Food
Physics and Mathematics of Sustainable Energy
College of the Atlantic

1. (a) Suppose you eat around 2 kg of red meat per week. (This is roughly the average per capita US consumption.) What is the CO_2e associated with this over the course of one year? Is this a lot or a little?

   (b) Suppose you replace this red meat with chicken or fish every week. How much CO_2 have you prevented from being emitted?

   (c) How much driving in an average car would emit a similar amount of CO_2?

2. Answer the following questions using Table 1 and Figure 2 from Weber and Matthews.

   (a) How much energy does it take to ship 3 metric tons of corn from Iowa to Bar Harbor via truck?

   (b) How many tons of carbon dioxide does this emit?

   (c) What is the total emissions associated with 3 tons of corn?

3. According to Scarborough, et al[1], the CO_2e emissions in kg/day associated with different diets in the UK is: 7.19 (7.16, 7.22) for high meat-eaters ($>= 100$ g/d), 5.63 (5.61, 5.65) for medium meat-eaters (50-99 g/d), 4.67 (4.65, 4.70) for low meat-eaters ($<$ g/d), 3.91 (3.88, 3.94) for fish-eaters, 3.81 (3.79, 3.83) for vegetarians and 2.89 (2.83, 2.94) for vegans. The numbers in parentheses are 95% confidence intervals.

   (a) If a medium meat-eater switched to a vegetarian diet, how much less CO_2e would be emitted in one year? Is this a lot or a little?

   (b) If a high meat-eater switched to a fish-eater diet, how much less CO_2e would be emitted in one year? Is this a lot or a little?

Some useful info:

- Burning one gallon of gasoline releases 38 kWh of energy.
- Burning gasoline releases 240 grams of CO_2 per kWh.
- Burning one liter of oil releases 10.5 kWh of energy.
- Burning oil releases 260 grams of CO_2 per kWh.

---

[1]Scarborough, Peter, et al. "Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK." *Climatic change* 125.2 (2014): 179-192.