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FOLLOWING THE PLOW



UBC
FOOD
SYSTEM
PROJECT

EMPOWERING EATERS TO MAKE CLIMATE-
FRIENDLY CHOICES: A PUBLIC EDUCATION
INITIATIVE

Scenario IIIB

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Table of Contents

Abstract	3
Introduction.....	4
Problem Statement.....	.Error! Bookmark not defined.4
Reflection on the Vision Statement and Identification of Value Assumptions.	Error! Bookmark not defined.6
Discussion	Error! Bookmark not defined.7
<i>P.L.O.W. Definition and Justification of Carbon Smart Food.....</i>	<i>7</i>
<i>Justification of Carbon Smart Guide.....</i>	<i>11</i>
<i>Justification of Carbon Label.....</i>	<i>13</i>
<i>Justification of Carbon Smart Website.....</i>	<i>14</i>
Recommendations	16
Conclusion	17
<i>Central Findings.....</i>	<i>17</i>
<i>Findings Related to the Impact of Personal Food Choices on Climate Change.....</i>	<i>18</i>
References.....	22
Appendix A: Carbon-Smart Food Guide.....	Error! Bookmark not defined.
Appendix B: Carbon-Smart Food Website Homepage	Error! Bookmark not defined.
Appendix C: Carbon-Smart Food Website Content	See Separate Doc Error! Bookmark not defined.
Appendix D: Carbon-Smart Food Website Interactive Game.....	Error! Bookmark not defined.

ABSTRACT

The UBC Food System Project (UBCFSP) is an ongoing community based action research project involving the collaboration of several stakeholders from the Centre for Sustainable Food Systems (CSFS) at UBC Farm and the 100-Mile Diet Society. The goal of our project this year is to create a carbon-smart food guide that aims to educate Vancouverites about the environmental impacts of the food system so they can become “empowered eaters”. The carbon smart food guide our team created is in the format of a brochure, which is both compact and convenient for easy distribution. We also produced a carbon-smart label and developed a website to help to further guide and educate the community of the essence of carbon-smart food choices. Based on the extensive research conducted by our team, the three public resources will work to help members of the community easily define what a carbon-smart food is. The definition our team has come up with for carbon smart food is “food that contributes to the minimization of green house gas emissions when taking into account its methods of production, processing and distribution from field to table.” To convey to the public the four main factors that we believe identify carbon-smart foods, we came up with the acronym: P.L.O.W., standing for plants, local, organic, and whole.

INTRODUCTION

The origins of the University of British Columbia Food System Project (UBCFSP) began in 2002 when students enrolled in Agricultural Sciences 450 began investigating the different components of the food system in order to assess and improve its overall sustainability (Rojas, 2009). Each year, the project has striven for further improvements in our community's food system security and sustainability via its ongoing collaborative, community-based research action plan involving the instructor, teaching team, stakeholders and students (Rojas, 2009). As the future key-holders to implementing change, we believe that the underlining goal of the UBCFSP's education initiative delves deeply to convey the message of love and peace between human and nature in our community. We foresee the UBCFSP as a leader in this "green revolution" through its sincere contribution to improving the relationship between human and nature, with the potential to grow even greater and achieve many possibilities.

Presently, the UBCFSP is in the process of assessing the current state of the food system and exploring solutions on how it might go about minimizing its carbon footprint (Rojas, 2009). In order to improve the climate change problem, group 15's task is to inform and educate Vancouver eaters on how they can make a difference in our current climate crisis through their food choices. This report begins with the problem definition, vision statement, and the definition and justification of what an appropriate carbon-smart diet should encompass. Suggestions on how to adopt a more carbon-smart lifestyle are also outlined in our educational pieces. In the discussion we justify the design and proposal of our brochure, carbon smart label and website that will be presented to the public. Final recommendations and reflections are made to both the project collaborators and students of next year.

PROBLEM STATEMENT

The broad problem to which the UBCFSP addresses is climate change. Between 1970 and 2004, there was a 70% increase in greenhouse gas (GHG) emissions, 80% increase in carbon dioxide

emissions, and 120% increase in direct emissions from transport in the atmosphere with numbers expected to rise even more over the next few decades (IPCC, 2007). Largely contributing to GHG emissions is the employment of petroleum in the production of synthetic fertilizers, machinery, and the transport in our food system. It is reported that an individual's consumption pattern contributes equally to GHG emissions as his or her transportation choices (Eshel & Martin, 2006). Therefore, our "Changing the Food System to Change the Climate" project aims to make the food system more sustainable, indirectly, by empowering consumers with the knowledge and desire to make climate-friendly food and lifestyle choices.

Consumers today are bombarded with information from various sources like the newspapers, advertising, and media, to name a few, regarding the ecological and climate impacts of food choices. Overwhelmed with information from the many sources, some credible while others not, consumers face the challenge of making sense of all that information in order to be able to make ethical food choices that reduce GHG emissions. Education and knowledge is an important aspect in moving towards a greener lifestyle. Thus, the goal of the carbon-smart brochure, website, and label is to educate and inform the public about carbon-smart food choices and lifestyles, so that consumers can be empowered to make climate-friendly choices.

While the carbon-smart food guide focuses on environmental sustainability, attention is also paid to other problems in the food system, including the economic and social dimensions. In addition to increasing environmental sustainability through decreasing GHG emissions by promoting climate-friendly food choices, we also address economic and social sustainability factors of our food system. For instance, promoting the purchase of local foods will help stimulate and inject money into the local agricultural economy, recreate ties between consumers, producers, and the land, and increase the social sustainability of our food system.

