SpACE

Behavioural Change Section 3

Date: 31/08/21

Introduction

SpACE is focused on the built environment and its impact on climate change. The operation and construction of existing and new buildings accounts for around 40% of carbon emissions globally. Data shows that a net-zero future requires changes to our lifestyles and the adoption of more sustainable behaviours. This requires significant change in the way people travel, heat their homes, and make choices about food and what they buy. Behavioural change will affect aspects of our lives that we take for granted and we need to understand how our lives today impact on climate change to help inform choices about the things we can change. The scale of the challenge should not be underestimated, however.

What is a carbon footprint?

Although carbon-dioxide is a gas, it is measured by weight and carbon emissions of a building or vehicle are reported in tonnes or kilogrammes of CO2e (equivalent).

You can work out your own carbon emissions by examining everything you do from heating homes to choices about food and travel, and the investments you make in your pensions. This is your carbon 'footprint' and is expressed in tonnes of carbon per year. Follow this link to see how you perform and where you can improve: https://offset.climateneutralnow.org/footprintcalc

Household Emissions – heating and powering our homes

Edinburgh's 232,000 households contribute 30%[1] of the city's annual carbon emissions. Edinburgh's rich mix of heritage buildings contribute to the cultural, social and economic character of the city, but require a lot of energy to heat them so a sensitive approach is needed to their adaptation to improve their energy efficiency.

An assessment on the range of typical dwelling types found across Edinburgh illustrates the typical base emission levels for each type and provides an indication of savings possible through lifestyle change, energy efficiency interventions and more radical options such as low carbon heating or renewable energy technologies.

Our assessment identifies opportunities for change in terms of investment starting with lifestyle changes, which could be implemented immediately at little or no cost, followed by change which requires greater levels of investment:

- **Behavioural/lifestyle change** – shorter showers, fewer baths or reducing room thermostats by 1ºC.
- **Low-cost/appliance-related interventions** – replace lighting with LED or exchange white goods for more efficient versions.
- **Medium cost/building fabric interventions** – installing wall or additional loft insulation, double or secondary glazing, and further draught-proofing measures.
- **Higher cost interventions through renewable energy technologies** – installing air-source heat pumps, solar photovoltaic and solar thermal arrays.

[1] Edinburgh Climate Commission (2020), Net Zero Carbon Roadmap for Edinburgh

– **Future interventions –** application of sustainable technologies[2] or approaches not yet available, such as hydrogen boilers, hybrid heat pump, bioenergy boiler, electric heating or connecting to low-carbon district heating networks.

Transport – reducing travel emissions

Private transport

The movement of people, goods and services around Edinburgh accounts for approximately 30% of carbon emissions. Significant carbon savings are achievable if personal travel choices can be changed. Sixty thousand people from other council areas travel into Edinburgh by car and a similar number of residents commute to jobs within Edinburgh by car. More than 50% of personal vehicle journeys are reported to be less than 5 km and for the purpose of:

- Shopping, leisure including eating out or entertainment – 44%
- Commuting – 31%
- Visiting friends and family – 8%
- Education – 7%

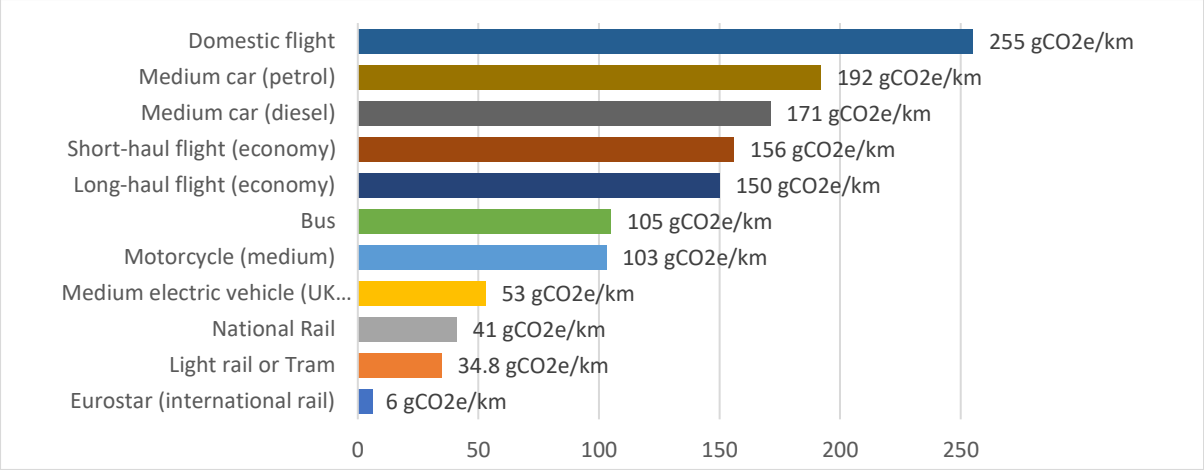
Approximately 60%[3] of Edinburgh households have access to one or more cars; from over 200,000 registered vehicles, 178,000 are private vehicles. The average distance travelled per resident is estimated at 13,000 km per year equating to approximately 2.3 tCO_2e/y carbon emissions per vehicle. Private vehicles contribute over 400 $KtCO_2e$ annually to Edinburgh emissions, which totalled 2451 $KtCO_2e$ in 2020.

