



Green Food Challenge

Sprint 1

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CMPT 276 - Fall 2018

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Revision History

Date	Version	Changes
Oct. 9, 2018	1.0	Initial description of project and requirements

1. Overview

The Green Food Challenge application aims to help people collectively reduce greenhouse gas emissions in Metro Vancouver.

2. Background

As Canadians, we often think of ourselves as surrounded by nature and thoughtful about the environment. Indeed, Vancouver has spearheaded the Greenest City Action Plan since 2011, with the goal of becoming the greenest city in the world by 2020.¹ Of the plan's 10 specific goals, and one of the goals is for a **lighter footprint**, reducing Vancouver's carbon footprint by 33% over 2006 levels.

What is a carbon footprint?

Greenhouse gases, measured in CO₂e (CO₂ equivalents), are known to directly contribute to climate change, and include carbon dioxide, methane, and nitrous oxide. In 2015, regional emissions in Metro Vancouver were projected to be 14.9 million tonnes of CO₂e, between 6-8 tonnes per capita. In other words, we can then say that our personal carbon footprint is about 6-8 tonnes of CO₂e. However, it is generally estimated that global emissions must be reduced to approximately 2 tonnes per capita by 2050.

What contributes to greenhouse gases?

There are many CO₂e contributors to our carbon footprint, including transportation and buildings (commercial, residential)². Municipalities and businesses are currently undertaking measures to reduce their footprints. For example, Metro Vancouver transit can be promoted over cars, and buildings are changing their heating systems from natural gas to hydroelectric.

Despite these efforts at the governmental level, at the current pace of change, it is unlikely we will meet the 2020 target³. What else can we do to mitigate climate change? Aside from taking transit, is there anything else we can do as individuals?

¹ https://en.wikipedia.org/wiki/Vancouver%27s_greenest_city_action_plan

² <http://www.metrovancouver.org/services/air-quality/emissions-monitoring/emissions/emission-inventories/Pages/default.aspx>

³ <http://www.metrovancouver.org/metro2040/environment/reduce-ghgs/ghg-emissions/Pages/default.aspx>

The carbon impact of food

Food is generally under-reported as a source of CO₂e. For instance in Europe, agriculture contributes to 10% of the carbon footprint. In particular, ruminants such as sheep and cows produce methane through enteric fermentation (i.e. they pass gas) and produce more CO₂e than other types of animals. According to the European Commission, the vast majority of methane emissions (85%) come from ruminants' digestion.⁴

Consumption-Based GHG Emissions, 2015

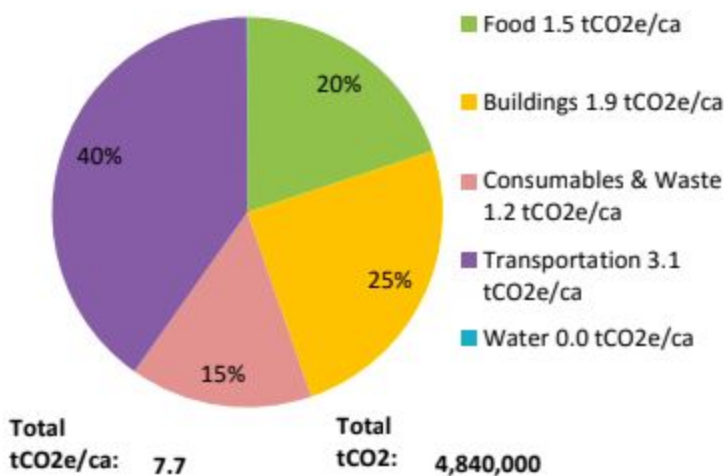


Figure 1: Breakdown of Greenhouse Gas Emissions Per Capita in Vancouver. The chart shows the breakdown of GHG's per person in Vancouver. While efforts in waste management and recycling (15%) are the most visible actions for Vancouverites today, an even larger contributor to our greenhouse gas emissions is food (20%).

