

**"FOODPRINTS", CARBON TARIFFS AND CANADA'S FOOD**

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**Poster**

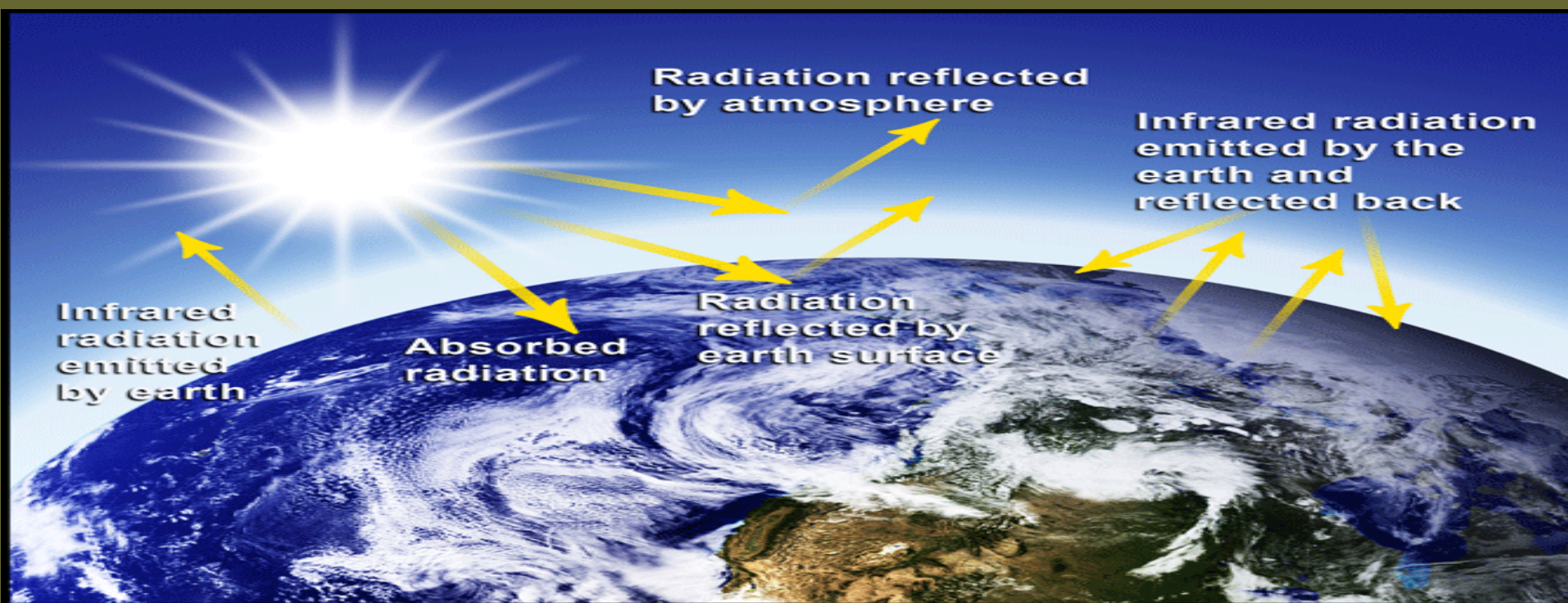
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# “FoodPrints”, Carbon Tariffs and Canada’s Food

