantages, including the cost and the range limitations. “With a smaller vehicle in a shared hire scheme, expectations of range are lowered and due to the high usage, cost effectiveness is increased, while still lowering emissions,” says Crist.

month, until December 2012 where it is expected to extend to 1,100 stations, with nearly 6,600 recharging points for around 3,000 cars available to rent.

“We expect 3,000 autolib's to replace more than 20,000 private cars and to lead occasional car users to opt out of car ownership altogether,” says Dominic Steffan from City Hall in Paris. “According to official figures, owning a car costs about €5,000 a year including buying the car, petrol, insurance, and the cost of parking. So our strategy consists of offering a cheaper alternative, ▶

“With the current price structure, a subsidy for an electric vehicle is basically a subsidy for upper income households to purchase a car”

*Philippe Crist, economist,
OECD International Transport Forum*

without the cons of owning a car, and with an environmental benefit for all.”

Crist believes the strategy of incentivising car owners to buy electric rather than share electric through taxis or public car pools may be missing its target.

“With the current price structure, a subsidy for an electric vehicle is basically a subsidy for upper income households to purchase a car,” says Crist.

“So in a sense, some cities want to push these, but what you are in fact doing is providing help to those households that are most able to afford it.”

Car manufacturers may say electric is the future but with a poor uptake on recent models, firms like Ford are now spending more money and promotion on showing how petrol engines can be much more efficient.



Autolib' is forecast to reduce the number of cars in Paris by 22,500

Autolib': fast facts

- Autolib' is a public service for 47 municipalities operated by Bolloré under a 12 year agreement
- The city pays €50,000 (US\$65,000) per station but the infrastructure for charging can be used by all electric vehicles not just rental cars. The operating costs for the whole network are expected to reach €80 million a year. This is recouped through payments by Bolloré for use of the public space over the 12 year concession.
- The cost for the users depends on their subscription. If they are subscribing for a year (Premium = €144/year so €12/month), they will pay a lower rental rate of €5 per half hour. If they subscribe for a day (€10/day) or a week (€15/week), rental charges are €7 per half hour.
- Current user figures for 1,000 cars at 400 stations are: 1,100 people per day on weekends and 1,600 people on weekdays
- 113 tonnes of CO₂ emissions have been saved from December 2011 to March 2012.

Source: Autolib' and Paris City Hall

“The point is that you can see high efficiency, low emission, regular or traditional combustion engine vehicles that come pretty close to electric vehicles, that certainly reduce emissions considerably but are also more cost effective for the consumer and also from a societal point of view,” says Crist.

Some of the pressure to develop electric vehicles may be economic rather than social or environmental. “How much as a city or national government do you choose to subsidise that because you have commercial concerns because you want to develop the market, both internally for the long term and for export?” asks Crist.

Investing in electric vehicles for public transport, combined with pedestrianisation as part of a strategy to reduce the number of vehicles altogether, may be a better bet for cities.

Says Crist: “When you look into the subsidies that many authorities are extending to the purchase of electric vehicles, they are essentially paying to reduce the cost for the consumer, which possibly could be better used by investing in schools, hospitals, public transport or even research into lower emission vehicles.” ■