Small switch big difference carbon comparison calculations

Emissions data

Mode (source: Greenhouse gas reporting: conversion factors 2024)	**Emissions (kg CO2e)**	
National Rail (per passenger km)	0.035	How many times more polluting than rail
Domestic Flight (per passenger km)	0.273	8
Average Car - single occupancy (per km)	0.167	5
Average Car - average occupancy (per km)	0.111	3
		Savings from swap from car to rail
Average return train journey (74.6 km)	2.645	
Equivalent car journey - single occupancy	12.451	9.806
Equivalent car journey - average occupancy	8.301	5.656
Estimated adults over 17 holding a full driving licence	42,269,824	
Savings from all drivers swapping 1 return car journey to rail	**239,064,373**	**OR 239,064 tonnes of CO2e**
Savings from all drivers swapping 1 return car journey to rail per month for a year	2,868,772,473	

General statements and substantiations

Statement	**Substantiation**
Swapping just one return car journey for an average return rail journey would save 5.7 kg CO2e, which is 68% lower than driving	According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e

	per km.[1] Dividing this by the average car occupancy of 1.5 people,[2] it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km, or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 12.451 (saving of 9.806) kg CO2e if making the same journey by car (single occupancy) and 8.301 (saving of 5.656) kg CO2e (average occupancy).
Driving alone is 5 times more polluting than travelling by train (on a per km basis) Travelling by car (average occupancy) is 3 times more polluting than travelling by train	According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km.[3] This represents 5 times higher emissions per passenger per km. Dividing the car emissions by the average car occupancy of 1.5 people,[4] it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. This represents three times higher emissions than rail per passenger per km.
If every one of the 42.3 million driving licence holders in Great Britain were to swap one return car journey with the average return rail journey by the end of the year, this would save 239,064 tonnes of CO2e. This is equivalent to switching off half of the UK's street lighting for a year/ switching off the UK's street lighting for half a year.	There are more than 42.3 million full driving licence holders in Great Britain.[5] Multiplying this by the emission savings of one journey swap equates to 239,064 tonnes of CO2e. Street lighting across the UK produces 478,000 tonnes of CO2 emissions per annum.[6] Saving 239,064 tonnes equates to half of that.
Swapping one return journey from car to train a month represents an 8% saving of an average person's transport footprint.	Emissions generated directly by UK households were 135 million tonnes (mt) CO2e in 2021. Including emissions from goods and services consumed by UK residents, emissions amounted to 705 mt CO2e in 2021.[7] In 2021, the UK population was 67 million.[8] This means the average UK person's carbon footprint was 2,015 kg CO2e using emissions generated directly only, and 10,055 kg CO2e if we include all consumption emissions.

[1] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024
[2] https://www.gov.uk/government/statistical-data-sets/nts09-vehicle-mileage-and-occupancy#car-or-van-occupancy
[3] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024
[4] https://www.gov.uk/government/statistical-data-sets/nts09-vehicle-mileage-and-occupancy#car-or-van-occupancy
[5] https://www.data.gov.uk/dataset/d0be1ed2-9907-4ec4-b552-c048f6aec16a/gb-driving-licence-data
[6] https://ukrlg.ciht.org.uk/media/12713/sotn-report.pdf
[7] https://www.gov.uk/government/statistics/uks-carbon-footprint/carbon-footprint-for-the-uk-and-england-to-2019
[8] https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2021

	Therefore, a 5.7 kg saving is miniscule (0.3% of 2,015kg). If a person switched one return rail journey from a car every month, you would save 67.9kg of CO2e in a year, which represents 3.7% of 2,015 kg. In 2021, 59 mt CO2e in transport emissions were generated directly by UK households,[9] so the average UK person's carbon footprint from transport was 880.6 kg CO2e. Swapping one return journey represents 0.65% saving of a person's transport footprint. Swapping one return journey a month represents a 7.7% saving of a person's transport footprint. If GB figures are preferred here: Transport emissions in NI: 3.8 mtCO2e;[10] GB households therefore: 55.2 mtCO2e. Population of Great Britain in 2022: 65,686,000.[11] Therefore the average GB person's carbon footprint from transport was 840.4 kg CO2e. Swapping one return journey represents 0.68% saving of a person's transport footprint. Swapping one return journey a month represents an 8.1% saving of a person's transport footprint. In both cases we can round up to 8%.