The UBCFSP aims to achieve food system sustainability, by the way of unanimous contribution and collaboration from all parties, including: food outlet providers, agricultural farmers, educators, and community members at large. Our project within the UBCFSP aims to improve the sustainability methods by educating the consumers, who ultimately drive the demand for sustainable practices and foods. Thus, the carbon-smart food guide aims to educate the general public and consumers so they can do their part in this arduous journey towards food system sustainability.

REFLECTION ON THE VISION STATEMENT AND IDENTIFICATION OF VALUE

ASSUMPTIONS

After reflecting upon the Vision Statement as a group, we collectively agreed with the overarching goal and its individual components. We feel the Vision Statement is complete, because it touches upon all aspects of a sustainable food system: the environmental, economic, social, and health aspects.

In relating the Vision Statement to Lang and Heasman's paradigms, we feel that the Ecologically Integrated paradigm is vital to achieving a sustainable UBC food system, which is accurately depicted in the seven principles. The Ecologically Integrated paradigm is grounded firmly in the science of biology, but it takes a more integrative and less engineering approach to nature, and it aims to preserve ecological diversity (Lang & Heasman, 2004). This paradigm has a holistic view of health, in comparison to the "medicalized" view of the Life Sciences paradigm, in which biological technologies are used for production are emphasized (Lang & Heasman, 2004).

The current Productionist paradigm has contributed to increasing quantity but has also compromised the quality and nutritional value of many foods, such as the loss of bioactive components like vitamins and minerals (Lang & Heasman, 2004). Our group is comprised of students in the Nutritional Sciences and Food Sciences fields, and our education backgrounds largely shape our value

assumptions. Based on our views, we believe it is very important to maintain the nutritional value of whole foods in a balanced diet. Agriculture, nutrition, and health are all interconnected; that is, human health cannot be achieved without preserving environmental health. Through our literature research, we realized that locally grown food and composting are both excellent components of the Vision Statement; the reasons being that one, it will contribute to the health of the ecosystem, and two, it will contribute to the health of individuals.

DISCUSSION

P.L.O.W.: DEFINITION AND JUSTIFICATION OF CARBON-SMART FOOD

Our definition of carbon-smart foods is “food that contributes to the minimization of GHG emissions when taking into account its methods of production, processing and distribution from field to table.” This definition captures both the on-farm and the off-farm components of the food system. It is the off-farm components of processing and distribution that most consumers rarely consider when making food choices. The three components - production, processing and distribution - from field to table are equally important since production generates as much GHG emissions as processing and distribution together, according to Heller and Keolian’s *Life-Cycle-Analysis of the U.S. Food System* report. Although the report is based on an American study, the similarity of the United States and Canada in terms of technology and economy makes this finding applicable to our own country’s situation (Rojas, 2009). In a long term perspective, Canada will have to conduct its own national study to improve data accuracy and consistency.

There are two main sections to our carbon-smart food guide: ‘Why choose carbon-smart foods’ and ‘How to choose carbon-smart foods’ (Refer to Appendix A); both help to define what a carbon-smart food is. There are obvious significant benefits for supporting foods that are environmentally and anthropically sound. For instance, we only need to consider how mankind’s prosperity and obsolescence

is affected by nature. However, people usually need certain incentives to consider initiating lifestyle changes, especially in our economically driven society today. The two difficulties consumers may believe are associated with a carbon-smart diet might include: inconveniency, and expense. Therefore, to minimize the above effects, our food guide emphasizes on benefits people gain both nutritionally and socioeconomically, such as being able to enjoy fresher, healthier food, supporting local farmers and keeping their money in their community. To eliminate potential confusion on what carbon-smart foods are, we came up with a catchy acronym: P.L.O.W. as the major criteria of a carbon-smart food. Each letter of P.L.O.W. represents: Plant, Local, Organic and Whole food, respectively. The justification for each is defined below.

Plants

Plants require less energy input and thus, it is less of a burden on our limited supply of fossil fuels (Nierenberg, 2005). In contrast, a unit calorie of beef production requires 33% more energy than plant production (Nierenberg, 2005). In order to satisfy meat consumers, other important natural resources are being depleted just to feed the livestock. Water, grain, and antibiotics are among these resources that contribute to the unnecessary waste (Pollan, 2008). Shockingly, the world's livestock generates more GHG emissions than our worldwide transportation industry (Pollan, 2008). For example, the production of a pound of beef requires an equivalent of sixteen pounds of grain (Gershon, 2006). Therefore, production and consumption of meat and animal products accelerate environmental damage, jeopardizing the ecological system and the future of mankind. Deforestation, erosion, fresh water scarcity, air and water pollution, climate change, biodiversity loss, the destabilization of communities, and the spread of disease will continue to exist if we persist in mindlessly supporting such exploitations (Worldwatch Institute, 2004). On the other hand, people who emphasize plants in their diet save more water than those that emphasize meat (Worldwatch Institute, 2004). A sharp contrast of water

usage exists between these two styles of diets, which is 300 gallons for a plant-based diet versus 4,200 gallons daily for a animal-based diet. (Worldwatch Institute, 2004). Overall, a vegetarian or a vegetable-centered diet is more ecologically friendly than an omnivore's diet (Wallace, 2008). Sixteen percent of the world's annual production of GHG methane comes from livestock waste (Nierenberg, 2005). Thus by eating more plants, we not only reduce the production of harmful gases released into our environment, but we also reduce food scarcity (Nierenberg, 2005).

