

Online Resource 3. GHG emission calculations

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Exploring the impacts of mobile application interventions on sustainable lifestyle changes

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Action	GWP impact data	Other assumptions	References
(1) Reduce your speed on the highway today	178.5 gCO ₂ /km (petrol, diesel) 44 gCO ₂ /km (biofuel in high proportions) 106 gCO ₂ /km (plug-in hybrid Austria) 102 gCO ₂ /km (plug-in hybrid Finland) 102 gCO ₂ /km (plug-in hybrid Lithuania) 33 gCO ₂ /km (electric car) 33 gCO ₂ /km (electric car Austria) 25 gCO ₂ /km (electric car Lithuania) 115 gCO ₂ /km (electric car Türkiye)	Fuel consumption decreases by 6%. The user may have input the emission factor of their passenger car.	Claudelin et al. 2022
(2) Active transport only – for the next seven days	178.5 gCO ₂ /km (petrol, diesel) 44 gCO ₂ /km (biofuel in high proportions) 106 gCO ₂ /km (plug-in hybrid Austria) 102 gCO ₂ /km (plug-in hybrid Lithuania) 33 gCO ₂ /km (electric car Austria)	Distance assumed to be average urban trip per day: 12.4 km per day, country-specific values for Germany, Austria, Greece, Italy, and Belgium. Average value of 13 countries for other countries.	Claudelin et al. 2022 Eurostat 2021

	25 gCO ₂ /km (electric car Lithuania)		
(3) Take a ride on a public bike	178.5 gCO ₂ /km (petrol, diesel) 45.9 gCO ₂ /pkm (bus) 46 gCO ₂ /pkm (bus Izmir) 20 gCO ₂ /pkm (bus Lahti) 15 gCO ₂ /pkm (bus Linz) 28 gCO ₂ /pkm (bus Vilnius)	2.204 km replaced by public bike The user was able to select whether they had replaced travelling by passenger car or public transport with a public bike. Public transport was assumed to be replaced if not stated (majority chose public transport). Public transport is assumed to be a bus.	Claudelin et al. 2022 Willberg et al. 2021
(4) Commit to a staycation this year	178.5 gCO ₂ /km (petrol, diesel) 45.9 gCO ₂ /pkm (bus) 28 gCO ₂ /pkm (bus Vilnius) 141.9 gCO ₂ /pkm (flying) 11.6 gCO ₂ /pkm (train Lithuania)	Staycation is assumed to replace either a domestic or international trip. GHG emission reductions calculated for those who named the unused travel mode. Personal vehicle = petrol or diesel vehicle, car, bus, or train = domestic, flying = international, one-way domestic trip = 450 km, one-way international trip = 1239 km. Default number of passengers in a car 1.4. Aviation does not include the climate impact of non-CO ₂ emissions.	Claudelin et al. 2022 Laroche et al. 2023
(5) Shortest trip by bike or foot	178.5 gCO ₂ /km (petrol, diesel) 44 gCO ₂ /km (biofuel in high proportions) 102 gCO ₂ /km (plug-in hybrid Lithuania) 33 gCO ₂ /km (electric car) 33 gCO ₂ /km (electric car Austria) 25 gCO ₂ /km (electric car Lithuania)	The distance and the number of times trip is taken is input by the user. The user may have input the emission factor of their passenger car.	Claudelin et al. 2022

(6) Start a carpool next week	178.5 gCO ₂ /km (petrol, diesel) 44 gCO ₂ /km (biofuel in high proportions) 102 gCO ₂ /km (plug-in hybrid Lithuania) 33 gCO ₂ /km (electric car) 33 gCO ₂ /km (electric car Austria) 25 gCO ₂ /km (electric car Finland)	The number of people in the carpool is input by the user. The user may have input the emission factor of their passenger car.	Claudelin et al. 2022
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Action	GWP impact data	Other assumptions	References
(7) Turn your appliances off standby mode today	Annual electricity consumption per person and emission factors for electricity from Claudelin et al. 2022. For countries not participating in the app launch, annual electricity consumption was assumed to be 1200 kWh, and the emission factor for electricity 255 gCO ₂ e/kWh.	Action leads to 7% reduction in electricity consumption. If number of people in household was unknown, an average for the country was used.	Claudelin et al. 2022 Brindle 2021 Statista 2024 Statistics South Africa 2022 Turkstat 2024
(8) A day without electronics	Annual electricity consumption per person and emission factors for electricity from Claudelin et al. 2022. For countries not participating in the app launch, annual electricity consumption was assumed to be 1200 kWh, and emission factor for electricity 255 gCO ₂ e/kWh.	Assumption that 1.84 kWh is saved. Average time watching TV in the EU is 220 min/day. Energy consumption is assumed to be 0.5 kWh/h on average (lower for TV, higher for consoles etc.).	Statista 2024a Schien et al. 2021
(9) Set your dishwasher to eco mode	Emission factors for electricity from Claudelin et al. 2022. For countries not participating in the app launch, an emission factor for electricity of 255 gCO ₂ e/kWh was used.	Users were asked how many times they use the dishwasher in a week. If they did not answer, 4 times was used. Normal load consumes approx. 1.2 kWh, and eco mode 0.73 kWh.	Claudelin et al. 2022. Direct energy n.d. Bosch n.d.