Comparisons with other green actions

Action	Emissions	Swapping one return car journey to rail saves emissions equivalent to…	Each driver in Britain swapping one return car journey to rail would save emissions equivalent to…	Other assumptions
1. Recycling	5,938,000 tonnes of dry recycling is collected from households in England, which saves 4,199,000 tonnes CO2e a year. This equates to 1.4 kgs CO2e per person per week.	A person recycling for four weeks	3.25 million people (the population of Birmingham, Leeds, Liverpool, Manchester, Bristol and Peterborough combined) recycling for a year	Dry recycling saves 4,199,000 tonnes CO2e a

[9] https://www.gov.uk/government/statistics/uks-carbon-footprint/carbon-footprint-for-the-uk-and-england-to-2019
[10] https://www.daera-ni.gov.uk/news/northern-ireland-greenhouse-gas-statistics-1990-2022-released#:~:text=Domestic%20transport%20contributed%2018.1%25%20to,showed%20a%20decrease%20in%20emissions.
[11] https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/latest

			Recycling 450 Olympic swimming pools of recyclable rubbish	year.[12] The population of England is 57.1 million people,[13] so that's 73.53 kg CO2e saved per person per year. Dividing the emission savings from modal shift by that number gives the equivalent of 3.25 million people recycling for a year. Birmingham = 1,121,375 Leeds = 536,280 Liverpool = 506,565 Manchester = 470,405 Bristol = 425,215 Peterborough = 190,605.[14] 5,938,000 tonnes of dry recycling is collected from households in England, which saves 4,199,000 tonnes CO2e a year. The saving from the mode shift therefore equates to recycling 338,078 tonnes of recycling. Using an average density of 0.3 tonnes per cubic meter, this equates to 1,126,927 cubic meters of

[12] https://assets.publishing.service.gov.uk/media/63974500e90e077c329444f0/Statistics_on_carbon_emmisions_Waste_Households_England_v8_2018.pdf, p. 14, 16. Data from 2020 is the latest emissions data available.

[13] https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2022#population-of-uk-at-mid-2022

[14] Cities population according to ONS (Usual resident population counts and median age, by individual BUA, England (excluding London) and Wales, 2021), https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/townsandcitiescharacteristicsofbuiltupareasenglandandwales/census2021

				recycling. An Olympic swimming pool is 2,500 cubic meters therefore this recycling would fill 450 pools.
2. Less packaging	Avoidable food packaging: 0.20 tonnes of CO2e per person per year	a person buying food without packaging for 10 days	1.2 million people buying food without packaging for a year	Avoidable food packaging contributes 200 kgs CO2e per person per year.[15] This is divided by 365 days to give a per person per day rate.
3. Food recycling (in lieu of composting)	All food waste recycled through anaerobic digestion from households in England saves 33,000 tonnes CO2e Recycling food waste through anaerobic digestion saves 0.078 kg CO2e per kg of food waste	recycling 72.5 kgs of food waste	all of England's food recycling over 7 years and 3 months	Recycling food waste through anaerobic digestion saves 78 kg CO2e per tonne (0.078 kg CO2e per kg).[16] So saving 5.656 kg CO2e from swapping one return journey to rail, is the equivalent of recycling 72.5 kgs of food waste. 26,000 tonnes of food waste is collected from households in England and recycled through anaerobic digestion, which saves 33,000 tonnes CO2e.[17] All drivers swapping one return car journey to rail is equivalent to all of

[15] https://www.carbonindependent.org/18.html
[16] https://assets.publishing.service.gov.uk/media/63974500e90e077c329444f0/Statistics_on_carbon_emmision
[17] https://assets.publishing.service.gov.uk/media/63974500e90e077c329444f0/Statistics_on_carbon_emmision