Local

Choosing locally grown foods is another factor we consider as a great contributor to a carbon-smart diet. One of the greatest benefits of eating locally comes from shortening the chain between consumers and farmers, which subsequently creates a more direct connection with our food source. (MacKinnon and Smith, 2009). Also, when foods travel a long distance, they tend to lose nutrients (Tychie and Lee, 2007). Fresh and local produce, on the other hand, retain more nutrients (Tychie and Lee, 2007). An average North American meat product travels 2400 kilometres to get from the field to our dinner table (Hendrickson, 1996, cited in The Green Guide, 2008, p.10). An average British Columbian's meal contains ingredients from six different countries (Get Local, 2008). A quarter of the transported goods are foods (Get Local, 2008). GHG emissions vary in terms of the type of transportation used, and food. Transportation of food relying heavily on airfreight is one of the greatest contributors to pollution (Get Local, 2008). We have seen a tripling sum of importation and exportation with agriculture in the past 20 years just in North America alone (Get Local, 2008). Purchasing an apple from New Zealand contributes to 87 percent higher GHG emissions than buying a locally grown apple (Get Local, 2008). All these factors indicate that the consumption of local fruit, vegetable and grains has limited environmental impact as compared to imported food. In addition, by supporting local agricultural businesses, we create more job opportunities. Such environmental and socioeconomically-

sustainable practices are especially important in the current economic downturn.

Organic

Certified Organic (CO) plants are grown without the use of synthetic pesticides and fertilizers, and animals are raised without the use of antibiotics and growth hormones (Jones, 2001). Synthetic chemicals used intensively in agriculture have huge negative impacts on the environment and our health (Pimental et al, 2005). Manufacturing these inputs require huge amounts of energy that is derived from oil and natural gas, which results in the emission of carbon dioxide (Gershon, 2006). Organic agriculture requires up to 32% less amount of fossil energy, and contributes to soil biodiversity and fertility. Such soil is self-sustainable and, therefore, spares the use of fertilizers (Pimental et al, 2005). As shown in recent studies, organic food produce is denser in concentration in most nutrients, including vitamins A, C, E and the B group, and minerals such as zinc and calcium and fibre (Pollan, 2008). Therefore, consuming smaller quantities of food is enough to meet the optimal nutrition requirement (Pimental et al, 2005). As a result, CO foods, and all its benefits such as reduced GHG emission, better quality of food, improved animal welfare and a sustainable and fertile agriculture system, is an important factor in carbon-smart foods (Tara, 2008).

Whole

Whole foods promote the concept of eating unprocessed or minimally processed food, which means they are natural, contain zero preservatives and are environmental friendly (Climate counts, 2009). Whole foods contain the same composition they had while growing and also retain most of their beneficial nutrients (Climate counts, 2009). Choosing whole fresh foods is a win-win practice as it benefits both personal and environmental health. Our current Food and Nutritional Science practices do little to promote whole food consumption as the sciences treat food as single nutrients (Pollan, 2008). This reductionist point of view enables scientists, and large food companies to manipulate foods to

create food-like substances, additives such as aspartame and Splenda, and preservatives such as sodium nitrate and potassium nitrate. The safety of these substances to our body has been a controversial topic in recent years as mounting evidence point towards the side effects of these additives. Undoubtedly, food and nutrition has brought convenience and pleasure to our society, however, before Food and Nutritional Sciences move to their mature stage and the controversies associated with those food-like substances can be completely ruled out, we certainly should not risk our health. As it stands, and has since the beginning, we, as consumers, should choose foods that are natural and unprocessed.

JUSTIFICATION OF CARBON SMART FOOD GUIDE BROCHURE

When our group was given the task of creating a carbon-smart food guide, we were not given many specific requirements. The main task was to provide the readers with the knowledge of what carbon-smart food is and to justify our definition, while making the food guide appealing to the eye.

Our food guide targeted two categories of audiences. The first category included people who were already interested in carbon-smart foods, but would like more information. The second category were individuals who might not know about carbon-smart food, but whom after reading our food guide would be better educated and hopefully motivated to make carbon smart food choices. This brings us to the purpose of our food guide, which is to motivate, inform, and attract the attention of the reader. The purpose was to communicate educational information without overloading readers with too many statistics. We also wanted the concepts and definitions to be brief, concise, and easy to grasp.

Several reasons impacted our decision to adopt a brochure format for our food guide. Firstly, the size of a brochure is compact and so it will serve as an easy tool to hand out to people if they are walking by or visiting the UBC farm. Brochures are fairly inexpensive compared to a large poster that would need to be put on thicker paper or on a wooden frame. They can also be used to reach more people whereas, posters can only be seen where they are set up. Furthermore brochures can be easily

handed out anywhere and can be taken home and kept as an easily accessible reference, and they are a good tool to spark attention without overloading the reader with too much information.

The content of the brochure was designed to be easy for the readers to follow (See Appendix A). Our brochure opens with a definition of a carbon-smart food and then continues to explain why a person should choose those foods and how. We used the acronym P.L.O.W. to structure the rest of our brochure to make it easier for the readers to remember the different aspects of a carbon-smart food. At the end we further outlined some carbon-smart lifestyle choices that a person can make. These choices are not directly associated with carbon-smart foods, but we felt it was important to include them because they serve the same purpose of GHG reduction. We concluded our brochure with some additional website links that the readers could look up for more information. Our carbon-smart website was included to give further guidance and information about our P.L.O.W. acronym that we could not include in our short brochure. The 100-Mile Diet Society website was included because of our affiliation with that organization. We included the UBC Farm since the guide will most likely be handed out to people who are visiting the UBC Farm and so they can learn more about the farm and what it has to offer. Along with that idea, we included a website that helps people locate Vancouver Farmer's Markets. This was a way for us to prove to people that they can actually follow the guidelines in our carbon-smart food guide and to help them find those places where they are achievable.

The aesthetics of our food guide were made to be as appealing as possible. We tried to make it colourful and attractive, by incorporating pictures of foods that can be locally bought and produced in Vancouver. This helps to give people an idea of its availability and may motivate them to make local choices.

We researched the cost of printing 5000 full color, tri-fold brochures between two major printing and copying companies, Staples and FedEx Kinkos, and found that the prices were fairly competitive.