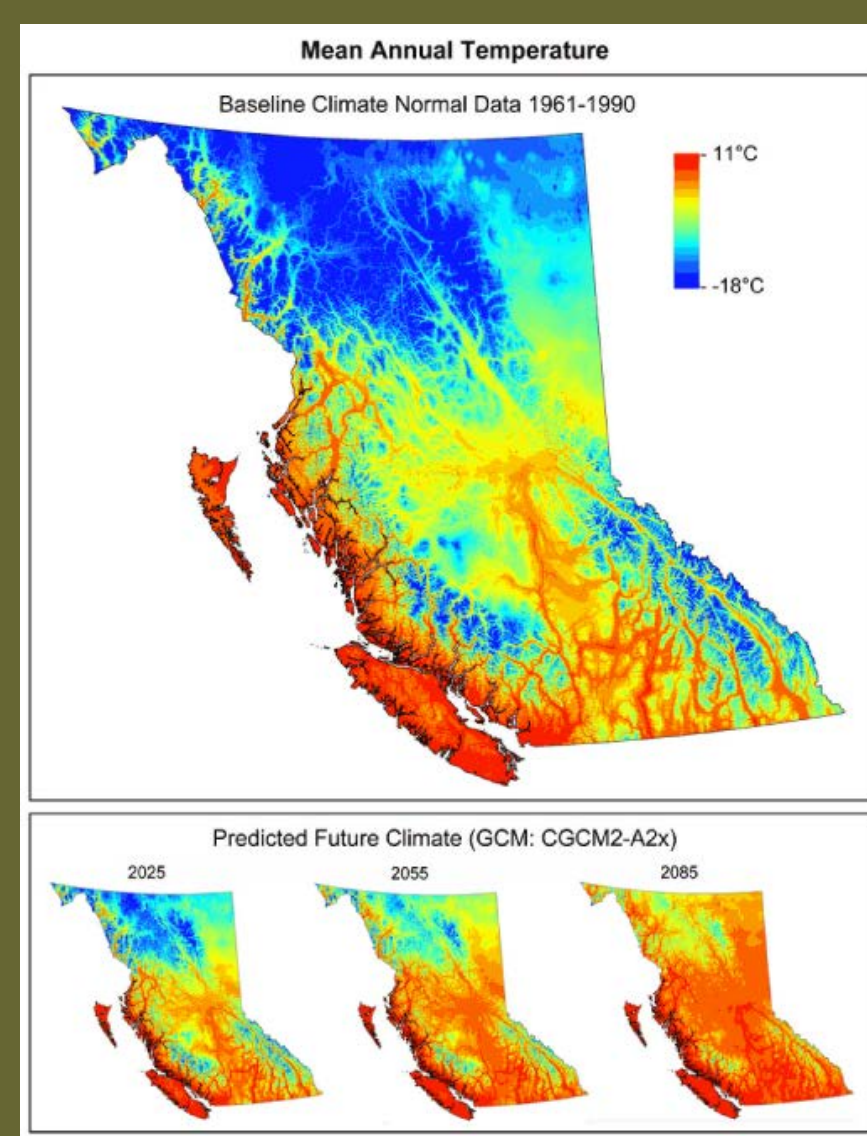
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## Abstract