				England's food recycling over 7.25 years.
4. Switching to vegetarian/vegan diets	a) One vegetarian day per week saves nearly 100kgs of CO2 per year. b) One vegan day per week can save nearly 143kgs of CO2 per year.	a) Switching to a vegetarian diet/ not consuming meat for 3 days b) Switching to a vegan diet/ not consuming animal products for 2 days	a) 341,500 people (around the population of Coventry) switching to a vegetarian diet for a year b) 239,000 people (around the population of Wolverhampton) switching to a vegan diet for a year	One vegetarian day per week saves nearly 100kgs of CO2 per year (1.92 kg per day). One vegan day per week can save nearly 143kgs of CO2 per year (2.75 kg per day).[18] Coventry = 344,285 people Wolverhampton = 234,025 people
4c. OR Cutting out meat and diary consumption (vegan diet)	Meat and dairy consumption produces 0.4 tonnes (400 kg) CO2e per person per year, so switching to a vegan diet can reduce an individual's carbon footprint by 0.4 tonnes	c) Cutting out meat and diary consumption / switching to a vegan diet for 5 days	c) 600,000 people (twice the population of Nottingham) cutting out meet and diary for a year / 300,000 people (the population of Nottingham) cutting out meet and diary for two years	Meat and dairy consumption produces 0.4 tonnes (400 kg) CO2e per person per year,[19] which equals 1.096 kg a day. Dividing the emission savings from modal shift by the annual savings = 597,661 people. Nottingham = 299,790

[18] https://news.exeter.gov.uk/how-much-carbon-could-you-save-by-going-veggie-or-vegan-every-so-often/#:~:text=now%20and%20again%3A-,1%20vegan%20day%20per%20week%20(52%20days%20a%20year)%20can,80kgs%20of%20CO2%20per%20year.
[19] https://www.carbonindependent.org/18.html

5. Replacing meat with plant-based food	Producing 1kg of beef results in 59 kg of CO2e, as opposed to 2 kgs for beans	Swapping a small beef burger (150g) to bean one	Swapping 28 million beef burgers to bean ones	Producing 1kg of beef results in 59 kg of CO2e, as opposed to 2 kgs for beans,[20] so a 150g patty saves 8.55 kg of CO2e.
6. Home insulation	Better insulation in a house can reduce its carbon footprint by 900 kg CO2e per year.		insulating 265,627 homes	Better insulation in a house can reduce its carbon footprint by 900 kg CO2e per year.[21]
7. Switching from gas boiler to heat pump	An average household gas boiler emits 2.2 tonnes of CO2e per year.[22]		10,000 households switching from gas boiler to heat pump for 11 years	An average household gas boiler emits greenhouse gases equivalent to approximately 2.2 tonnes of CO2 per year.[23] A higher estimate of 3.3 tonnes of savings per year is available in this calculator,[24] but we have used the more conservative estimate.
8. Switching to energy saving light bulbs	Replacing all the bulbs in your home with LED lights saves 35 kg CO2 per year[25]	Replacing all light bulbs with LED for 2 months/ the annual savings from changing 6 light bulbs to LED	6.8 million households replacing all bulbs with LED lights	Replacing all the bulbs in your home with LED lights saves 35 kg CO2 per year[26]

[20] https://interactive.carbonbrief.org/what-is-the-climate-impact-of-eating-meat-and-dairy/
[21] https://www.climateaction.gov.wales/green-energy-choices/insulation/#:~:text=A%20well%2Dinsulated%20home%20will,kilograms%20of%20CO2e%20per%20year. More detailed breakdown of the savings from different types of insulation (but not for all together) at https://media.nesta.org.uk/documents/Insulation_impact__how_much_do_UK_houses_really_need___1.pdf, p. 9
[22] https://www.nesta.org.uk/press-release/gas-boiler-emits-more-annual-co2-seven-transatlantic-flights/
[23] https://www.nesta.org.uk/press-release/gas-boiler-emits-more-annual-co2-seven-transatlantic-flights/
[24] https://calculator.topten.eu/heating/?country=uk. 3,300 kg CO2/year savings, calculator assumptions: total floor area of 90m2 (typical semi-detached or large terraced property), switching from a 7 year old gas boiler, 4 people living in the house, 15,000 kW annual gas consumption
[25]
[26] https://energysavingtrust.org.uk/advice/lighting/