The after tax cost of printing at FedEx Kinkos totaled \$3248, at \$0.65 per sheet, while Staples offered a rate of \$4000, with folding included for an additional \$100.

JUSTIFICATION OF CARBON SMART LABEL

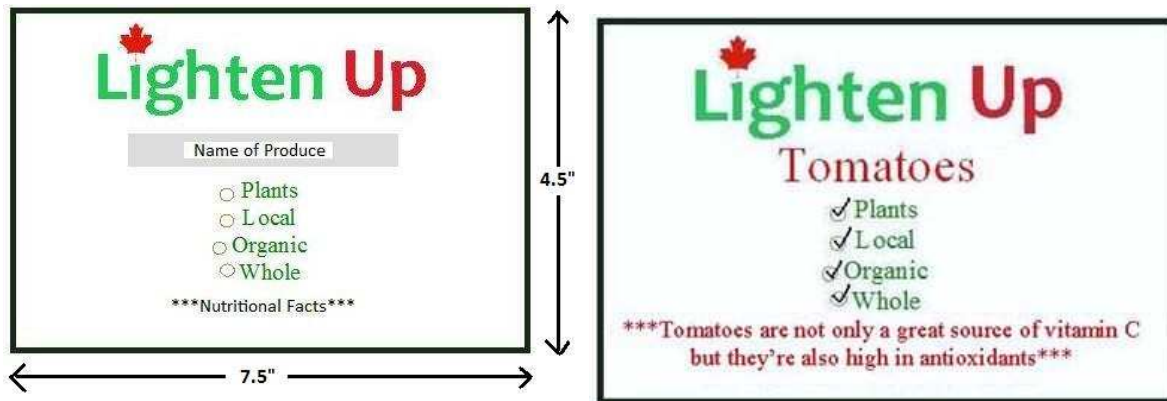


Figure 1 Design and sample of Carbon-smart Label

The purpose and design of our carbon-smart Label (Figure 1) is to succinctly capture and convey the message of P.L.O.W. to Vancouver consumers; raise awareness; and guide consumers toward carbon friendly food choices that will satisfy the Carbon Smart Food definition. We believe that the four factors - plants, local, organic and whole - are vital components in reducing GHG emissions, because it is a consumer guide for what to look out for to reduce their GHG emission via their everyday food choices. P.L.O.W., being the message consistently communicated in our website and brochure also appears on the labels to further act as reminders to carry out the best practice of being a responsible consumer. All three of our sources complement each other in its message. By incorporating P.L.O.W. into the label, we are making the assumption that consumers are aware of what each word represents, and ideally the brochure would be near the signage, or handed out as reference for consumers who are not familiar but are interested.

The design of our carbon-smart label was partially influenced by the AMS Lighter Footprint Eco-label as seen in the AMS Food and Beverage Department outlets. Noted differences include the

acronym, the colour scheme and the heading. Instead of using L.O.V. as our acronym and 'Lighter Footprint' as the heading, we used P.L.O.W. and 'Lighten Up'. The words 'Lighten Up' relates to lightening up the consumer's carbon footprint. The nutrition information is optional but is something we decided would be appealing to include since many consumers are generally interested in making purchases that are beneficial to their health. Also, as nutrition students we believe it would be beneficial to inform consumers of the overlooked benefits of fruits and vegetables, especially since the recommended servings consumed in this particular food group are rarely met (Garriguet, 2007). The label's layout is intended to be straightforward but salient, while including all the necessary contents to make carbon-smart food choices. The label is approximately half the size of a standard letter paper, 7.5 inches by 4.5inches, and would be large enough to be seen from a distance. The colour scheme includes two basic colours, red and green, to invoke patriotism, localism and nature/plant life.

JUSTIFICATION OF CARBON-SMART WEBSITE

The major components of the carbon-smart website (www.plowfood.com) (Refer to Appendix B and C) include: food availability charts; resources and links to carbon smart recipes and vegetarian restaurants that incorporate Canada's Food Guide to Healthy Eating; a table of carbon smart lifestyle practices; an interactive game; and a discussion forum. Adhering to the P.L.O.W. principle, more specifically the "Local" and "Whole" aspects, we included local and seasonal food availability charts to illustrate which foods are fresh and abundant during a particular month (Refer to Appendix C). These charts provide consumers with an idea of what foods are easily accessible in local markets for the preparation of a delicious and healthy meal. In addition, our resources feature recipes containing carbon smart ingredients (refer to Appendix C). These ingredients would be primarily fruits and vegetables (Wallace, 2008) grown organically without the use of artificial fertilizers and growth hormones (Jones, 2001), and local (MacKinnon and Smith, 2009) and whole foods with minimal processing and

packaging (Climate Counts, 2009). By providing these resources, consumers can create their own carbon-smart dishes, and begin to build confidence and self-efficacy to becoming carbon-smart.

Links to local vegetarian restaurants supplement the website to emphasize the “Plant” aspect of our carbon smart definition (refer to Appendix C). We encourage consumers to visit local vegetarian restaurants (HappyCow's Vegetarian Guide, 2009) in hopes that these personal experiences will facilitate their desire to incorporate more vegetable centered meals in their diet. It is our hope that consumers will discover a plant based diet to be delicious, healthy and easy to prepare.

A balanced diet comprised of four food groups is crucial to the health of the general population (Canada's Food Guide, 2007). On our website, we refer the browsers to the four food group requirements for specific genders and age groups in the food guide (Appendix C). The emphasis on vegetables and fruits, and whole food products in the food guide coincides with the main theme of the P.L.O.W. principle. Thus, following Canada's Food Guide and the Carbon Smart Food Guide, together, will contribute to both personal and environmental health.

