

# THE FUTURE OF CARBON INFORMATION ABOUT CONSUMER PRODUCTS

by

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## Abstract

Canada is behind in the effort to curb carbon emissions: it ranks 15th out of 17 for greenhouse gas per capita emissions out of all OECD countries (OECD Environment Directorate, 2008). A portion of carbon emissions relate to production and consumption of goods. In the marketplace, there are innovations in assessment of consumer goods that could allow the widespread comparison of carbon impacts at the product-level. It is unclear which drivers will be the dominant factors that influence the future use of carbon life-cycle assessment of products (CLCA). The foresight process known as "*Cone of Plausibility*" is used and enhanced to manipulate important drivers which create four scenarios for CLCA in Canada over the next 10 years. This study provides scenarios for business, government and research institutions attempting to innovate in the retail space to test out their strategies and to evaluate if they are salient in each scenario.

## Acknowledgements

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## **Dedication**

To Julia and Melvin Rose.

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## Introduction

There is a major problem with human consumption habits on a global scale. Each year as of 2007, we are utilizing resources and creating waste 50% faster than the earth can regenerate or absorb (WWF & Global Footprint Network, 2010, p. 34). Global consumption is placing unsustainable stress on the earth's support systems: 60% of the earth's ecosystems have been degraded over the past 50 years (Millennium Ecosystem Assessment, 2005, p. 1). Acerbating these direct impacts production and consumption contributes to climate change which is recognized as the largest worldwide environmental threat (Esty et al., 2006, p. 49).

The tangible impact of our consumptive habits in effecting human-induced global warming has become a growing concern to individuals. Canada is falling behind, it ranks 15<sup>th</sup> out of 17 for greenhouse gas per capita emissions out of all OECD countries, many of which are acting to lower impacts and innovate out of heavy carbon emissions (Conference Board of Canada, 2011; OECD Environment Directorate, 2008, p. 13). While our current Prime Minister was the opposition leader, he warned that joining the Kyoto Protocol would cost Canada anywhere between 23-40 billion dollars annually (Smith, 2009, p. 53). However, in recent years studies have shown not acting on climate change has the potential to cost Canada 43 billion dollars annually (De Souza, 2012). The government agency

responsible for this finding, National Roundtable for the Environment and Economy (NRTEE) was promptly cancelled in this year's budget (De Souza, 2012). Furthermore, NTREE was on the cusp of completing a comprehensive study of life-cycle thinking in the public and private sector (National Round Table on the Environment and the Economy, 2011).

This is a large setback because in the absence of international agreements, new technologies and standards have emerged for the calculation of the carbon life-cycle of products (CLCA). New ways to display that information in retail settings have been developed. These standards and technologies provide a pathway for producers and consumers to lower carbon footprints when governments refuse to act. If NTREE could plan into the future, there would be an opportunity to facilitate a process by which the government could enhance the impact of standards and tools which would serve as a catalyst for change in the absence of international agreement.

This foresight study will walk the reader through the current landscape of standards and shopper tools. The Cone will synthesize an understanding of carbon life-cycle assessment of products, as well as develop scenarios on how it might be used in the future by consumers leveraging dominant drivers. In addition I have included a description of followers and leaders, potential winners and losers, a backcast timeline and implications that relate to the uptake and

impact of CLCA information. All of these factors together allow me to propose and illustrate the way carbon information will be displayed to Canadian shoppers ten years from now.

This study takes a 10-year time frame to reflect upon unplanned directions, rather than commenting on plans that are already heavily invested in, and where the critical path has been chosen. The overarching value of these scenarios is that they could be used as strategic planning tools for local groups interested in improving the ubiquity and use of product carbon information as a shopping tool for consumers in Canada. This is crucially important as Canada lags behind many other countries with regards to supporting CLCA standards. The hope is that interested groups will use these possibilities as launching pads for strategies to reduce Canada's production and consumption climate change emissions by enabling the government, producers and consumers to act on salient climate information about products.