9. Switching to purchasing renewable electricity	574 kg of CO2 a year saved	4 days of using renewable energy for your home	416,488 households switching to a renewable energy supplier	The carbon footprint for a typical British home using a year's worth of electricity at the national average was 574kg of CO2 per year in 2022 -23. The same electricity from renewable energy has a carbon footprint of 0.[27] Other estimates: Bulb [which is now Octopus] estimates that its average members can lower their carbon impact by 3.4 tonnes of CO2 a year by switching to its tariff.[28] Warning: In reality, your electricity comes from the same grid whoever you buy it from, but green suppliers contribute to renewable energy generation
10. Washing clothes at 30 degrees	Switching laundry from 40°C to 30°C saves up to 27.2kg of CO2e per year	11 weeks of washing clothes at 30 degrees	8.8 million households switching to washing clothes at 30 degrees for a year	Decreasing washing temperature from Cotton 40°C cycle to Cotton 30°C cycle reduces CO2 equivalent from 1436Kg

[27] https://octopus.energy/renewables/
[28] https://www.theecoexperts.co.uk/energy-switching/why-you-should-switch

10a. Line drying rather than tumble drying clothes most of the time		10a. 3 weeks of line drying rather than tumble drying clothes	10a. 2.4 million households line drying rather than tumble drying clothes for a year	CO2e to 1164 Kg CO2-eq over ten years or up to 27.2Kg of CO2e every year per household, based on one household having an average of one washing machine.[29] 10a. Assuming a family of four with two children doing 211 cycles a year, if using the dryer only for 20% of the loads instead of all the loads the family could save 170 kWh with a modern dryer and even 506kWh with an old dryer. This leads to annual emissions savings of about 80kg, or 230kg, respectively.[30] We've gone for 100ks saving per household within this range.
11. Taking colder showers	The emissions saving from switching from a 15 minute hot (1.7kgCO2e) to 15 minute cold shower (0.6kgCO2e)	switching 5 hot showers to colder ones	1.2 million people switching to colder showers	A 15 minute hot shower heated by an electric power shower produces 1.7 kg CO2e.[31] Cold Showers save three times the carbon emissions from a

[29] https://www.electroluxgroup.com/en/new-research-from-electrolux-group-reveals-europe-turns-to-30-wash-driving-down-co2-emissions-35393/#:~:text=A%20household%20saving%20up%20to,(GWP)%20of%20use%20phase

[30] https://www.zerofy.net/2023/03/02/save-money-co2-washing-drying.html#:~:text=Reduce%20your%20clothes%20dryer%20usage&text=This%20leads%20to%20annual%20emissions,way%20to%20reduce%20your%20emissions.

[31] https://social-change.co.uk/blog/five-ways-your-everyday-carbon-footprint-can-be-reduced

				comparable warm shower.[32] Therefore, switching one shower saves 1.1Kg CO2e.
12. Lower thermostat	Lowering your thermostat by one degree would save up to 275kg CO2e	lowering your thermostat by 1 degree for 4.3 days	870,000 households lowering their thermostat by 1 degree for a year OR 12a. Everyone in Great Britain lowering their thermostat by 1 degree for 25 days (but this is based on a lower savings estimate).	Lowering your thermostat by one degree, would save up to 275kg CO2e per year for the average household.[33] In the UK, people typically have their heating on for about 200 to 220 days per year, depending on location, weather, and the efficiency of their homes. This means a saving of 1.31 kg CO2e per day. If everyone in Great Britain turned their thermostat down by 1 degree, we would save 3.5 million tonnes of CO2 per year.[34]
13. Choosing locally produced foods	Opting to organic, locally grown tomatoes rather than tomatoes from the supermarket saves 8.7 kg CO2e per kg.	Buying 700g of organic, seasonal, locally grown tomatoes rather than from the supermarket	Buying 27,500 tonnes of organic, locally grown tomatoes rather than from the average supermarket / the average consumed by 2.5 million households	The carbon footprint of 1KG of tomatoes in Great Britain: - Organic, grown locally outdoors in July (0.4kg CO_2e) - Average tomatoes in a supermarket (9.1kg CO_2e)[35]