Making proper food choices should not be the only factor that contributes to GHG reduction. Up to 8% of global GHG is generated by daily household energy consumption, such as gasoline, electricity, natural gas and water. (Gershon, 2006) Complementing the carbon-smart food guide is a table incorporating simple lifestyle practices and principles behind each practice that has been designed for our browsers (Appendix C). Links to the local farmer's markets within BC provide convenience for consumers to locate farmer's markets near them (Appendix C). Finally, the goal of this table is to help consumers achieve a long term climate-friendly way of living.

In order to stimulate the interest of consumers and browsers, we developed a game called “Guess the Greenhouse Gas Emissions!” (Appendix D). The design of this interactive game is vivid and colorful. The background is a farm, featuring various fruits, vegetables, and livestock. When players

click on one of the items, the GHG emissions of the local version of the food and the conventional or imported version will appear. Upon comparing and contrasting local versus imported foods, we hope that consumers will be more conscious of the dramatic differences in GHG emissions.

A Carbon-Smart Forum was also constructed to give browsers a place to discuss their experiences, share carbon saving tips, creative recipes, and nutrition concerns with other individuals who share the similar vision of creating a low carbon community (Appendix C). Interactions between browsers in this forum will help them think critically about the consequences of making food choices and relationships between food, human beings and the environment. Having active and engaged members is crucial to building a strong carbon-smart society.

RECOMMENDATIONS

Based upon our findings, and our experience with scenario 3B of the UBCFSP, our team has made some recommendations for the future teaching team and colleagues.

AGSC 450 Teaching team

- At the beginning of the academic term, we were given a list of specific tasks to work on. Our group felt that there were too many components which made determining which one to focus on a challenge. Thus, we suggest prioritizing the tasks for our future colleagues.
- In addition, more specific requirements and guidelines about the project should be given at the beginning of the course in order to avoid confusion.
- In the continuation of this scenario, our group believes it would better to focus on just one component, e.g. the Carbon smart food guide, or website, or the label, due to the limited time.

AGSC 450 2010 Colleagues

- We suggest that our future colleagues evaluate the effectiveness of carbon-smart food guide and related educational materials (website and label), including how well the public education pieces affects the public, and to what extent the guide helps people change their personal food choices to reduce the climate impacts of the food system. This could be done through a survey on the general public and the visitors of UBC farm during the Saturday Farm Market events.
- GHG emissions is highly correlated with being carbon-smart, we consider it a parameter in measuring the degree of how well a food is carbon-smart. We suggest that our future colleagues work on figuring a way to calculate GHG emission to categorize the level of food's carbon emissions in collaboration with UBC Farm, Vancouver Farmers Market, UBC Global Resource System group and other related associations.
- Students of next year could also work on other practical aspects of the food system and evaluate government food policies, such as cage-free chickens versus conventional chickens and how the two compare in GHG emissions, sustainable practices, and the safety and hazards posed to the general public.

CONCLUSION

CENTRAL FINDINGS

The main goal of the project is to identify foods grown with minimum ecological impact and to promote the consumption of these foods by developing public education materials to inform Vancouverites about how their food choices would impact the environment with respect to GHG emission (Rojas, 2009). Our team concludes that a carbon-smart diet is depicted by a diet pattern comprised of foods which are grown and produced with minimal use of fossil fuel and GHG emissions.

Personal food choices is now an essential component that contributes to sustainability; the carbon-smart diet, incorporating the P.L.O.W. principle, has the potential to empower consumers to make food choices that commit to the improvement of environmental and human health and provide mitigation to climate change (Bomford, 2009).

FINDINGS RELATED TO THE IMPACT OF PERSONAL FOOD CHOICES ON CLIMATE CHANGE

The P.L.O.W. principle represents aspects of food in the carbon-smart diet which commit to less GHG emissions, and thus alleviate the negative impacts brought by climate change. This principle is consistently expressed throughout the carbon-smart food guide (Refer to Appendix A), website (Refer to Appendix B C, D) and label (Figure 1). The “Plant” aspect informs consumers to centre their diet towards plant-based sources because growing plants depletes fewer resources than raising animals. Reducing the growing demand for meat and animal products puts less pressure on the limited supply of fossil fuel, water and other natural resources (Nierenberg, 2005). The “Local” aspect encourages consumers to purchase more foods grown and produced by local farmers because of the benefit brought by the shortening of food miles amongst the food, the producers and the consumers. This directly minimizes the GHG emissions from food transportation and distribution, improves local agri-business, and supplies nutritious food (MacKinnon and Smith, 2009; Get Local, 2008). The “Organic” aspect educates consumers about the benefits of CO foods. CO foods require less intensive inputs of synthetic fertilizers, antibiotics and growth hormones during the production phase; subsequently minimizing fossil fuel used and GHG emission in the manufacture of these inputs (Pimental et al., 2005; Gershon, 2006). In addition, CO foods are known to be more nutrient-dense than conventional foods (Pollan, 2008). Finally, the “Whole” aspect promotes the consumption of unprocessed and minimally processed foods. Whole foods do not require the energy intensive food processing phase which would be implemented in

the production of conventional foods; and consumers benefit nutritionally from eating fresher foods that retain most of their vitamins and minerals (Climate counts, 2009).

We believe that personal food choices, adhering to the P.L.O.W. principle, definitely reduce the climate impacts of the food system through aspects of production, processing and distribution (Lang and Heasman, 2004). Natural resources like fossil fuel, natural gas, water are scarce, hence should be used wisely. P.L.O.W. foods are grown and produced efficiently due to the fact that these characteristics require significantly less energy input than their counterparts, such as animal, imported, non-organic and processed. Consumers' demands on more of these sustainable aspects of food ultimately contribute to the overall sustainability.