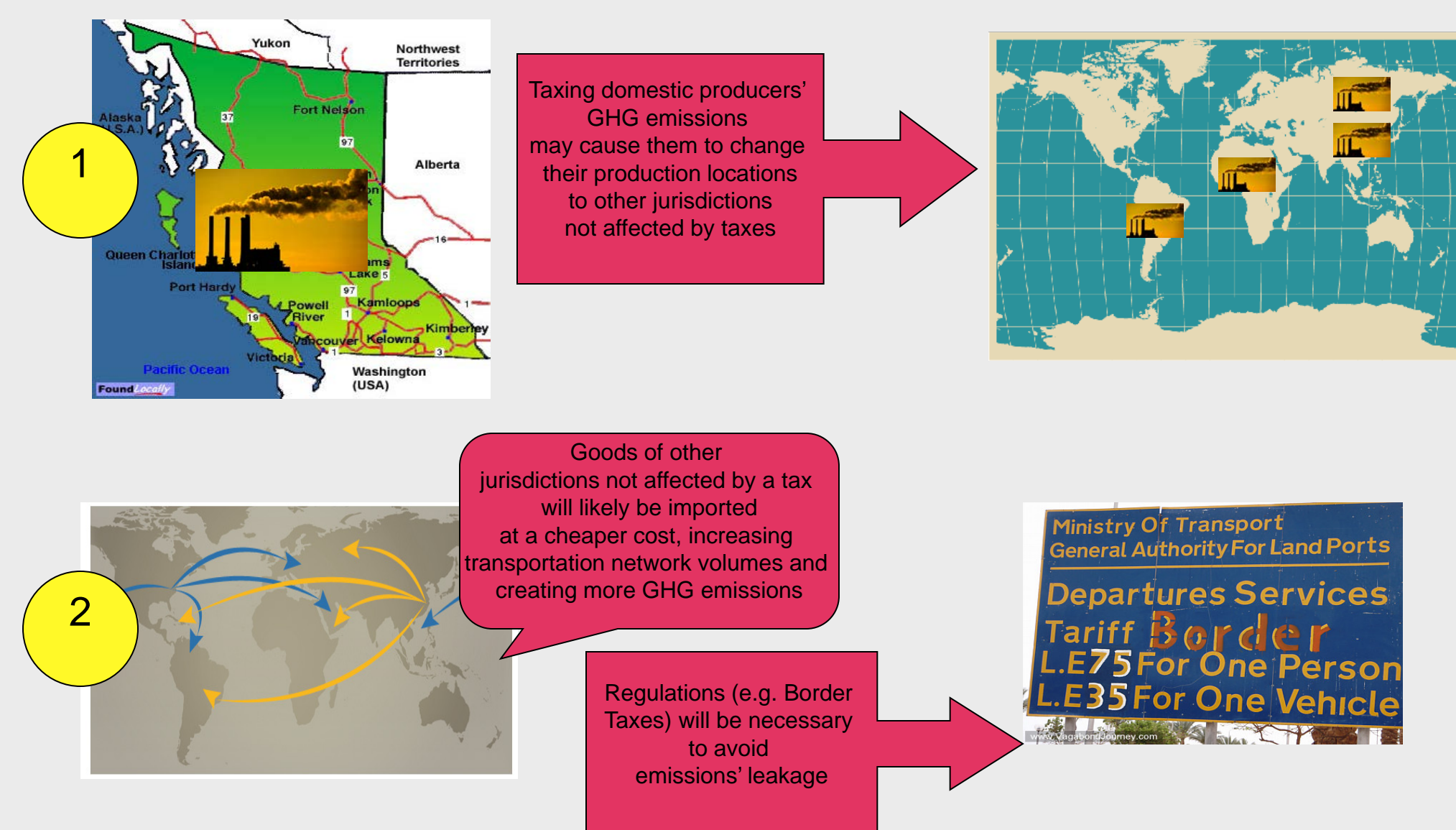
A carbon tax has already been introduced in British Columbia. It is likely that other carbon regulations will come into play shortly. In all likelihood, with the introduction of a domestic emissions pricing agreement there will be an accompanying border tax adjustment or other similar provision. Most recently for example, the US Congress suggested provisions to address carbon emissions and jobs leakage. One provision of significant interest proposed for the US is a border tax adjustment scheme that will serve to prevent carbon leakage from trade and outsourced goods (including food). We are conducting a study to help us understand the implications of a border tax provision on foods imported to Canada. We first quantify foods imported and estimate GHG emissions from their production and transport to Canada (9 food categories are chosen: field grown vegetables, greenhouse grown vegetables, fruits, dairy, beef, chicken, pig, eggs and grains). Second, assuming a hypothetical price for GHGs in tons of Carbon Dioxide equivalents (t-CO<sub>2</sub>e), we seek to predict what a border tax adjustment reflective of GHGs from the production and transport of imported foods might look like. In the next phase of this project, using historical time series data on imports, tariff and non-tariff barriers we will research and predict the impact of our proposed border tax adjustment on trading patterns and values of foods imported to Canada.



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## Context: Just What is the Problem?



Between 1970 and 1990 direct emissions from agriculture grew by 27%. Today the average food item travels between 2,500 and 4,000 km before it reaches consumer plates - about 25% further than food traveled in 1980. Changes in our climate are developing as “heat stress, droughts and floods negatively affect[ing] crop yields and livestock<sub>2,3</sub>”. Climate change is directly affecting food-productivity as “average temperatures increase, rainfall amounts and patterns change and atmospheric concentrations of CO<sub>2</sub> and pollution levels” rise. Meanwhile, the scale of policies associated with climate change “has not yet been large enough to counteract the global growth in emissions<sub>2,3</sub>”. We consider a border tax adjustment scheme as one option to prevent GHG emissions’ leakage from the production and transport of foods consumed in Canada.