[32] https://www.crediblygreen.com/2023/02/16/environmental-impact-of-hot-vs-cold-showers/
[33] https://www.ikea.com/gb/en/files/pdf/c0/63/c0635daa/lower-one-degree.pdf
[34] https://energysavingtrust.org.uk/new-research-finds-96-of-uk-homeowners-are-concerned-about-their-home-energy-efficiency-yet-one-in-five-arent-taking-simple-steps-to-improve-it/
[35] https://www.52climateactions.com/eat-local-seasonal-food/full

14. Reducing food waste	average emissions from food waste are 638.3Kg CO2e per household per year.	A household producing no food waste for 3 days	375,000 households producing no food waste for a year/ all households in Great Britain producing no food waste for 5 days	Emissions from UK household food waste are 18 million tonnes CO2e per year.[36] There are an estimated 28.2 million households in the UK.[37] Therefore, each household's average emissions from food waste are 638.3Kg CO2e every year. Extrapolating for the number of households in GB (27.4 million) equals approximately 17.5 million tonnes CO2e for GB.
15. Not buying fast fashion (buying fewer items, or more durable items)	Keeping clothes in use 9 months longer saves 10 Mt CO2e, or 149.3 Kg CO2e per person, per year.	a) 28% of the carbon it takes to make a pair of jeans	b) 1.6 million people keeping their clothes in use 9 months longer/ c) the carbon footprint of 160,000 households' clothing each year (the households in Reading and Northampton combined)/ the carbon footprint of over 45 million pieces of clothing, which would fill 27 Olympic swimming pools	a) It takes 20kg of carbon to make a single pair of jeans.[38] b) Keeping clothes in use longer: 10% longer lifetime (i.e. 3 months longer) 8% (3 Metric tons of carbon dioxide equivalent (MtCO2e)), 33% longer lif3 time (i.e. 9 months longer) 27% (10 MtCO2e)[39] c) The carbon footprint of total UK clothing

[36] https://www.wrap.ngo/taking-action/food-drink/actions/action-on-food-waste
[37] https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2022
[38] https://www.mycarbonplan.org/reduce
[39] https://www.rgs.org/about-us/our-work/sustainability/39-ways-to-save-the-planet/buy-less-stuff

				consumption is 38 million tonnes CO2e each year. On average, the annual carbon footprint of a household's new and existing clothing (calculated as the amount of emissions resulting from processes over the whole life of clothing, from fibre production to final disposal of a worn-out garment) is 1.5 tonnes of CO2e, the equivalent of driving for 6,000 miles.[40] Reading – around 70,000 households Northampton = 90,000 households

Other comparisons:

- Producing 100g of protein from beef: 25kgCO2e; from tofu: 1.6kgCO2e; from beans: 0.7kgCO2e. 22.8g protein per beef burger; one burger = 5.7kg CO2e
- Global emissions from food production: 52.3bn tonnes CO2, 74% of which is non-food related (38.7bn tonnes CO2)
- 6.5 million leave the lights on while not in the room producing 37,440,000kg CO2 per day. 14 million regularly leave the lights on when leaving the house, producing 26,880,000 kg CO2.[41]

[40] https://www.wrap.ngo/sites/default/files/2021-01/WRAP-valuing-our-clothes-2012-07-11.pdf
[41] https://www.utilitydesign.co.uk/blog/leaving-lights-on/#:~:text=Our%20calculations%20suggest%20that%20the,15%20flights%20around%20the%20world.