Our project aims to make the food system more sustainable, indirectly, by empowering consumers with the knowledge and desire to make climate-friendly food and lifestyle choices. This project works in supporting two groups: first, those who are already interested in becoming carbon-smart, and secondly, those who might not be conscious about making such changes. For the first group, the goal is to provide more information to help achieve carbon-smart lifestyle and dietary practices, and for the latter, the aim is to motivate by educating them about the benefits and importance of being carbon-smart. We hope that more public education campaigns like the creation of this carbon-smart food guide and related educational materials will raise awareness and engage more people to initiate and maintain sustainable practices.

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For references for the brochure and website, please see Appendix A and Appendix B, C, D respectively.

FOOD

P_{lant.} L_{ocal.} O_{rganic.} W_{hole.}

[Carbon Smart Lifestyle](#)

[Recipes and Restaurants](#)

[Healthy Eating](#)

[Discussion Forum](#)

[Interactive Game](#)

[Homepage](#)

Why choose
Carbon Smart
Foods?

Welcome to **PLow** food!

At PLOW food, our website is devoted to providing you information and resources to live carbon smart, through both your food and lifestyle choices.

What is carbon smart eating? A carbon smart food refers to food that contributes to the minimization of greenhouse gas emissions when taking into account its methods of production, processing and distribution from field to table.

But being carbon smart is not just about your diet, but also your lifestyle. Our website also features lifestyle tips that can also help you to reduce your greenhouse gas emissions.

Be Carbon Smart!

~ Creating Healthy People in Healthy Communities ~



Carbon Smart Lifestyle

Practices and Actions that Contribute to A Healthy Lifestyle ¹

Solutions	Tasks	Principles
Reduction on waste production	<ul style="list-style-type: none"> • Create a recycle centre at home with categorized recycle bins • Shop with your own bags; select products with the least packaging and purchase in large quantities each time 	<ul style="list-style-type: none"> • On average, each American household generates approximately 4.5 pounds of solid waste, 1/3 contributed by packaging. Waste management is energy consuming, and do not forget about transportation of the waste. • 2 pounds of greenhouse gases produced from 1 pound of solid waste going into the landfill.
Reduction on use of hot water	<ul style="list-style-type: none"> • Change your showerheads to the water-saving type so that hot water comes out at a slower rate • Reduce your shower time and limit the time under 5 minutes • Add aerators to the household faucet • Wash clothes in cold water 	<ul style="list-style-type: none"> • 4 pounds CO₂ is generated by heating water for 10 minutes
Use electricity efficiently	<ul style="list-style-type: none"> • Wash clothes only when you really need to • Avoid over-using heater or turning the temperature too high by dressing warm at home • Switch off the power when electronic equipments are not in use 	<ul style="list-style-type: none"> • A regular washing and drying machine creates 5 pounds GHG per load of clothes • Household heating contributes to more than 1/4 of the total household energy consumption and colder areas generates 8800 pounds of CO₂ every year just by heating up the houses • Typical usage of home appliances generates 600 pounds of CO₂ annually
Reduce driving	<ul style="list-style-type: none"> • Plan your trip • Take advantage of public transit, car-pooling, biking • Avoid fast accelerations and sharp breaks when driving • Choose energy efficient cars to drive 	<ul style="list-style-type: none"> • CO₂ emissions from automobiles can produce from 2000 to 26667 pounds annually depending on miles driven.
Increase physical exercise	<ul style="list-style-type: none"> • Incorporate at least one hour physical activity daily² (For more information, please refer to Health Canada's Physical Activity Guide at http://www.phac-aspc.gc.ca/pau-uap/psguide/start.html) 	<ul style="list-style-type: none"> • Likely to follow a healthy eating pattern, preventing binge-eating. • Resulting in less total food consumption and in turn reducing the demand and production

Low Carbon Eating - Practices and Actions that Contribute to Healthy Eating³

Priority	Action	Results
High	Consume less meat and dairy products	Reduced N ₂ O and CH ₄ productions Improved carbon sequestration Reduced use of pasture
High	Don't eat more than your body needs	Overeating leads to obesity and over-weight
Medium high	Minimize waste of food, save leftovers	Decreased food demand and emission Generated in waste management
Medium	Choose seasonal, open-field grown crops	Reduced CO ₂ from GHG as less fossil energy
Medium	Choose affordable organic certified foods and dairy	Reduced CO ₂ from GHG as less fossil energy
Medium	Choose locally produced	Reduced GHG emitted by transportation
Medium	Consume eco-friendly fish	Intensively raising fish creates great Amount of emission
Medium	Simplify cooking and store foods at home in an energy-saving manner (eg. Pressure cooker, less refrigeration)	Reduced energy use in household
Medium	Reduce or avoid energy dense and low nutrient foods (eg. Alcohol, deep fried food)	Reduced energy on junk food production
Medium	Be critical about food choices; shop at location where staffs know about the origin of produce in store	Reconnection of food to the eaters

1. Gershon, D. (2006). *The Low Carbon Diet: A 30 Day Program to Lose 5000 Pounds*. NY 3rd ed Empowerment Institute.
2. Public Health Agency of Canada. (2003) *Physical Activity Guide*. Retrieved March 15, 2009: <http://www.phac-aspc.gc.ca/pau-uap/paguide/start.html>
3. Garnett, T. (2008). *Cooking up a Storm: Food, Greenhouse Gas Emissions, and Our Changing Climate*. Food Climate Research Network, Centre for Environmental Strategy. University of Surrey.

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Recipes and Restaurants

Unleash your creativity and enjoy cooking!