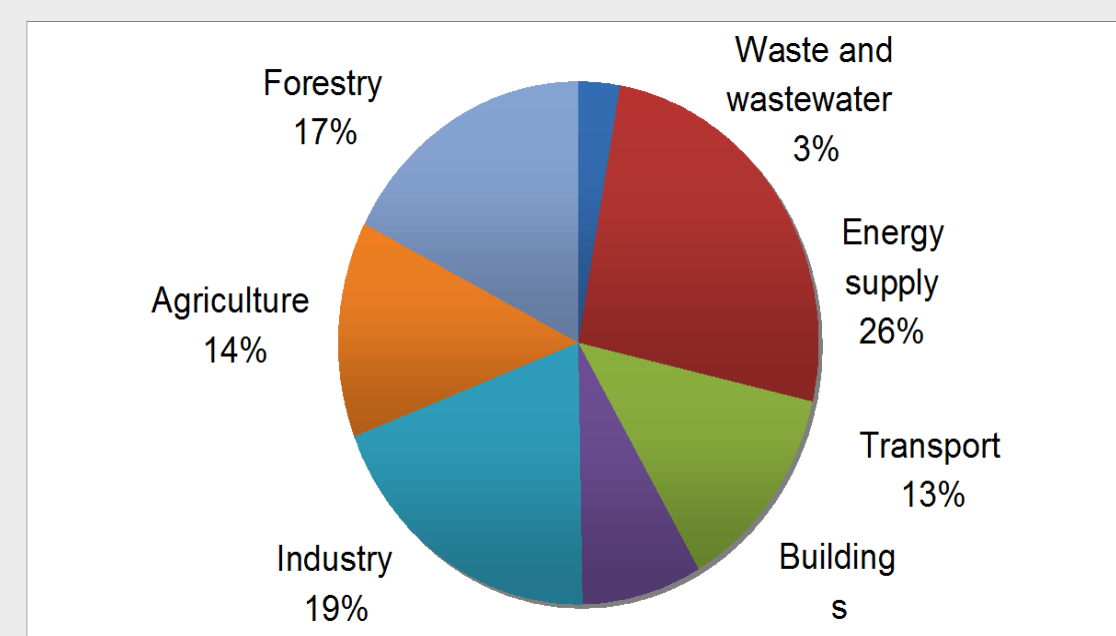


Figure 1: Global Sector GHG Emissions

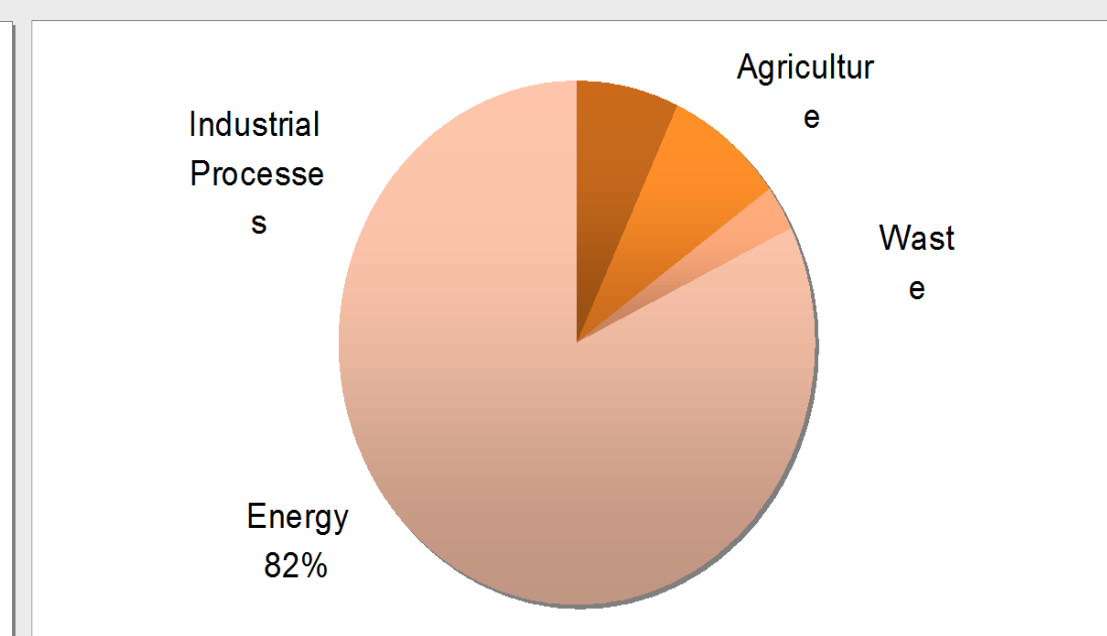


Figure 2: Canada's Sector GHG Emissions

## Introduction: Border Taxes and Our Dinner

Changes in policies and the patterns of regional food production increase international trade of agricultural products. An increase in international trade increases energy consumption and GHG Emissions from shipping and transportations. A carbon tax has already been introduced in BC. It is likely that other carbon regulations will come into play shortly. In all likelihood, with the introduction of a domestic agreement pricing emissions there will be an accompanying border tax adjustment or other similar provision. This study looks to help us understand what the implications of a border tax provision on foods imported to Canada might be. We ask two questions: Part 1) Assuming a hypothetical price for carbon emissions what would be the appropriate border tax adjustment for GHG emissions (or embodied energy) from the production and transport of whole foods imported to Canada? And Part 2) What would the impact of a border tax adjustment be on trade values of these whole foods from different countries to Canada? We seek to understand what the impact of our border tax adjustment will be on trading patterns and values of foods imported to Canada.