Source: Vancouver EcoCity Footprint Tool

Certain foods take more CO₂e to produce than others. The table below shows the relative CO₂e costs for various types of food.

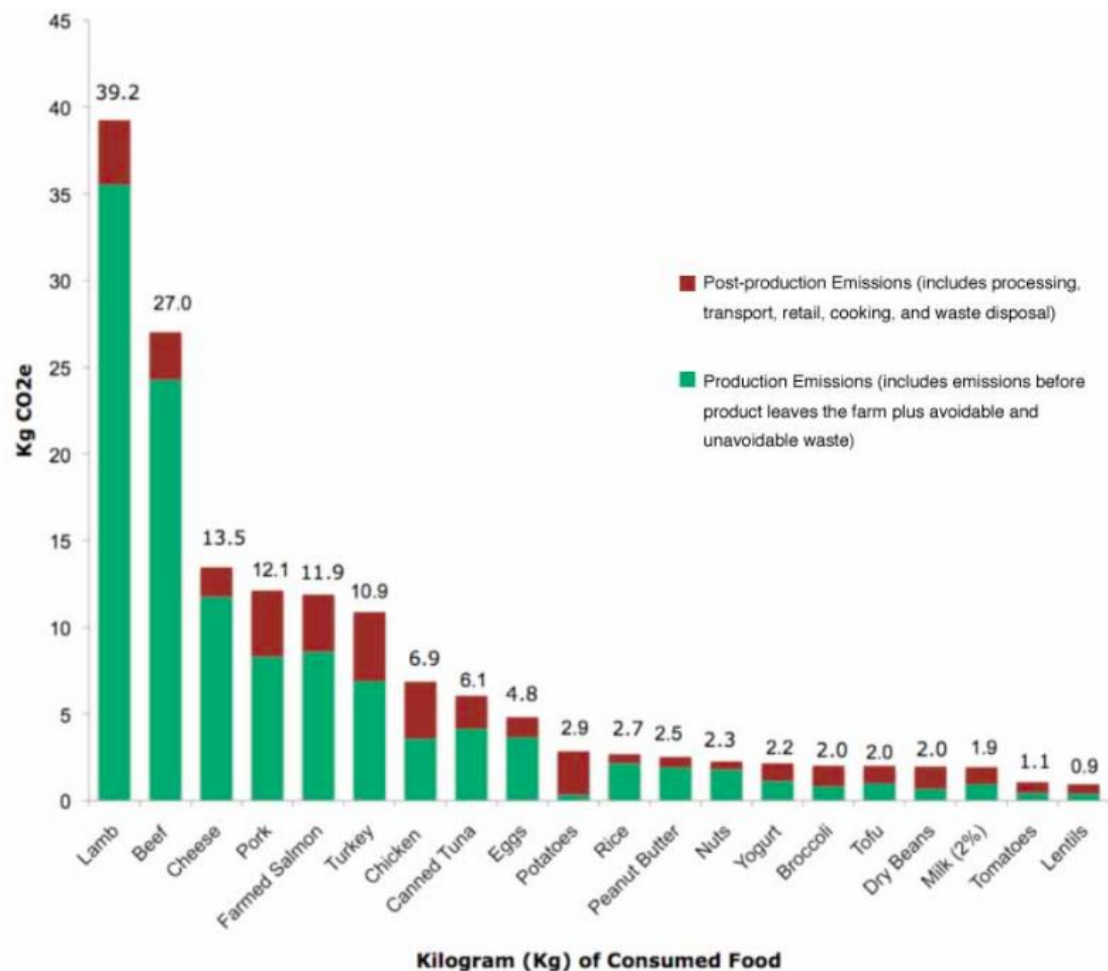


Figure 2

Source:

http://static.ewg.org/reports/2011/meateaters/pdf/methodology_ewg_meat_eaters_guide_to_health_and_climate_2011.pdf

Other sources:

https://pub.epsilon.slu.se/10757/1/roos_e_130821.pdf

A Low Carbon Diet

There are 2.46 million people living in the Metro Vancouver area, and about 90% of them eat food that are relatively high in CO₂e (i.e., are non-vegetarian). If each of those people, for instance, reduced beef/lamb from 35% to 10% and instead ate chicken, Vancouver could save 900,000 to 1 million tonnes of CO₂e per year.