(10) Unplug unused electrical appliances for two weeks	Annual electricity consumption per person and emission factors for electricity from Claudelin et al. 2022. For countries not participating in the app launch, annual electricity consumption was assumed to be 1200 kWh, and emission factor for electricity 255 gCO₂e/kWh.	Action leads to 7% reduction in electricity consumption. If number of people in household was unknown, an average for the country was used.	Claudelin et al. 2022 Brindle 2021 Statista 2024b Statistics South Africa 2022 Turkstat 2024
(11) Lower your thermostat by 1 degree this week	Values for annual heating energy consumption (kWh/m²) and emission factors for heating from Claudelin et al. 2022	Action lowers heating energy consumption by 7%. If size of the house/apartment was not known, an average of other users was used. For Austria and Lithuania country specific averages were used because of the higher number of successful challenges. For countries not participating in the app launch, annual heating energy consumption was assumed to be 125 kWh/m²	Claudelin et al. 2022 European Commission 2022 Statista 2024b Statistics Austria 2025 Statistics Lithuania n.d.
(12) Shower with a stopwatch next week	Emission factors for warm shower usage (gCO₂e/min) from Claudelin et al. 2022.	Shower uses 15 l of water per minute. Users were asked how long their showers are usually, and how many times a week they shower. For those who did not answer or answered 90 mins (highest end on the slider), the average of other users (17 mins) was used. For number of times a week, 5 was used for those who did not answer.	Claudelin et al. 2022
(13) No bathing this week, shower only	Average emission factor for heating water from Claudelin et al. 2022 (109 gCO₂e/min)	Users were asked how many times they replaced a bath with a shower. For those who did not answer, 1 time was used.	Claudelin et al. 2022

		Assumption that a bath consumes 150 l of water, and a shower instead of a bath saves 80% of water.	
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Action	GWP impact data	Other assumptions	References
(14) Avoid dairy for a week	GHG emissions for diets: -Vegan 1055 kgCO ₂ e/year -Vegetarian 1391 kgCO ₂ e/year -Reduced meat eater (<50 g/day) 1705 kgCO ₂ e/year -Average meat eater (50-99 g/day) 2055 kgCO ₂ e/year -High meat eater (>100g/day) 2624 kgCO ₂ e/year	GHG emission savings were calculated based on the difference between vegetarian and vegan diets, considering the amount a user eats. Users were able to choose whether they eat: -small quantity (-25 %) -average quantity (+/-0 %) -large quantity (+25 %) -very large eater (+50 %)	Claudelin et al. 2022
(15) Eat meat free for the next 7 days	same as above	GHG emission savings were calculated based on the difference between the diet the user chose and a vegan diet, considering the amount the user eats.	Claudelin et al. 2022
(16) Make today a no meat day	same as above	same as above	Claudelin et al. 2022
(17) Add an additional day without any meat	same as above	same as above	Claudelin et al. 2022

Action	GWP impact data	Other assumptions	References
(18) Drink tap water for one week	Carbon footprint of a 1.5 litre PET bottle in Europe is 160 gCO ₂ e.	Users were asked how many plastic bottles they avoided.	Beverage Industry Environmental Roundtable 2012

(19) Ask for a reusable cup when ordering a drink 'for here'	Using a ceramic cup instead of a disposable one avoids 21 gCO ₂ e.	Two disposable cups avoided.	Loschelder et al. 2019
(20) Make a habit of checking out second hand goods first before buying a new one	On average, GHG emissions from a used item of clothing are 33% of those of a new item resulting in savings of 12.4 kgCO ₂ e	Assumption that instead of a new item of clothing, a used one is bought.	Moon 2024
(21) Buy vegetables and fruits without plastic bags for a week	Carbon footprint of an average LDPE plastic bag is 82 gCO ₂ e.	Three plastic bags avoided.	Danish Environmental Protection Agency 2018
(22) Stop buying new durable goods for a month	Emission factors for goods from Claudelin et al. 2022. Users were able to define how much they buy manufactured goods compared to the average: less (-50%) /same as average /more (+50%), and the share of used goods: none/some (50%)/all (100%). 67% of GHG emissions avoided when buying used goods.	Yearly consumption of durable goods divided by 12.	Claudelin et al. 2022 Moon 2024

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