In other words the research question this study answers is *“How might the transfer of carbon information at the product level change for Canadian consumers in the next 10 years?”*

Major objectives of this study are:

1. To describe the current state of carbon life-cycle assessment at the product level as an in-store shopper tool.

2. To gain an understanding of the use of carbon accounting in product supply chains 10 years into the future.

In Canada there are a number of not-for-profit, think tank, for-benefit and advocacy groups interested in this subject matter. *For-benefit* is used to describe companies that receive profits but have an overall mandate for the public social or environmental good. For-benefit Canadian companies such as *Zerofootprint* and *CarbonCounted* see the opportunity for a transition from measuring institution-level carbon impacts to imagining how individual product-level impacts can be tracked throughout the supply chain. These companies incorporate automation and software solutions as a way to measure, compare and change the consumptive behavior of organizations, groups and individuals. Outside of Canada, there are a number of groups creating best practices with regards to CLCA and how CLCA information ought to be displayed to consumers. However, complicating the eventual adoption of a single-factor measurement is the existence of at least nine<sup>1</sup> other important environmental factors to consider in a product life-cycle assessment. These factors could provide potential environmental tradeoffs as opposed to simply looking at the carbon neutrality of a product (Golden, 2010, p. 13; Lewis, 2010, pp. 58–59; Terrachoice, 2010, p. 10).

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<sup>1</sup> Soil, air and water quality, biodiversity, stratospheric depletion, resource depletion, waste and recycling, landscape and heritage, noise, dust and odours



The section titled “Background” will go through the current landscape of CLCA, the use of labels and other in-store shopper tools utilized for ethical shopping. The “Methods” section will discuss various methodology employed in gathering information, ranking drivers and developing scenarios. An explanation as to why one method was chosen over another will be discussed. Finally, the section “Future of CLCA” will provide the ranked content of drivers used in the study, as well as the scenarios formed from the drivers utilizing Taylor’s version of the Cone of Plausibility Method.

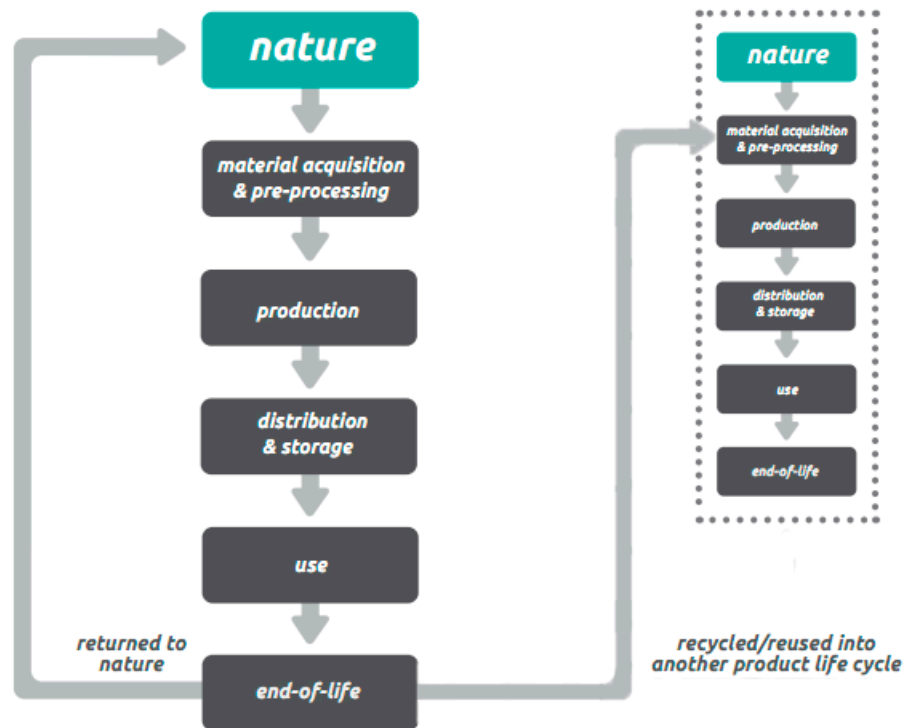
## **Background**

In the last few years there have been many developments in carbon life-cycle assessment products. Furthermore, there has been an increased sensitivity regarding how complicated it is to create environmental, social and health indicators for products, and how to translate them into easy-to-use tools for shoppers. This section will firstly provide a primer on the carbon life-cycle assessment of products (CLCA). Secondly, it will describe the current state of CLCA, including standards and in-store interventions piloted for, or available in, shopping areas.

