Further information and references for TakeABiteAtHome Theme 1: Planet to Plate

Work-it-out worksheet cheatsheet to calculations

- ``An average person causes 6000 grams of greenhouse gas emissions (gCO2e) each day because of the food they eat."
- ``Typically, every minute driving causes 165 gCO2e. How many gCO2e did your journey cause? "
    - e.g. Car journey taking 10 minutes
    - 10 minutes * 165 gCO2e / minute = 1650 gCO2e
    - This is about a quarter of the emissions of 1 day of food
- "Typically, each minute in the shower causes 80 gCO2e. How many gCO2e does your shower cause?"
    - E.g. shower lasting 5 minutes
    - 5 minutes * 80 gCO2e / minute = 400 gCO2e
    - This is about a quarter of the emissions from a 10 minute car journey
- "Each minute that a kettle is switched on, it causes 8 gCO2e. How many gCO2e are caused by boiling a kettle? How might this change if you put more water in the kettle?"
    - E.g. kettle taking 1.5 minutes to boil
    - 1.5 minutes * 8 gCO2e / minute = 12 gCO2e
    - This is very small compared to the shower or the car journey or the day of food
    - Would be larger if you put more water in the kettle

Work-it-out worksheet references

- ``An average person causes 6000 grams of greenhouse gas emissions (gCO2e) each day because of the food they eat." This is an average person in the world. This is about the same as the value for the UK, and about half the value for the US - from Bajzelj et al 2013
    - Bajzelj, Allwood and Cullen 2013 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3797518/ give in their Table S19 that food causes 2.2 tonnes CO2e / person / year. Dividing this out over 365 days in a year, converting from tonnes to kg gives 6 kg / person / day.
    - Comparing with other literature, Springman et al 2016 https://www.pnas.org/content/113/15/4146 find 7.6 Gt per year for 2005/7 and which converts to 1.15 tCO2e per person per year assuming a population of 6.6 billion (in 2006), which is 3.2 kg per person per day, which is half the 6 kg number above, however, their emissions data don't include land clearance, transport, processing, packaging or cooking.
    - Poore & Nemeck 2018 https://science.sciencemag.org/content/360/6392/987 get 13.7 GtCO2e / year in 2010, which is 5.4 kg CO2e per person per day. When they include food waste this adds 2.05 GtCO2e / year, bringing the total to 6.2 kg CO2e / person / day, in line with the value we use of 6 kg CO2e / person / day.
    - See also Food and Climate Change -- Without the Hot Air, to be published by UIT Cambridge when the printing presses re-open (was due May, now hopefully September) www.sarahbridle.net/faccwtha #faccwtha

- ``A mean power consumption of the 25 cheapest electric showers sold by Screwfix … [give] a power of 9.2 kW. - Screwfix Limited, Screwfix.com | The UK's number 1 trade catalogue. 2020 [cited 2020 March]; Available from: https://www.screwfix.com '' - lifted from MPhys report by Joanne Cook. A 5 minute shower therefore uses 9.2 kW * 5 minutes / 60 minutes per hour = 9.2 * 5 / 60 kWh = 0.77 kWh. Using 0.5 kg CO2e / kWh this causes 500 grams CO2e / kWh * 0.77 kWh = 500 * 0.77 gCO2e = 385 gCO2e. Each minute in the shower causes 385 / 5 gCO2e = 77 gCO2e. We round this to 80 g CO2e in the worksheet.
- Assume a typical kettle draws 1 kW of power. Putting it on for 1 minute would use 1 kW * 1 minute / 60 minutes per hour = 0.0167 kWh. Using 0.5 kg CO2e / kWh this causes 500 grams CO2e / kWh * 0.0167 kWh = 500 * 0.0167 gCO2e = 8.35 gCO2e. We round this to 8 gCO2e in the worksheet for simplicity.
- Earth cartoon image credit https://pixabay.com/vectors/planet-earth-cartoon-world-2831514/
- Tree stump image credit https://publicdomainvectors.org/en/free-clipart/Ax-stuck-in-a-wood-log/79929.html

Interview with Pete Smith

- Pete's work includes https://coolfarmtool.org/ Cool Farm Tool, which is free for farmers to use to calculate their environmental impacts, including greenhouse gas emissions depending, on the specific decisions being made about e.g. fertilizer and land use.
- "Across the world, about 27 football pitches' worth of forests are lost every minute." https://medium.com/wwftogetherpossible/the-climate-change-solution-under-our-noses-ad04c2c7b6c0 See also http://www.climateandlandusealliance.org

Interview with James Hand

- Try out Giki's emissions calculator for yourself here https://zero.giki.earth/
- Use Giki's app to find out more about your purchases here https://badges.giki.earth/

Interview with Dave Reay

- ``A big chunk of the greenhouse gas emissions in this country (the UK) actually come from decisions individual people make at home (about 40% of all UK emissions come from households), like how we heat houses, what we eat, and how much 'stuff' we buy." Source: https://www.theccc.org.uk/wp-content/uploads/2016/07/5CB-Infographic-FINAL-.pdf
- ``The average household in the UK is responsible for around 8 tonnes of greenhouse gas emissions each year, with the biggest culprits being home heating & electricity, travelling in cars and planes, and producing all the food we buy'' https://energysavingtrust.org.uk/blog/path-net-zero-overview
- "drier conditions damaging their cocoa crops and pushing their farms out of business." Source: https://link.springer.com/chapter/10.1007/978-3-030-18206-9_6
- "During a big drought in the UK back in 2018 the potato crop was hit badly and there was even a fear that our chips would all have to be an inch shorter!" https://link.springer.com/chapter/10.1007/978-3-030-18206-9_12

- More info from Dave, removed from the interview sheet due to lack of space “Finally, if you like some crispy, battered fish with your chips (my favourite take away!) then you may have to get used to the usual fish like Cod disappearing from the chip shop menu. Warming of the oceans due to climate change is meaning cold water fish like Cod are retreating from the seas around the UK to try and find cooler waters further north " https://link.springer.com/chapter/10.1007/978-3-030-18206-9_13

Please send us your questions, to queries@takeabitecc.org

Errata / potential improvements

- Text could link better with the worksheet video by changing the text to ``half full (500 ml) and the full (1000ml) kettle''
- each minute in the shower causes 80 grams of CO2 -> CO2e
- CO2 -> CO2e throughout the worksheet video
- Look at a range of kettle models to find the typical power consumption - might be higher than 1 kW.