## Methods: Chasing Fossil Fuels in Our Food System

4 steps are taken to estimate GHG emissions from Foods Imported to Canada:

- Step 1.** We quantify foods imported. 43 shipping countries and 9 Food Categories are chosen as Fruit, Vegetables (Greenhouse and Field Grown), Eggs, Dairy, Grains, Poultry, Sheep/Lamb, Beef, Pork;
- Step 2.** We estimate GHG emissions from farm level production of foods imported to Canada (from agri-land use, energy consumption, agri-chemicals available to BC, and the manufacture and transport of feed imported to BC);
- Step 3.** We estimate GHG emissions from the transport of foods imported to Canada using the WASD (weighted average source distance) formula whereas:  $g\text{-CO}_2e \sim (\text{weight (tons)})(\text{distance (km)})(T\text{-km factor})$ . T-km factors applied include Boat: 30, Rail: 41, Truck: 207, and Air: 1206
- Step 4.** Results from Steps 2 and 3 are added together for a total estimate of GHGs from foods imported to Canada.

We assume a carbon price of 25\$/tonne to calculate a “C-Tariff” for each food category imported by country. A regression analysis will be used to understand the relationship between our C-Tariffs and trade values of foods imported to Canada.

## Results: Carbon “FoodPrints” Elite Food Travelers and Carbon Tariffs

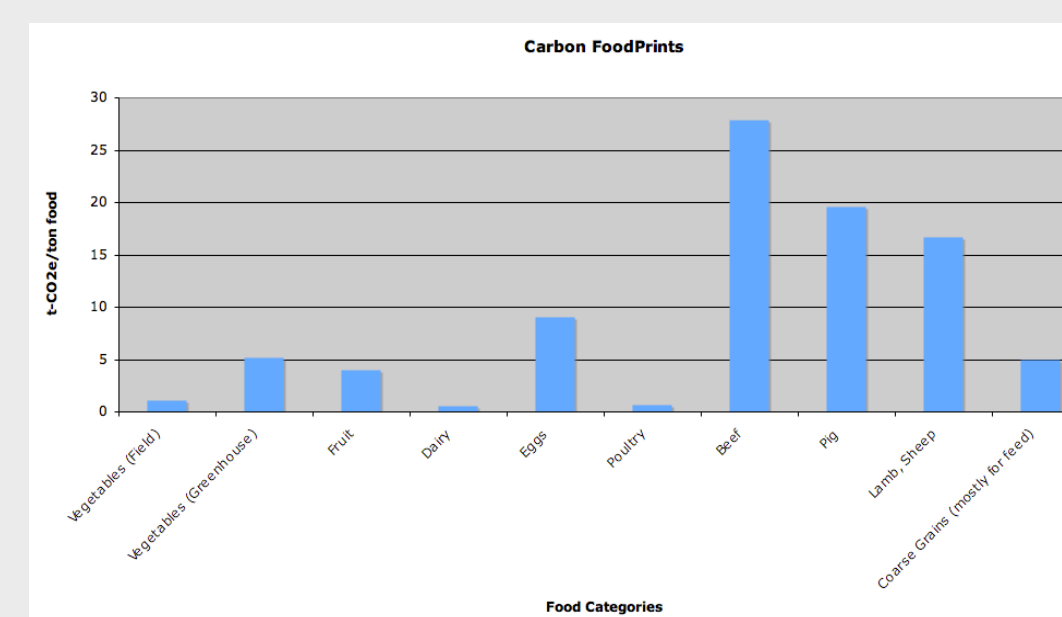


Figure 3: Carbon “FoodPrint” Estimates (Production Emissions Only)