Green Food Challenge

In this project, we aim to raise awareness and promote behaviour change by running the Green Food Challenge. In this challenge, people install a mobile application to learn how much their diet produces in terms of CO₂e, and discover how much CO₂e they (and their greater community) could save by making dietary adjustments.

Over the course of the Green Food Challenge, participants track their "green meals", containing chicken, seafood or vegetable-based proteins. Participants would see how many tonnes of CO₂e they save together as a community, as well as share restaurants that offer delicious "low carbon" meals. By incentivizing these CO₂e-friendly meals, it is hoped that participants learn to sustainably change their eating habits towards a lighter footprint.

3. Specifications

The Green Food Challenge application will be created in 3 phases (sprints):

1. Green Food Challenge Carbon Calculator
2. Green Food Challenge Group Pledge
3. Green Food Challenge Restaurant Guide

3.1. Green Food Challenge Carbon Calculator

The first phase of the application will allow users to a) estimate how much their current diet produces in CO₂e, and b) simulate how much CO₂e they could save by changing the relative proportions of food in their diet.

3.1.1 Canada Food Guide Data and Example Calculation

The Canada Food Guide recommends a standard serving of meat or alternative protein every day.

- Suggested daily serving of meat/alternatives (women)⁵: 150g

- Suggested daily serving of meat/alternatives (men)⁶: 225g
- More information depending on age is available on the Canada Food Guide website.

Note: While other sources of CO₂e exist (e.g. dairy), this calculator is intended to make a rough estimate based on the major contributors from food.

3.1.2 Table of CO₂e for Meat/Alternatives

Meat / Alternative Protein Source	CO ₂ e per kilo of food consumed (kg)
Beef	27
Pork	12.1
Chicken	6.9
Fish (Sushi, white fish filet, fish and chips)	6.1
Eggs (Quiche, hard-boiled, fried)	4.8
Beans (Falafel, hummus, tofu)	2
Vegetables (Pasta, veggies, soups)	2

Source:

http://static.ewg.org/reports/2011/meateaters/pdf/methodology_ewg_meat_eaters_guide_to_health_and_climate_2011.pdf

3.1.3 Example Diet

The calculator will ask the user to estimate the relative percentages of the meat/alternatives they consume. Another way to ask for the information may be, for example, to ask the user to estimate how many times per week they eat chicken and extrapolate.

e.g.

Meat / Alternative Protein Source	Current Proportion of Diet (%)
Beef	35
Pork	10
Chicken	35
Fish (Sushi, white fish filet, fish and chips)	10

Eggs (Quiche, hard-boiled, fried)	5
Beans (Falafel, hummus, tofu)	0
Vegetables (Pasta, veggies, soups)	5

3.1.4 Carbon Footprint Calculation of Current Diet

Requirement 3.1.4a: The calculator should present the user with an estimate of how many kilograms of CO₂e their current diet produces per year.

3.1.5 Carbon Footprint Savings Calculation

After estimating the user's current food carbon footprint, the carbon footprint calculator should offer a way to see how much the user could save by changing the relative proportions of their diet.

Some ideas include:

- Creating different "plans", e.g.
 - Meat-Eater Plan (e.g. continuing to eat the same amount of meat, but changing proportions to eat less high CO₂e foods)
 - Low Meat Plan (e.g. reducing amount of meat consumed and generally eating less high CO₂e foods)
 - Plant-based Plan (e.g. becoming vegetarian)
- Allow the user to move sliders to change the relative proportions of foods while updating the carbon footprint.

Requirement 3.1.5a: The calculator should present the user with an estimate of how many kilograms they could save in CO₂e with a different/better diet.