Several initiatives are being considered to reduce private journeys across the City. One proposal is to create sustainable 20-minute neighbourhoods so residents can access local services and amenities within a 10-minute round trip from home enabling them to consider more sustainable modes of travel such as walking, wheeling, cycling, shared or public transport.

Air Travel

Air travel is a significant contributor to global carbon emissions representing 6% of the UK's annual emissions. Aviation does not feature in Edinburgh's carbon budget because from an accounting perspective, aviation emissions are incurred outside the City but are significant proportion of a person's carbon footprint. Most emissions are associated with holiday travel (61%), visits to friends and family (25%), and business trips (11%). The graph illustrates the carbon footprint for each travel kilometre for different modes of transport.

[2] Scottish Government – Technical Feasibility of Low Carbon Heating
[3] Edinburgh City Council - Edinburgh by Numbers 2020



In 2019, UK citizens took on average 1.9 holidays abroad and 3.9 holidays in the UK. Of 14.7M passenger journeys from Edinburgh Airport, 35% were to other UK airports, 53% to Europe and 6% were long haul trips. The emissions associated with aviation were estimated to be 375 $KtCO_2e$ per annum or 15% of the City's emissions in 2020.

Dietary choices – promoting low carbon and sustainable eating

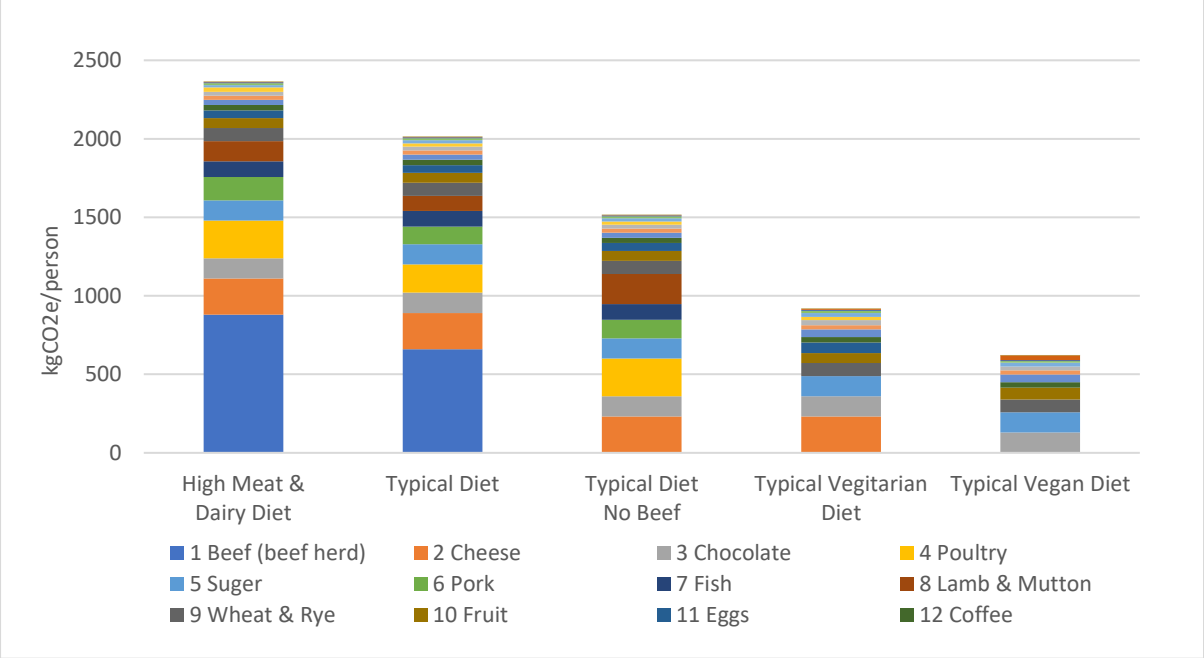
Meat and dairy products are associated with increased levels of carbon emissions when compared with plant-based sources of equivalent nutrition.

