

Carbon Calculator – Carbon Statistics Methodology

Rail emissions calculations

Note: Data shows that NTL’s passenger km data is distributed 33/67 between EMUs and DMUs, respectively, which was sourced from our customer data.

Rail carbon calculation from departure station to arrival station:

- 1) 22/23 actual passenger km = 2,476,878,843 km.
- 2) 33/67 percentage passenger km split between EMU and DMU, respectively.
- 3) 22/23 actual kWh of electricity or Litres of gas oil factored up to its kgCO₂e*.
- 4) kgCO₂e figure divided by passenger km, giving kgCO₂e/pkm figure.
- 5) Calculator:
 - a. The selected journey uses that journey’s dominant train type’s (EMU or DMU) carbon efficiency factor (kgCO₂e/pkm).
 - b. kgCO₂e/pkm figure multiplied by journey’s km distance, giving projected carbon emissions for that passenger’s Northern train journey.
 - c. Calculator compares this to the road’s carbon calculation output for the same journey (step 3 of ‘Road carbon calculation from departure station to arrival station’).

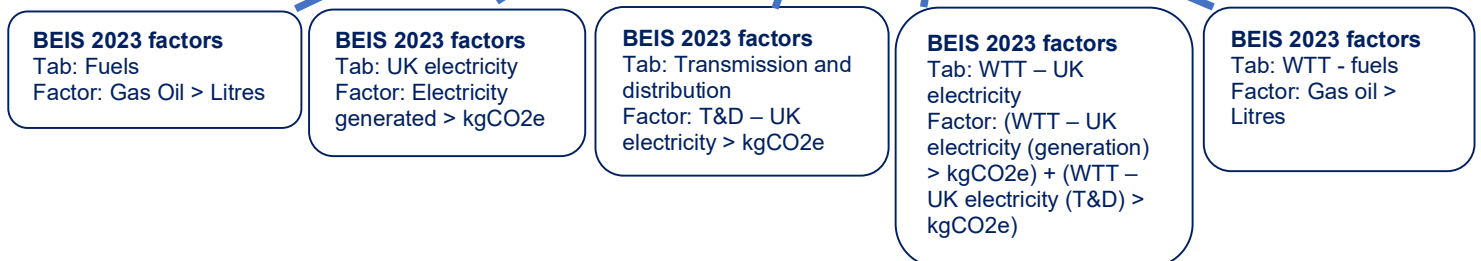
*BEIS 2023 factors CO₂e data displayed in table 2 for these calculations – available from: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023>

Table 1: Data from NTL displaying average gCO₂e/pkm for EMUs and DMUs

TRAIN	pkm distribution	22/23 pkm	22/23 kWh	22/23 Litres	kgCO ₂ e	kgCO ₂ e/pkm
EMU	33%	817,370,018	81,700,569	-	22,456,169	0.0275
DMU	67%	1,659,508,825	-	44,425,478	150,249,587	0.0905

Table 2: Carbon factors used to calculate gCO₂e/pkm figures from kWh or Litres used by EMUs and DMUs

TRAIN	22/23 kWh	22/23 Litres	kgCO ₂ e Scope 1	kgCO ₂ e Scope 2	kgCO ₂ e Scope 3 (T&D)	kgCO ₂ e Scope 3 (WTT)	kgCO ₂ e	kgCO ₂ e/pkm
EMU	81,700,569	-	-	0.207	0.018	0.050	22,456,169	0.0275
DMU	-	44,425,478	2.755	-	-	0.627	150,249,587	0.0905



Road emissions calculations

Road carbon calculation from departure station to arrival station:

- 1) For each car type, kgCO₂e scope factors summed**.
- 2) Divided by average occupancy***, giving kgCO₂e/pkm.
- 3) kgCO₂e/pkm figure multiplied by journey's km distance, giving projected carbon emissions for that passenger's car journey.