Cuisines	Food & Alternatives	Others
<u>African-American</u>	<u>Beans</u>	<u>Beverages</u>
<u>Chinese</u>	<u>Breads</u>	<u>Desserts</u>
<u>Filipino</u>	<u>Casseroles</u>	<u>Dips and Dressing</u>
<u>Greek</u>	<u>Grains</u>	<u>Fat Free</u>
<u>Indian</u>	<u>Nuts</u>	<u>Fruit</u>
<u>Indonesian</u>	<u>Pasta Noodles</u>	<u>Holiday Dishes</u>
<u>Italian</u>	<u>Pies</u>	<u>Mediterranean</u>
<u>Japanese</u>	<u>Pizza</u>	<u>Raw</u>
<u>Malaysian</u>	<u>Sandwiches</u>	<u>Salad</u>
<u>Mexican</u>	<u>Veggie Burgers</u>	<u>Slow Cooker Recipes</u>
<u>Southern USA</u>	<u>Hand Holds</u>	<u>Snacks</u>
<u>Spanish</u>	<u>Tofu</u>	<u>Soups</u>
<u>Thai</u>	<u>Dairy Alternatives</u>	<u>Stews</u>
<u>Vietnamese</u>	<u>Meat Alternatives</u>	<u>Stirfry</u>

Vegetarian recipes ¹ from <http://www.happycow.net/vegetarian-recipes.html>

Blueberries	Strawberries	Raspberries	Oranges
BC Blueberry Peach Crisp	BC Strawberry Bruschetta	Auntie Alice's Raspberry Cake	Orange Cream Scones with BC Strawberry Cream Cheese Spread
Blueberry Banana Loaf	BC Strawberry Granola Trifle		
Blueberry Marmalade	BC Strawberry Hazelnut Flan		
Blueberry Melon Salsa	BC Strawberry Streusel Pie		
Roasted Corn and Blueberry Relish			

Recipes for fruits ² from <http://www.bcfarmfresh.com/recipes.asp>

For a list of seasonal ingredients in Vancouver, refer to Get local BC:

<http://www.getlocalbc.org/files/Seasonal%20Chart.pdf>

Interested in Vancouver vegetarian restaurants? Go to

http://www.happycow.net/north_america/canada/british_columbia/vancouver/

1. HappyCow's Vegetarian Guide (2009). "Healthy Vegetarian and Vegan Recipes". Retrieved March 18, 2009, from <http://www.happycow.net/vegetarian-recipes.html>
2. Fraser Valley Farm Direct Marketing Association (2009). Tips and Recipes. Retrieved March 18, 2009, from <http://www.bcfarmfresh.com/recipes.asp>

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Healthy Eating with Canada's Food Guide

In collaboration with Canada's Food Guide

A Carbon Smart Diet with a Healthy Body

While promoting a carbon smart diet, we realize that people's health is another aspect besides the environment that will be directly affected by the food people choose to eat. It's our responsibility to guide the public toward a carbon smart diet, as well as a better health status, considering the fact that diet-related diseases such as cardiovascular disease, stroke, osteoporosis, obesity and diabetes are becoming a more and more touchy issue in the western world. Therefore, incorporation of the Canada's Food Guide in our website is essential to this achievement.

The Canada's Food Guide divides foods into four categories, grain, vegetable and fruit, milk and alternatives, and meat and alternatives. For people in different age group, the guide provides a specific serving size for each category of food. In collaboration with our PLOW principle, the consumers can refer to the *get local (metro Vancouver)* for local and seasonal food groups. This may reduce the diversity of some people's food choice, but the choice is up to the consumer. By offering this option, we believe that it will to certain extent decrease GHG emission, promote local business and may overall benefit people's health. Here we include the local and seasonal food tables.

Availability Chart of BC Fresh Fruits ¹

Availability Chart *B.C. Fresh Fruits*

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Apples												
Blackberries												
Blueberries												
Cherries (pie)												
Currants												
Gooseberries												
Hazelnuts												
Pears												
Plums												
Prunes												
Raspberries												
Saskatoons												
Strawberries												

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Healthy Eating with Canada's Food Guide

Availability Chart *B.C. Fresh Fruits and Vegetables*

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Beans							■	■	■			
Beets	■	■	■				■	■	■	■	■	■
Broccoli						■	■	■	■	■	■	
Brussels Sprouts									■	■	■	■
Cabbage-red	■	■	■				■	■	■	■	■	■
Cabbage-green	■	■				■	■	■	■	■	■	■
Carrots						■	■	■	■	■	■	■
Cauliflower						■	■	■	■	■	■	
Celery						■	■	■	■	■	■	
Chinese Vegetables					■	■	■	■	■	■	■	
Corn							■	■	■	■	■	
Cucumbers-field							■	■	■	■	■	
Leeks	■	■	■				■	■	■	■	■	■
Lettuce	■	■	■	■	■	■	■	■	■	■	■	■
Onions-green					■	■	■	■	■	■	■	
Onions-red/yellow	■	■	■				■	■	■	■	■	■
Parsnips	■	■					■	■	■	■	■	■
Peppers-field							■	■	■	■	■	■
Potatoes	■	■	■	■	■	■	■	■	■	■	■	■
Radishes				■	■	■	■	■	■	■	■	
Rhubarb-field				■	■	■	■	■	■	■	■	
Rutabagas	■	■				■	■	■	■	■	■	■
Spinach				■	■	■	■	■	■	■	■	■
Turnips-white	■	■			■	■	■	■	■	■	■	■
Zucchini						■	■	■	■	■	■	■

Other resources: seasonal and local food options

<http://www.getlocalbc.org/files/Seasonal%20Chart.pdf>

<http://www.getlocalbc.org/en/>

Canada's Food Guide,

<http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php>

Carbon diet calculator: want to know how much your diet contributes to carbon emissions?