Food Stuff	$kgCO_2e$ per kg consumed	Typical diet (kg/person/y)	Total emissions $kgCO_2e$/person/y
Beef (beef herd)[5]	60	11	660
Pork[5]	7	15.7	110
Lamb & Mutton[5]	24	4	96
Poultry[4]	6	30.6	184
Cheese[5]	21	10.9	229
Chocolate[6]	19	6.8	129

The table above outlines the carbon emissions associated with a range of foods and illustrates an individual's typical consumption over a year. A typical balanced meat-eating diet would result in carbon emissions per person of around 2.1 tCO_2e/year. Individuals who consume greater quantities of red meat and dairy have a higher carbon footprint greater than 2.5 tCO_2e/y whereas a plant-based diet can result in emissions of less than 1 tCO_2e/y. Food waste also contributes significantly to annual carbon emissions. Waste levels up to 156kg/person per annum[7] are reported in Edinburgh with plans to reduce these by 25% by 2025. Data suggests that reducing red meat and dairy consumption, and

[4] OECD data - meat consumption
[5] Nationmaster - market sizing & trends
[6] Mintel – press office
[7] Scottish Government (2019), Food waste reduction: action plan

food waste could reduce individual carbon emissions by up to 500 $kgCO_2e/p$ per year and save the City 270 $KtCO_2e/y$ (24% of Edinburgh's estimated food-based emissions).



Consumerism – clothing and textiles

It is claimed that carbon emissions from clothing and textiles made up 4%[8] of C40 carbon emissions in 2017. Based on 2020 emission levels, this would amount to around 98 $KtCO_2e/y$ for the City or approximately 180 $kgCO_2e$ per person. It is claimed that savings up to 47% are possible by limiting the amount of clothing purchased annually[11]. Scaled to Edinburgh this could provide annual emission savings of 46 $KtCO_2e/y$ or 2% of Edinburgh's 2020 emissions.

Twenty simple things you can do to reduce household carbon emissions

Households can reduce carbon emissions significantly through behaviour change. Many suggestions offer global and societal benefits such as improved economic, health and wellbeing outcomes. The typical household carbon footprint for Edinburgh residents is estimated at 11 tCO_2e/y or 6.4 $tCO2_e$/person. The table outlines potential emissions savings associated with twenty behavioural changes and our analysis suggests that household carbon savings more than 30% are possible through such change.

[8] C40 Cities – Future of Urban Consumption in a 1.5°C world

Change in behaviour	Emissions Saving ($kgCO_2e/y$)
1. Reduce your thermostat setting in your house by 1°C	220
2. If you have an older or heritage property keep it well maintained and draught free	250
3. Halve the length of time spent in the shower, or install flow restrictors	200
4. Turn electronic appliances off instead of leaving them on standby	50
5. Replace all light bulbs with the lowest available energy option	60
6. Wash clothes less often on a lower washing cycle temperature & dry clothes naturally	100
7. Replace white goods with triple A rated appliances when your old ones expire	25
8. Consume less red meat (reduce red meat by 50%)	250
9. Eat less dairy produce such as cheese (reduce consumption by 50%)	120
10. Eat more locally grown and seasonal food produce	30
11. Reduce food waste through improved menu planning (Reduce from 156kg/y to 124kg/y)	60
12. Replace short car journeys with walking, wheeling, or cycling	950
13. Take public transport more often (50% reduction in private car use)	225
14. Use a car sharing scheme when commuting (see note 2)	275
15. Replace your petrol car with an electric vehicle (see note 1)	1000
16. Reduce the number of international holidays consider holidaying in the UK reducing foreign travel from 1.9/y on average to 1/y	450
17. Use the train instead of flying when commuting for business	300
18. Reduce garment purchases to less than eight items per year	90
19. Use clothes exchange sites to refresh your wardrobe in lieu of buying new reducing garment purchases by a further 50%	45
20. Use a clothes rental service for occasions instead of buying a new outfit	10

Note 1: replacing your petrol or diesel car with an electric vehicle will reduce your emissions significantly. However, as more journeys in Edinburgh are <5km this saving would be drastically reduced if someone decided to walk, wheel, or cycle these journeys. Both savings therefore cannot be taken. It is also environmentally irresponsible to replace your car with an electric vehicle if your annual milage is too low, since the embodied carbon expended in its manufacture cannot be recovered.

Note 2: approximately 31% of travel in Edinburgh is associated with commuting to work by car. Car sharing has the potential to reduce private transport emissions associated with travel by 50%. This saving cannot by counted in addition to walking, wheeling, cycling or using public transport as a proportion of the saving indicated are associated with commuting and would by double counted.