Requirement 3.1.5b: The calculator should offer these options in a positive, empowering way (rather than making the user feel guilty).

Requirement 3.1.5c: The calculator should be as easy to use as possible.

3.1.6 Calculation of Collective Footprint Savings

Considering the following data, the calculator can help users understand how, working together, we can help mitigate climate change.

- Number of residents in Metro Vancouver: 2.463 million
- Estimated percentage of non-vegetarians in Canada: 90%

Requirement 3.1.6a: The calculator should show how much CO2e would be saved in Metro Vancouver if everyone made the change the user did.

3.1.7 Increasing User Understanding

What is the equivalent of the CO2e savings in other metrics, such as trees planted or kilometres driven? How much are they reducing on their overall CO2e footprint?

Requirement 3.1.7a: The calculator should show how their food-based CO2e savings in equivalent measures that are easy to understand.

3.1.8 About Page

Requirement 3.1.8a: The calculator should have an About page describing the Green Food Challenge (Section 1 of this document) and providing educational information about carbon emissions (as described in Section 2).

3.2 Green Food Challenge Pledge

The goal of this phase is to be able to see how others in the community are pledging and be able to contribute to the Metro Vancouver CO2e savings, as well as share the challenge with their friends through social media.

Details to be confirmed.

3.3 Green Food Challenge Restaurant Guide

The goal of this phase is to be able to post pictures and locations of what you are eating and see what others are eating, in order to help others in your community find “low carbon” places to eat. For example, students could post about the falafel wrap at Donair Town, the sushi at Togo Sushi, and the Beyond Meat Burger at A&W.

Details to be confirmed.

4. Resources

Useful resources are listed below. Extra research may be required.

- **Vancouver Eco City Footprint Tool**
<https://drive.google.com/file/d/0B20bnHIOGzPIWF96ZUJFUy1icktCUTRXQ3BFUmd0ZUN5cWNR/view?usp=sharing>
- **Eat Low Carbon** <http://www.eatlowcarbon.org/>

- <https://www.carbonfootprint.com/calculator.aspx>
Typical carbon footprint calculators like the above are quite dry, boring and data-intensive, to the point where they become overwhelming for individuals. The Green Food Challenge should be easy to use and empower users to feel they can make a small but important change.
- <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

5. Technical Requirements

1. The solution must be built in an Android application.
2. The code must be written in Java and conform to the [Google Java Coding Style](#).
3. Most of your code should be contained in modular classes *outside* of the main file, in order to be unit tested.
4. Your code must have unit test coverage using JUnit. The more coverage, the better.
5. Your code should aim to be readable according to the [Clean Code](#) lecture.
6. The target API version is level 21 or better, running the "Nexus 5" hardware specification (1080x1920) in vertical orientation. If your team's demo Android phone has a different resolution, inform the instructor and coordinate with your team to work accordingly.

5. Academic Honesty

This project is to be done in your assigned groups. Do not share your code or solution with others outside your group, do not copy code found online. The Product Owner should be the main contact person communicating with the client as represented by Dr. Lim (see scrum team roles on course website.)

6. Submission

1. Your application should be pushed to the team Gitlab (<http://gitlab.cs.sfu.ca>) that has been created for your team.
2. Your team must create a **group** in **Coursys** with the same name as your Gitlab repo, and make a **Coursys** submission with your repo and git tag for that sprint.
3. The **Readme.md** in your Git repo should contain screenshots of your application.
4. Each sprint ends with a review demo in front of Dr. Lim or the TA. After the demo, a team retrospective will be done on how the sprint went, to improve team process. Students must be present to earn marks for the demo review and retrospective.
5. A marking guide will be posted each sprint. All sprints will be marked by the TA for your official grade.
6. Each member must submit [peer feedback](#) after the end of the sprint (due a few days after in Coursys). If you do not submit meaningful peer feedback then your mark will be reduced by 5%.