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Peak Car in the Big City: Reducing London's transport greenhouse gas emissions

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ABSTRACT

Road transport is substantially dependent on oil. Car ownership is expected to continue to grow, particularly in the developing economies. The transport sector is therefore seen as more problematic than other sectors as regards reducing greenhouse gas emissions. However, there is emerging evidence that per capita car use in many developed economies has ceased to increase. Moreover, a marked decline in the proportion of journeys by car is evident in a city such as London, with a growing population where road capacity is not being enlarged to meet demand. The expected global growth of urban populations suggests that car ownership and use, and the resulting greenhouse gas emissions, may be significantly lower than usually supposed.

1. Introduction

Transport accounts for over 60 percent of global oil consumption and about a quarter of energy-related CO_2 emissions (IEA, 2013; Kahn Ribeiro et al., 2007). Typical forecasts of future world transport energy use project growth rates of around 2 percent per year. Vehicle ownership is expected to continue to grow, particularly in the developing economies where passenger transport volumes measured in vehicle-km could be 4–5 times higher in 2050 (OECD, 2013a). The transport sector, with its reliance on oil for motive power, has been seen as more problematic than other areas of the economy as regards reducing greenhouse gas emissions. Most emphasis has been on new technology, in particular electric propulsion, where the present state of battery technology limits widespread adoption (Sperling and Gordon, 2009; Inderwildi and King, 2012; Burns, 2013) Demand-side measures are expected to have only modest impact (Fankhauser, 2013; Marsden et al., 2014).

There is, however, emerging evidence that the growth of car travel may be less than hitherto supposed on account of global urbanisation at population densities that limit car use. The argument developed in this paper is based largely on analysis of UK travel and transport statistics, which are exceptionally extensive, and in particular of developments in London, a case study to exemplify changes in travel patterns as a consequence of population growth at increasing density. Evidence is presented for a marked shift away from car use in London, as a result of policies that respond to population growth by investing in public transport, especially rail, and by measures that constrain car use. This shift away from car use should help achieve a significant mitigation of transport greenhouse gas emissions.

The trends identified seem to apply generally to developed economies, to the extent that data are available. The policy responses are likely to be relevant to cities in both developed and developing countries. The thesis of this paper has been outlined briefly elsewhere (Metz, 2014).

2. Cessation of growth of travel

There is evidence that the average annual distance travelled by car has ceased to grow in most of the developed economies, starting well before the recession, and may be declining in some cases—a phenomenon known as 'Peak Car' (Puentes and Tomer, 2008; Lucas and Jones, 2009; Metz, 2010; Millard-Ball and Schipper, 2011; Le Vine and Jones, 2012; Kuhnimhof et al., 2012; Goodwin and Van Dender, 2013; OECD, 2013b). A number of explanations have been proposed for this phenomenon, which are not mutually exclusive and which include: decline in younger people holding driving licences (Kuhnimhof et al., 2012; Delbosc and Currie, 2013); car

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taxation changes (Le Vine and Jones, 2012); travel demand saturation (Metz, 2010); a shift away from car use in urban areas, and technological factors constraining faster travel (Metz, 2013).

The annual National Travel Survey has tracked the key trends in England over a 40-year period for personal travel by all modes of transport (other than international aviation) (NTS, 2014). The average trip rate has remained broadly unchanged at about 1000 journeys per person per year, while average travel time has stayed at about 370 h a year or about an hour a day, a general finding for populations (Schafer and Victor, 2000). What has changed over the period is the average distance travelled, which has increased from 4500 miles a year in the early 1970s to reach about 7000 miles by the mid-1990s, the result of investment in more and better cars and roads, and also in railway improvements. These investments allowed people to travel faster and hence further in the unchanged time utilised for travel.

However, the average distance travelled in Britain ceased to grow around 1995, since when it has remained broadly unchanged. Since household incomes continued to grow over most of the period, the historic relationship between travel and income no longer applies (Metz, 2012). 77 percent of current distance travelled is by car (NTS, 2014, Table 0302), hence the cessation of growth of travel is consistent with the cessation of growth of per capita car use noted in the above discussion of the Peak Car phenomenon.

3. Travel in London

The cessation of growth of per capita car use implies that demographic factors are now the main future determinants of travel demand, in particular population growth and the location of additional inhabitants, whether on greenfield sites or urban brownfield (Metz, 2012). Because the road capacity of cities is limited, car use is constrained, despite the growth of both population and incomes.