- Having smaller living spaces / or co-housing to fill empty rooms: In the year to March 2023, the average new build emitted 1.4 tonnes of CO2, just 40% of the 3.6 tonnes emitted by an older property, a saving of 2.2 tonnes per year.[42] All drivers switching one journey to rail is the equivalent to carbon emissions from 64 new-build houses.
- The most efficient fridges consume up to five times less energy than a standard one. Energy efficient washing machines can reduce electricity usage by up to a third. A typical fridge can contain between 0.05kg and 0.25kg of refrigerant, which if it leaks into the environment, the resulting emissions would be equivalent to driving 675km-3,427km (420-2,130 miles) in **an average family-sized car**.
- Oxford Car Free Challenge
- The average per capita CO2 emissions per year from transport are 1.8 tonnes in the UK. Those who switch just one trip per day from car to cycling reduce their carbon footprint by 0.5 tonnes over a year.
- More efficient driving saves 220kg CO2 per car per year.
- Better insulating a house could save the emissions equivalent of using a gas boiler for 99 years.

CfBT Statements and substantiations

Statement: **If every driver in Britain switched one return car journey to train, it would save the same CO2 as switching off half of the UK's street lighting for a year**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). There are more than 42.3 million full driving licence holders in Great Britain. Multiplying this by the emission savings of one journey swap equates to 239,064 tonnes of CO2e. Street lighting across the UK produces 478,000 tonnes of CO2 emissions per annum. Saving 239,064 tonnes equates to half of that.

[42] https://peterwardhomes.co.uk/what-are-the-benefits-of-downsizing-to-a-new-build home/#:~:text=In%20fact%2C%20in%20the%20year,of%202.2%20tonnes%20per%20year.

Statement: **If each driver in Britain switched one return car journey to train, it would save the same CO2 as 3.25 million people recycling for a year – that's the population of Birmingham, Leeds, Liverpool, Manchester, Bristol and Peterborough!**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). There are more than 42.3 million full driving licence holders in Great Britain. Multiplying this by the emission savings of one journey swap equates to 239,064 tonnes of CO2e. Dry recycling saves 4,199,000 tonnes CO2e a year. The population of England is 57.1 million people, so that's 73.53 kg CO2e saved per person per year. Dividing the emission savings from modal shift by that number gives the equivalent of 3.25 million people recycling for a year. City population numbers: Birmingham = 1,121,375, Leeds = 536,280, Liverpool = 506,565, Manchester = 470,405, Bristol = 425,215 and Peterborough = 190,605.

Statement: **If every driver in Britain switched one return car journey to train, it would save the same CO2 as 6.8 million households replacing all their bulbs with LED, equivalent to 231 Blackpool Illuminations!**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). There are more than 42.3 million full driving licence holders in Great Britain. Multiplying this by the emission savings of one journey swap equates to 239,064 tonnes of CO2e. Replacing all the bulbs in your home with LED lights saves 35 kg CO2 per year. All drivers swapping a journey is the equivalent of 6.8million households replaced all their bulbs. The average UK house has 34 lightbulbs so that would be approximately 231.2 million LED bulbs. The Blackpool Illuminations has over one million LED lamps, so this is the equivalent of 231 times.

Statement: **If every driver in Britain switched one return car journey to train, it would save the same CO2 as recycling 450 Olympic swimming pools of recyclable rubbish.**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023,

the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). There are more than 42.3 million full driving licence holders in Great Britain. Multiplying this by the emission savings of one journey swap equates to 239,064 tonnes of CO2e. 5,938,000 tonnes of dry recycling is collected from households in England, which saves 4,199,000 tonnes CO2e a year. The saving from the mode shift therefore equates to recycling 338,078 tonnes of recycling. Using an average density of 0.3 tonnes per cubic meter, this equates to 1,126,927 cubic meters of recycling. An Olympic swimming pool is 2,500 cubic meters therefore this recycling would fill 450 pools.

Statement: **If each driver in Britain switched one can journey to train, it would save the same amount of CO2 as insulating 265,627 homes**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). There are more than 42.3 million full driving licence holders in Great Britain. Multiplying this by the emission savings of one journey swap equates to 239,064 tonnes of CO2e. Better insulation in a house (double glazing, roof and wall insulation, and draft-proofing) can reduce its carbon footprint by 900 kg CO2e per year. The saving from the mode shift therefore equates to insulating 267,627 homes.