<http://www.catlowcarbon.org/#>

1. Fraser Valley Farm Direct Marketing Association (2009). Availability Charts. Retrieved March 18, 2009, from <http://www.bcfarmfresh.com/charts.asp>
2. Fraser Valley Farm Direct Marketing Association (2009). Availability Charts. Retrieved March 18, 2009, from <http://www.bcfarmfresh.com/charts.asp>

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Forum

A forum would be useful in attracting viewers. The discussion forum is for people to share their personal experience, tips for healthy lifestyle, creative recipes and concerns of nutrition with other people who share a similar vision in creating a carbon smart community. Being interactive and inspiring to other people will contribute to a carbon smart community intellectually.

Here is what can be included in the forum.

- Personal experiences/stories/advices in becoming carbon smart
- Useful tips for healthy lifestyle
- Creative recipes
- Nutritional Concerns

Why Choose Carbon Smart Foods?

Evidence for the Benefits of PLOW

Plant:

Less energy is required to grow plant food. 133% of fossil fuel energy is required in one calorie of beef production, compared to 100% used in vegetables production of the equivalent amount¹.

Less Greenhouse gas methane production from raising livestock. 16% of world's annual production of greenhouse gas methane comes from livestock' wastes¹.

Reduce Food Scarcity, 2/3 of global fisheries stock is depleted rapidly due to activities of non-direct human consumption¹.

Increased consumer demand, consumption and production of animal products accelerate the environmental damage that threatening the ecological system and human future².

Some of these environmental damages include deforestation, erosion, fresh water scarcity, air and water pollution, climate change, biodiversity loss, social injustice, the destabilization of communities, and the spread of disease².

People who consume a diet consisted of more plant save more water than those who consume the average diet consisted of more animal products; 300 gallons of water per day versus 4,200 gallons of water per day².

Overall, decreased animal protein consumption lead to improved global food security, repletion of food and water supply, resolved global grain deficit and reduce food scarcity.

Local:

An average North American meal travels 2400km to get from the field to table³.

An average British Columbia meal contains ingredients from 6 countries⁴.

One calorie of food requires 10-15 calories of energy input⁵.

Importation and exportation of food have tripled with agriculture in the past 20 years in North America⁴.

Food is contributed to the biggest part of the most polluting transportation method: airfreight⁴.

Why Choose Carbon Smart Foods?

Purchasing an apple from New Zealand contribute to 87% higher greenhouse emission than buying a local apple⁴.

Decreasing transportation miles of foods greatly reduces fuel usage and CO2 emissions⁵.

All these factors indicate that the consumption of locally grown or produced fruit, vegetable and grains has limited environmental impact as comparing to imported foods, which also support the local economy.

Organic:

Certified organic plants are grown without the use of pesticides and artificial fertilizers, and animals are raised without the use of antibiotics and growth hormones⁶.

Manufacturing these inputs require a huge amount of energy that is derived from oil and natural gas, which then leads to the emission of carbon dioxide⁷.

An organic diet is denser in nutrients including vitamins A, C, E, and the B group, minerals such as zinc and calcium, and fibre⁸.

Whole food: According to the David Suzuki Foundation (2008 #16) “almost 75% of the food you consume has been processed in some way”. Several studies show a positive correlation between individual health and eating locally and/or organically⁹.

Whole foods have no or minimal processing and packaging, both of which are energy intensive procedures¹⁰.

Whole foods carry the same composition they had while growing and also retain most of their beneficial nutrients¹⁰.

1. Nierenberg, D. (September 2005). “Happier Meals: Rethinking the Global Meat Industry”. Worldwatch Paper 171. Worldwatch Institute. Retrieved March 18th, 2009, from <http://www.worldwatch.org/pubs/paper/171>

2. Worldwatch Institute. (July/August 2004). “Meat: Now, It’s Not Personal: But like it or not, meat-eating is becoming a problem for everyone on the planet”. Worldwatch Magazine. Worldwatch Institute. Retrieved March 18th, 2009, from <http://www.worldwatch.org/taxonomy/term/37>

3. Hendrickson, J.A. "Energy use in the U.S. food system: A summary of existing research and analysis," Center for Integrated Agricultural Systems, University of Wisconsin, Maddison, 1996. cited in, Pazderka, Catherine, Ann Rowan and Eric Enno Tamm (2008). *The Green Guide*. David Suzuki Foundation. Retrieved January 19, 2009, from <http://www.davidsuzuki.org/files/WOL/GreenGuide.pdf>
4. Get Local (2008). "Let's get local, metro Vancouver!" Farm Folk, City Folk. Retrieved March 18, 2009, from <http://www.getlocalbc.org/en>
5. Gershon, D. (2006). *The Low Carbon Diet: A 30 Day Program to Lose 5000 Pounds*. NY 3rd ed Empowerment Institute.
6. Jones, A. (2001). *Eating oil: Food supply in a changing climate*. Sustain, London and Elm Farm Research Centre,
7. Helsel, Z.R. "Energy and Alternatives for Fertilizer and Pesticide Use," *Energy in World Agriculture*, 6 (1992), p. 177-201.
8. Pollan, M. (2008). *In defense of food: An eater's manifesto*. NY: Ny: Penguin Press.
9. Rojas, A. (2009). "The University of British Columbia Food System Project" (UBCFSP) [Class Handout]. Vancouver, BC: University of British Columbia Vancouver, AGSC450. Retrieved March 18, 2009, from http://www.landfood.ubc.ca/research/faculty_webpages/rojas/2009%20UBC%20Food%20System%20Project.pdf
10. *Climate counts*. (2009). Retrieved March, 2009, from <http://climatecounts.org/>*Climate counts*. (2009). Retrieved March, 2009, from <http://climatecounts.org/>



Guess the Greenhouse Gas Emissions!

How to play:



Example: Carrots

Local = 15 g CO₂

Total = 1,040 g CO₂



DELICIOUS
APPLES
794
LB