**BEIS 2023 factors CO₂e data displayed in table 3 for these calculations – available from:

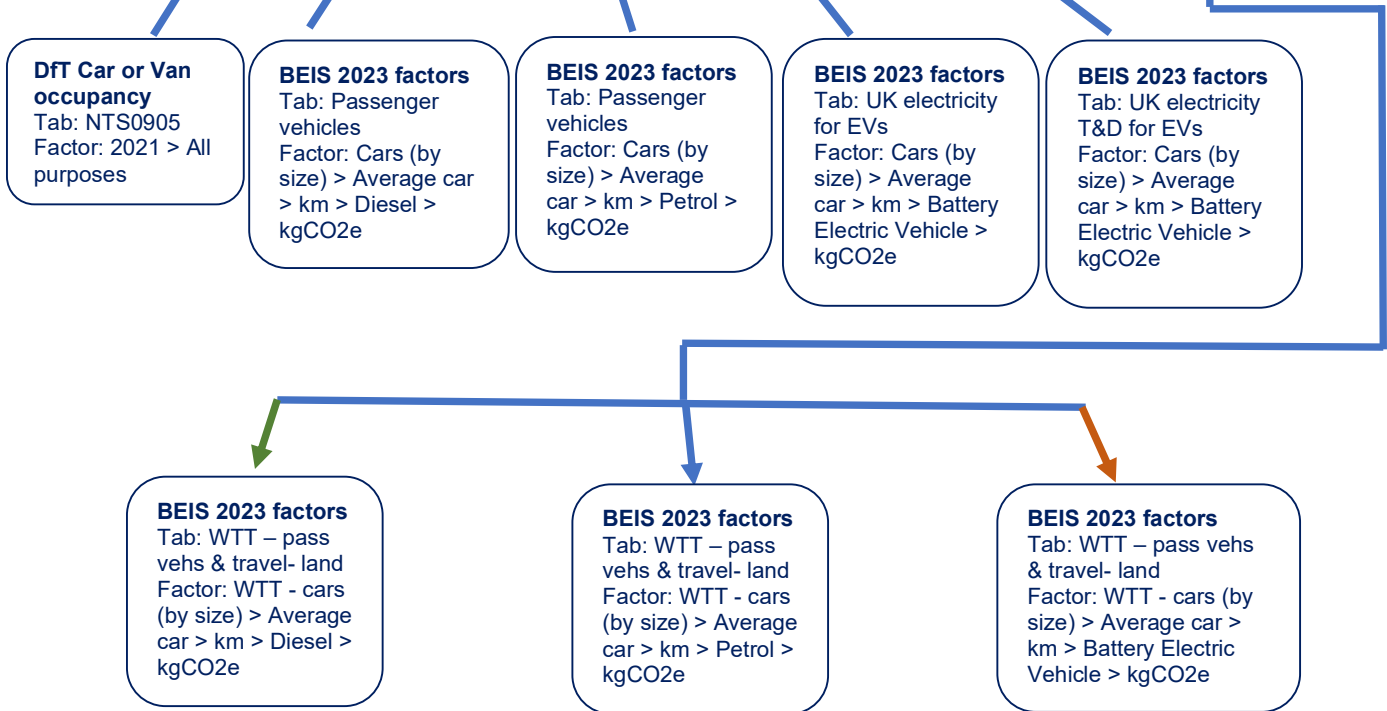
- <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023>

***Average occupancy data displayed in table 3 available from – available from:

- <https://www.gov.uk/government/statistical-data-sets/nts09-vehicle-mileage-and-occupancy>

Table 3: Occupancy and carbon factors used to calculate kgCO₂e/pkm figures for 3x car types based on gov data.

CARS	Average occupancy	kgCO ₂ e Scope 1	kgCO ₂ e Scope 2	kgCO ₂ e Scope 3 (T&D)	kgCO ₂ e Scope 3 (WTT)	kgCO ₂ e/pkm
Diesel	1.49	0.170	-	-	0.041	0.1418
Petrol	1.49	0.164	-	-	0.046	0.1405
Electric (Battery)	1.49	-	0.050	0.004	0.012	0.0449





Abbreviations:

- pkm = passenger kilometres
- EMU = Electric Multiple Unit
- DMU = Diesel Multiple Unit
- kgCO₂e = kilograms of Carbon Dioxide equivalent (all greenhouse gases with a data output as a carbon equivalent)
- NTL = Northern Trains Ltd
- T&D = Transmission and distribution
- WTT – Well-to-Tank
- Avg = Average
- EVs = Electric Vehicles
- Vehs = Vehicles