London, a city with a historic centre and mature suburbs, has no greenfield land for building but has considerable brownfield sites. London has not attempted to increase road capacity in recent years, and indeed has allocated more road space to bus and cycle lanes and pedestrians, with the result that both car traffic and trips have declined somewhat, as shown in Fig. 1 (which refers to the whole metropolitan area, inner and outer suburbs). Because the population has been growing, the share of all journeys that are taken by car has declined, currently 37 percent, down from a peak of 50 percent around 1990, while use of public transport has increased correspondingly, as shown in Fig. 2 (Metz, 2012; Transport for London, TfL, 2013). Consistent with this shift in mode shares, per capita distance travelled by car in London has steadily declined, in 2013 by 39 percent compared with 1996 for car drivers and by 27 percent for car passengers (NTS, 2014, Table 0107).

On the present central case projection, London's population, at present 8.6 m, is expected to grow to 11.3 m by 2050 within existing boundaries (Greater London Authority, GLA, 2013). To cope with this growth, investments have been made in the public transport system and further substantial investments are planned in additional rail capacity, but it is not intended significantly to increase road capacity (Mayor, 2012, 2013a, 2014). On this basis, car use in London is likely to decline to about 27 percent of all trips, as discussed next, which would be less than half the level of car use in Britain as a whole.

An estimate of the share of journeys made by car in London over the century 1950–2050 is shown in Fig. 3. The data for 1993 to the present are as in Fig. 2. Data prior to 1993 are estimated on the assumption that car use in London increased at the same rate as car ownership nationally, which is known from vehicle registrations. The extrapolation to 27 percent share for car use by 2050 is based on the official population projection (GLA, 2013), assuming no additional car trips are made, consistent with Fig. 1. Fig. 3 exemplifies the concept of Peak Car in the Big City. There is evidence from two other UK cities, Birmingham and Manchester, that car use in their centres is declining (Metz, 2013). There is also evidence for declining car use per capita in the main Australian cities since 2003–2004 and a rise in public transport use (Stanley and Barrett, 2010). Comparable data is difficult to locate for large cities in other countries, although anecdotal evidence suggests similar developments may be occurring.

As well as car traffic, road freight also contributes to traffic in London. Based on cordon counts, there has been a decline in medium and heavy goods vehicles entering central London since 1990, while light goods vehicle volumes have remained stable. Goods vehicle traffic entering inner London has been stable over this period, while such traffic crossing the outer boundary has increased by about twenty percent (TfL, 2014, section 3.17).

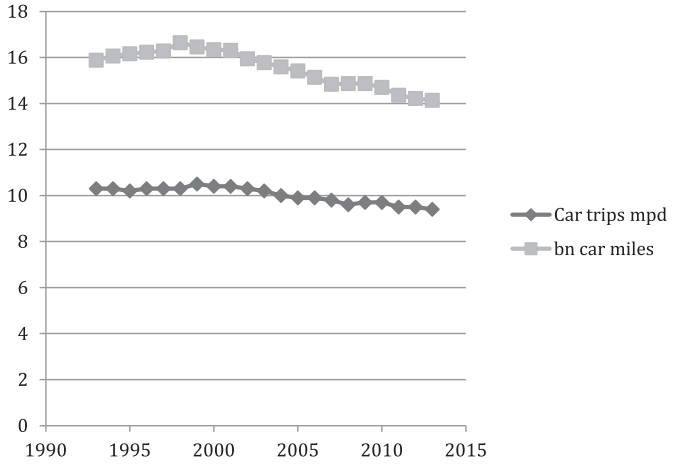

Fig. 1. London car trips (driver and passenger, million per day) and car-miles (billion per year).
Source: Transport for London, Travel in London Report 7 (2014); Department for Transport, Road Traffic Statistics.

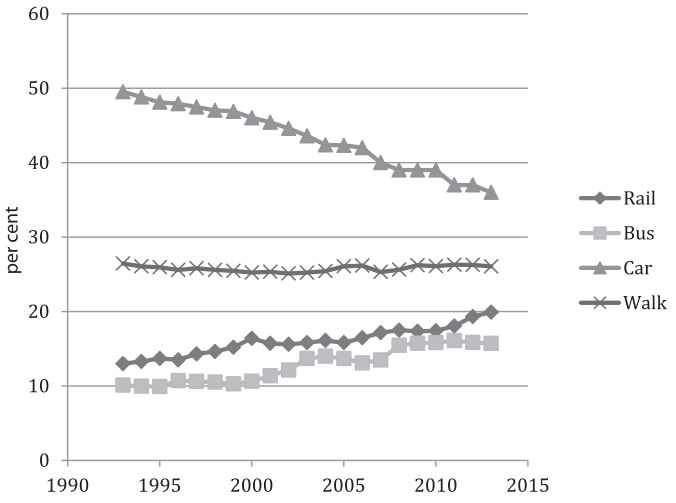

Fig. 2. Travel in London: trip-based mode share.
Source: Transport for London, Travel in London Report 7 (2014).