

LGA policy briefing series on decarbonising transport: Buses and transport decarbonisation

Technical note:

Carbon emissions by vehicle type & occupancy table

Carbon emissions by vehicle type & occupancy (g CO₂ equivalent)

<i>Today</i>	Vehicle emissions per km	Per head given (existing avg vehicle occupancy)	Per head with (achievable increased average vehicle occupancy)
Medium-sized petrol car 2020 (whole life emissions/km)	253	158 (1.6)	127 (2)
2019 fleet average petrol car (fuel consumption only)	174	109 (1.6)	87 (2)
2019 fleet average diesel car (fuel consumption only)	168	105 (1.6)	84 (2)
2019 fleet average diesel bus (fuel consumption only)	1,282	105 (12.2)	53 (24)
Medium-sized electric car in 2020, eg Nissan Leaf (whole life emissions/km, EU average CO ₂ /kWh electricity)	91	57 (1.6)	46 (2)
Dennis Enviro200 battery electric bus, currently in service in London, capacity 65 passengers (power consumption only)	438	36 (12.2)	18 (24)

Notes to table

Cars: Official statistics published by DfT on car fuel consumption (and hence CO₂ emissions) are based on cars being tested under laboratory conditions and have to be uplifted for 'real life' driving conditions. The *UK Government Greenhouse Gas Conversion Factors for Company Reporting 2020* dataset contains more accurate real life CO₂ emissions per kilometre for the fleetwide average petrol and diesel car in Britain, given the age and composition of the overall car fleet.

The *UK Government Greenhouse Gas Conversion Factors for Company Reporting 2020* dataset is at <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020>, and the figures used in the table are at worksheet 'passenger vehicles' cell E53 (average diesel), I53 (average car).

The European Federation for Transport and Environment ('T&E') has also produced an emissions tool or ready reckoner for the 'whole life emissions' of petrol, diesel and battery electric cars, taking

into account the embodied emissions from manufacturing and maintaining them, as well as powering them. The ready reckoner takes into account the carbon intensity of the electric car battery manufacturing process as well as of the electricity generation mix (fossil fuels/nuclear/renewables). The values used in the table assume an EU manufactured battery and an EU average electricity generation mix, which is right for the UK.

The T&E ready reckoner is at <https://www.transportenvironment.org/what-we-do/electric-cars/how-clean-are-electric-cars>. The background information for understanding the tool is in the April 2020 publication *CO2 emissions from cars: the facts* downloadable at: https://www.transportenvironment.org/sites/te/files/publications/2018_04_CO2_emissions_cars_The_facts_report_final_0_0.pdf

Average car vehicle occupancy is taken from DfT NTS0905 *Car occupancy, England*: <https://www.gov.uk/government/statistical-data-sets/nts09-vehicle-mileage-and-occupancy>

Buses: The 2019 UK Government greenhouse gas conversion factors for company reporting: *methodology paper* sets out CO2 emissions per passenger-kilometre for the fleetwide average local bus at Table 24 (page 59).

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/829336/2019_Green-house-gas-reporting-methodology.pdf

This table takes its data on average vehicle occupancy (bus loading factor) from DfT bus statistics table BUS0304 <https://www.gov.uk/government/statistical-data-sets/bus03-passenger-distance-travelled>.

The ‘well to wheel’ carbon dioxide emissions relating to existing battery electric buses currently in service in London is taken from the Low Carbon Vehicle Partnership’s webpage *Ultra Low Emission Bus Certificates*:

<https://www.lowcvp.org.uk/Hubs/leb/ultra-low-emission-bus-certificates.htm>

The bus model used in the table is the Alexander Dennis Enviro200EV single decker, passenger capacity 65. The website quotes per passenger-km emissions figure based on the bus being full to capacity, which is not a reasonable loading factor to assume for a bus over the course of its whole operating day. Therefore the DfT BUS0304 figures have been used.

The “achievable increased average vehicle occupancy” figures for both cars and bus are conjectural figures assuming steps are taken commensurate with declaring a climate emergency. Average car occupancy has stayed at 1.6 over the period 2002-2018, whilst average bus occupancy has increased from 10.1 to 12.2 over the period 2004-2018. Therefore the conjectured achievable increases in occupancy are quite radical.