Statement: **Switching one return car journey to train saves the same amount of CO2 as a person recycling for four weeks**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). 5,938,000 tonnes of dry recycling is collected from households in England, which saves 4,199,000 tonnes CO2e a year. This equates to 1.4 kgs CO2e saved per person per week. Saving 5.656 kg CO2e therefore saves the equivalent of 4 weeks of recycling.

Statement: **Switching one return car journey to train saves the same amount of CO2 as 55 loads of washing at 30 degrees rather than 40 degrees**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). Decreasing washing temperature from Cotton 40°C cycle to Cotton 30°C cycle reduces emissions from 1,436 kg CO2e to 1,164 kg CO2e over ten years or up to 27.2 kg of CO2e every year (0.523 kg per week) per household. Saving 5.656 kg CO2e therefore equates to 11 weeks. The average household does 5 washes a week, so this is 55 loads in 11 weeks.

Statement: **Switching one return car journey to train saves the same amount of CO2 as a person changing six light bulbs to LED.**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 12.451 (saving of 9.806) kg CO2e if making the same journey by car (single occupancy) and 8.301 (saving of 5.656) kg CO2e (average occupancy). Replacing all the bulbs in your home with LED lights saves 35 kg CO2 per year. The average UK house has 34 lightbulbs, so a saving of 5.565 kg CO2e is equivalent to the annual savings from changing 6 light bulbs to LED.

Statement: **Doing all these things - recycling, having 1 vegetarian day a week, replacing light bulbs with LED and washing clothes at 30 rather than 40 degrees, as well as swapping one return journey a month from car to rail – would reduce your direct carbon footprint by 15%.**

Substantiation: Dry recycling collected from households in England saves 4,199,000 tonnes CO2e a year, which equates to 73.53 kg CO2e per person per year. One vegetarian day per week saves nearly 100 kg CO2 per year. Replacing all the bulbs in your home with LED lights saves 35 kg CO2 per year. Switching laundry from 40°C to 30°C saves up to 27.2kg CO2e per year. Switching to the average return rail journey from car saves 5.656 kg CO2e, which equates to 67.9 kg CO2e for one journey a month across the year. The average UK person's annual carbon footprint was 2,015 kg CO2e (including only emissions generated directly by households).

Statement: **Fumes from petrol and diesel vehicles contribute 5x more carbon emissions into the atmosphere than travelling by train.**

Substantiation: A person travelling in an average car produces 0.167 kg CO2e per km (based on the average emissions of all cars on the road of various types and engines). For the average petrol car this is 0.165 kg and for the average diesel car 0.170 kg. National Rail trains on average produce 0.035kg CO2e per passenger per km, which means the average car is 4.7 times (nearly 5 times) more polluting (4.6 for petrol, 4.8 for diesel), for single occupancy journeys.

Statement: **Travelling by car is 3x more polluting than travelling by train.**

Substantiation: National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing the car emissions by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. This represents three times higher emissions than rail per passenger per km.

Statement: **An average train journey puts nearly 5 times less carbon emissions into the air than making this journey by car**

Substantiation: A person travelling in an average car produces 0.167kg CO2e per km (based on the average emissions of all cars on the road of various types and engines), while National Rail trains on average produce 0.035kg CO2e per passenger per km. This means the average car is 4.7 times (nearly 5 times) more polluting. Dividing the car emissions by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. This represents three times higher emissions than rail per passenger per km.

Statement: **If every driver in Great Britain switched one return car journey to train, it would save the same amount of CO2 as (a) 341,500 people (around the population of Coventry) switching to a vegetarian diet for a year/ (b) 239,000 people (around the population of Wolverhampton) switching to a vegan diet for a year.**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). There are more than 42.3 million full driving licence holders in Great Britain. Multiplying this by the emission savings of one journey swap equates to 239,064 tonnes of CO2e. One vegetarian/ vegan day per week saves nearly 100/ 143 kg CO2 per year. If this was a fully vegetarian/ vegan diet (seven days a week), it would save 700/ 1,001 kg CO2e per person per year. The saving from the mode shift

therefore equates to 341,500/ 239,000 people changing to a fully vegetarian/ vegan diet. City population numbers: Coventry = 344,285 people, Wolverhampton = 234,025 people.