Country of Origin	Production Emissions	Transport Emissions	Total Emissions From Food Category Imported
	kg-CO <sub>2</sub> e	kg-CO <sub>2</sub> e	kg-CO <sub>2</sub> e
Australia	60.25	0.85	61.10
New Zealand	34.04	0.39	34.42
Other Countries	40.93	0.16	41.08
<b>USA (Denver)</b>	<b>1357.78</b>	<b>14.61</b>	<b>1372.39</b>
<b>Total</b>	<b>1493.00</b>	<b>16.00</b>	<b>1509.00</b>

Figure 4: Production and Transport Emissions Of Beef Imported to Canada

Carbon “FoodPrint” estimates (i.e. GHG emissions from the production of a food category) from products imported to Canada are in Figure 3. From food production alone **beef, pig and lamb have the highest production emissions**. Using our Carbon FoodPrint Estimates and the WASD formula (mentioned in our methods section) we estimate emissions for each food category imported to include both production and transport emissions. An example of how we calculate emissions for the Food Category “Beef” is in Figure 4. **Elite Food Travelers, or those food products contributing the most to GHG emissions from food imports to Canada are listed in Figure 5. Examples of corresponding C-Tariffs for 4 high volume imports are in Figure 6.**

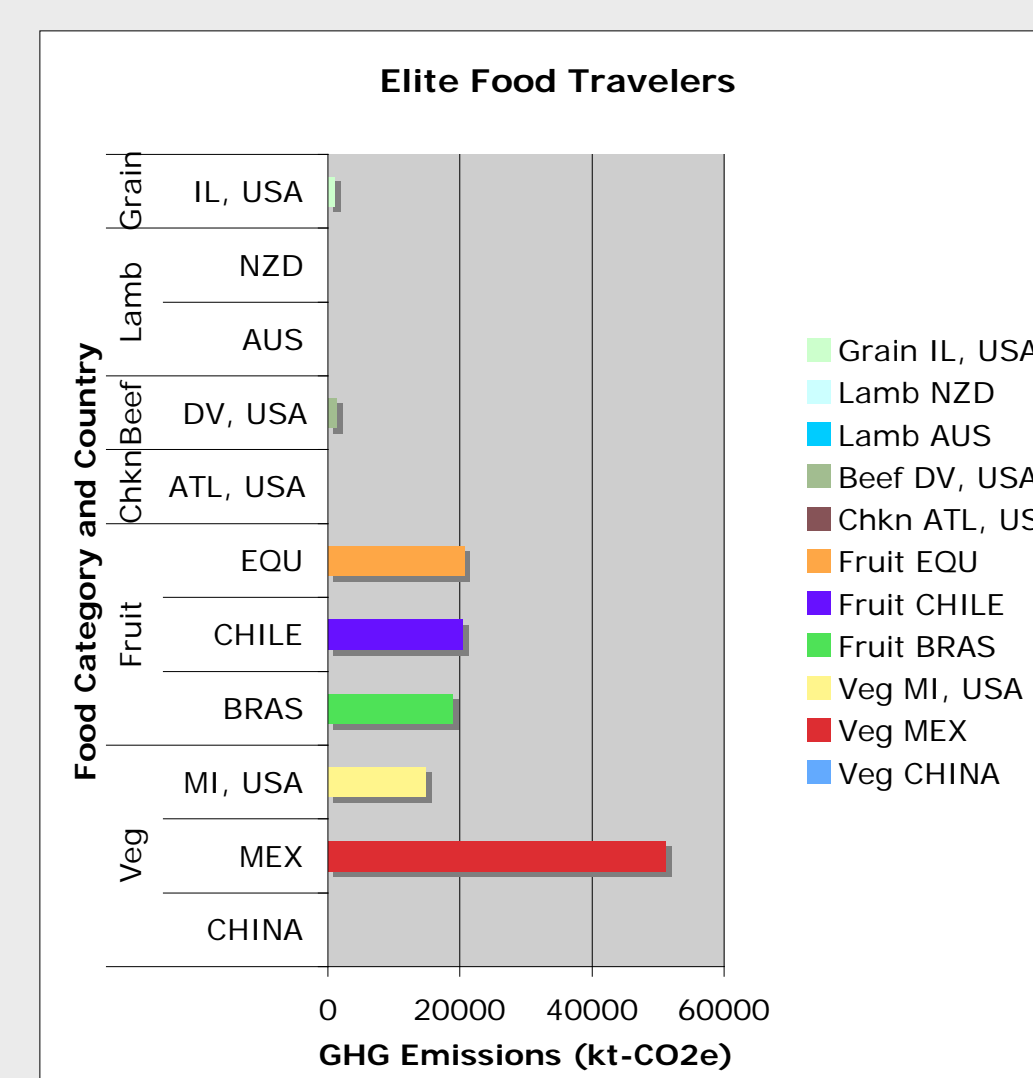
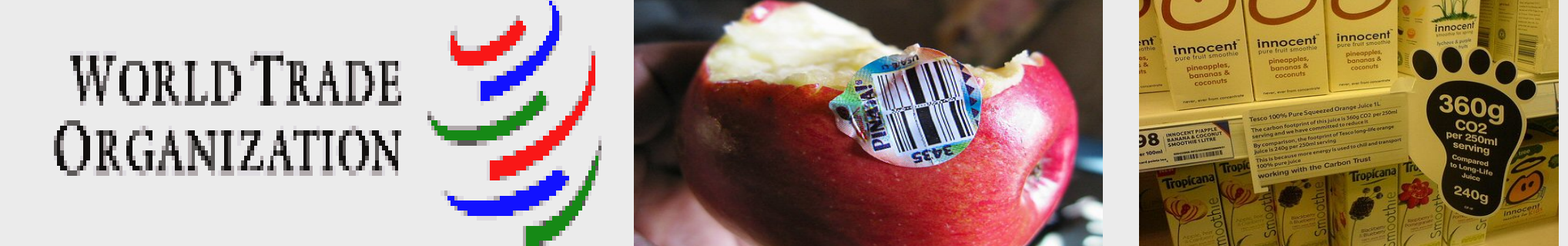