Statement: **Switching from car to train (for the average return journey) could save the same amount of CO2 as a person switching to a vegetarian/ vegan diet for 3/ 2 days.**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). One vegetarian/ vegan day per week saves nearly 100/ 143 kg CO2 per year, which equates to 2.75/ 1.923 kg CO2e per day, so one journey swap equals 3/ 2 days.

Statement: **If every driver in Britain switched one return car journey to train, it would save the same CO2 as 6.8 million households replacing all their bulbs with LED.**

Substantiation: According to government figures, National Rail travel produces 0.035 kg CO2e per passenger km. The average car (of average size and unknown/average fuel type) produces 0.167 kg CO2e per km. Dividing this by the average car occupancy of 1.5 people, it means that the average car journey (average occupancy) produces 0.111 kg CO2e per km. According to RDG data from 2023, the average rail journey one-way was 37.3 km or 74.6 km for a return journey. Therefore, the average rail journey produces 2.645 kg CO2e per passenger, compared to 8.301 (saving of 5.656) kg CO2e if making the same journey by car (average occupancy). There are more than 42.3 million full driving licence holders in Great Britain. Multiplying this by the emission savings of one journey swap equates to 239,064 tonnes of CO2e. Replacing all the bulbs in your home with LED lights saves 35 kg CO2 per year. All drivers swapping a journey is the equivalent of 6.8million households replaced all their bulbs. The average UK house has 34 lightbulbs so that would be approximately 231.2 million LED bulbs.

Footprint Reduction

Action	Explanation	Saving per person/household (Kg CO2e p.a.)
Recycling	Dry recycling collected from households in England saves 4,199,000 tonnes CO2e a year. This equates to 73.53 kg CO2 per person per year.	73.53
Switching to vegetarian diet one day per week	One vegetarian day per week saves nearly 100kgs of CO2 per year.	100
Switching to a vegan diet one day a week	One vegan day per week can save nearly 143kgs of CO2 per year.	143
Switching to energy saving light bulbs	Replacing all the bulbs in your home with LED lights saves 35 kg CO2 per year	35
Washing clothes at 30 degrees rather than 40	Switching laundry from 40°C to 30°C saves up to 27.2kg of CO2e per year	27.2
Taking colder showers	1.1 kg saving from switching from a 15-minute hot shower to cold, assuming 5 showers a week	286
Lower thermostat	Lowering your thermostat by one degree would save up to 275kg CO2e a year per household	275
Swapping 1 return journey to rail a month	5.626 x 12	67.9
Swapping 1 return journey to rail a week	5.656 x 52	294.1

Annual carbon footprint per person (DIRECT EMISSIONS ONLY)	The average UK person's annual carbon footprint was 2,015 kg CO2e (using only emissions generated directly by households)	2,015

Combo	Saving	% reduction
recycling, 1 veggie day a week, light bulbs and washing at 30 + 1 rail swap a MONTH	**303.6**	**15%**
recycling, 1 veggie day a week, light bulbs and washing at 30 + 1 rail swap a WEEK	529.8	26%
recycling, 1 VEGAN day a week, light bulbs and washing at 30 + 1 rail swap a MONTH	346.6	17%

recycling, 1 VEGAN day a week, light bulbs and washing at 30 + 1 rail swap a WEEK	572.8	28%

Annual carbon footprint per person (INCL CONSUMPTION EMISSIONS)	The average UK person's annual carbon footprint was 10,055 kg CO2e (if we include all consumption emissions)	10,055

Combo	Saving	% reduction
recycling, 1 veggie day a week, light bulbs and washing at 30 + 1 rail swap a MONTH	303.6	3%
recycling, 1 veggie day a week, light bulbs and washing at 30 + 1 rail swap a WEEK	529.8	5%
recycling, 1 VEGAN day a week, light bulbs and washing at 30 + 1 rail swap a MONTH	346.6	3%
recycling, 1 VEGAN day a week, light bulbs and washing at 30 + 1 rail swap a WEEK	572.8	6%