Figure 5: Production and Transport Emissions from Elite Food Travelers



Figure 6: C-Tariffs on High Volume Food Imports

## Discussion: Can We Really Place a Carbon Tariff on Our Food?



Possible Issues to Consider...

- Canada is subject to WTO principles, including the MFN (most favoured nation) principle which states that Canada can not discriminate across or between countries’ we import goods from.
- GHG emissions from foods imported to Canada are unique to farm production methods, location and transport methods.
- If we tax GHG emissions from foods at a standard carbon price, tariffs imposed will vary for each country and Canada could violate the MFN Principle.
- Canada could instead consider imposing C- tariffs or a Value Added Tax on a per product basis to foods imported; challenges would lie in accurately accounting for GHG emissions from each product (e.g. butter made in Holland vs apples farmed in New Zealand).
- Canada does not have the ability to access other jurisdictions’ food production methods. Effectively, we’d be left with “guess work” (rather than scientifically proven results) on accounting for GHG emissions.
- For example, to account for a full scope of a food product’s GHG emissions, we would need data from each stage of a product’s Life Cycle Assessment (LCA) (See Figure 7).

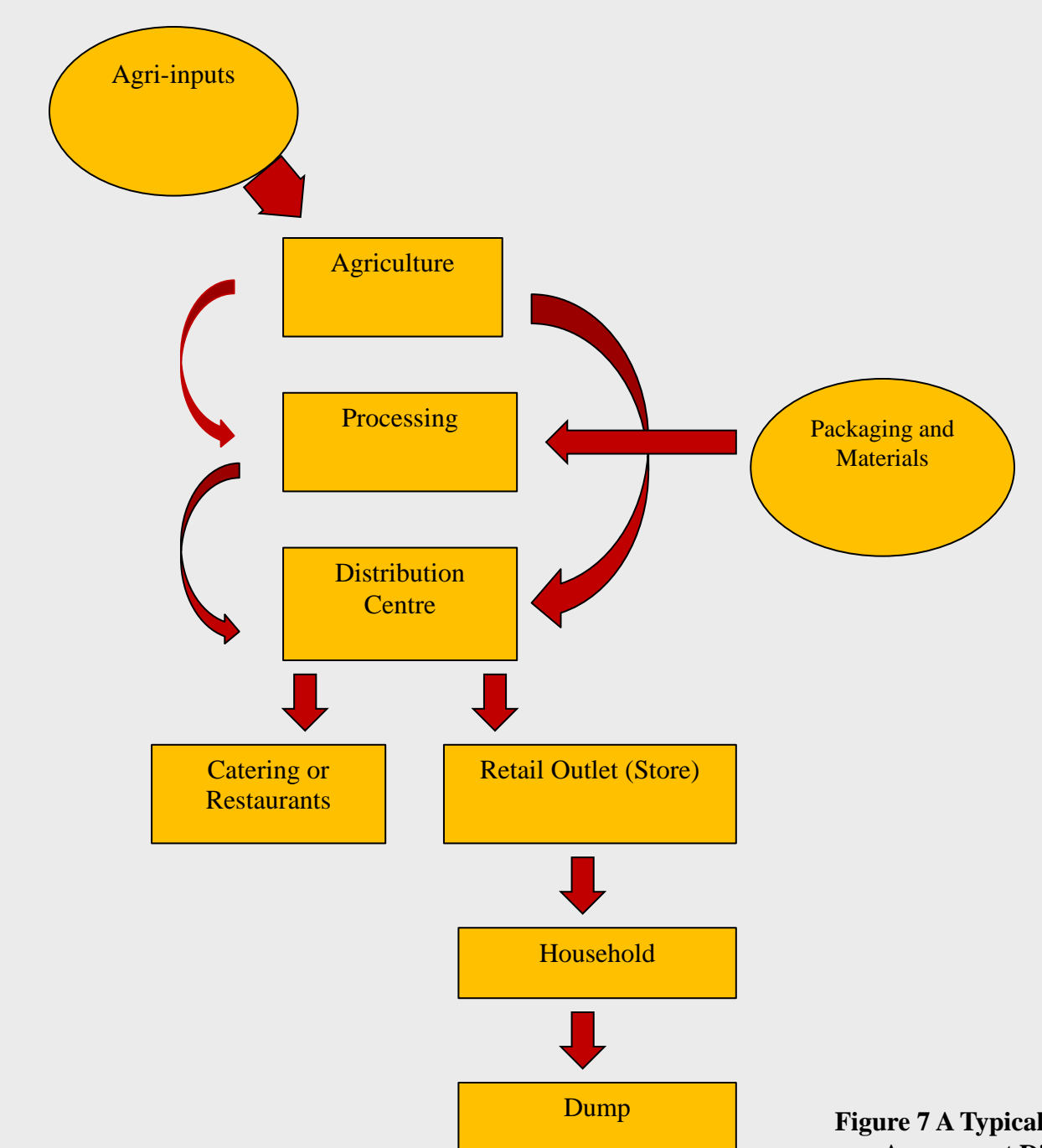


Figure 7: A Typical Life Cycle Assessment Diagram

## Next Steps in Research

Next steps in our research will involve interpreting results of our regression analysis, researching alternative national policy tools to C-Tariffs and discussing which food values Canada might consider as part of a national food ethic.

References (Footnoted)  
1. (UBCFSF 2009) - University of British Columbia Food System Project; reports available in the SEEDS Library: <https://circabc.ubc.ca/handle/2429/22911>  
2. (IPCC 2007) 2007a. Climate Change 2007 - Impacts, Adaptation and Vulnerability. Retrieved January 18, 2011 from: [http://www.ipcc.ch/publications\\_and\\_products.htm](http://www.ipcc.ch/publications_and_products.htm)  
3. (UN Division for Sustainable Development 2009) <http://www.un.org/esa/sustdev/publications/indicators/indicators.shtml>  
4. (StatCan 2009, 2006) <http://www.statcan.gc.ca/pub/16-201-x/2009001/eng.htm>  
5. (Bentley 2004) <http://www.foodlab.ca/2004/04/04/foodlab-report.pdf>