### **Carbon Life-Cycle Assessment of Products (CLCA)**

Carbon life-cycle assessment at the product level is the systematic tracking and tallying of greenhouse gases released during the production of a single consumer product. Stages include the extraction of resources from nature, the creation of component parts or “pre-processing” of raw extracted resources and “material acquisition” (the purchase of intermediate component parts), production (the assembly/manufacture of parts and packaging), distribution and storage, use and finally end-of-life disposal back to “nature” or “recycling” after use (see Figure 1.)

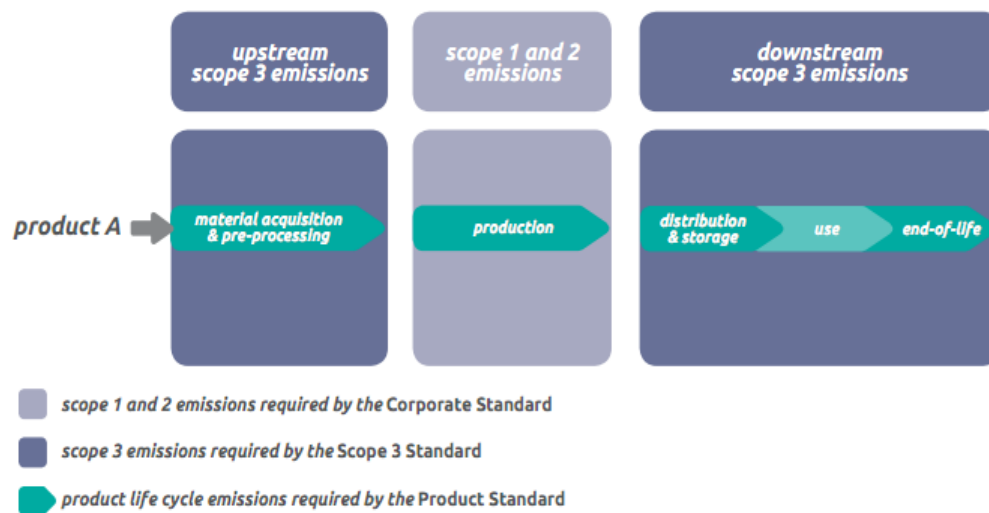
Greenhouse gases are described and measured as a carbon dioxide equivalent (CO<sub>2</sub>e.) This is important to note because although this methodology is referred to as “carbon life-cycle assessment,” it also accounts for other greenhouse gases such as methane that affect the climate.



**Figure 1** Adapted five general stages for a product life cycle (Greenhouse Gas Protocol Initiative, 2011)

Conceptually, there are three different types of emissions that are measured. *Scope 1 emissions* are the direct emissions created by the company developing the product, including emissions from engines by company owned fleets, boilers and other equipment that consume and combust fuel. *Scope 2 emissions* result from the electrical “on the grid” energy purchased by the

company to power machinery and facilities. *Scope 3 emissions* are emissions that occur outside of company ownership. These might include supplier emissions, employee transport to facility emissions, or emissions that result from retailer, and consumer use and disposal (see Figure 2.)



**Figure 2** Overlay of the type of emissions found at different stages in a products life-cycle (Greenhouse Gas Protocol Initiative, 2011)

Thus, CLCA is a bottom-up method for the quantification of CO<sub>2</sub>e where individual processes are added together in order to provide a picture of a products' overall life-cycle impact. CLCA contrasts the top-down method largely utilized by researchers and governments. The top-down method is based upon an input-output carbon assessment which calculates a products' CO<sub>2</sub>e based on overall economic data from the entire product category, correlating it to overall CO<sub>2</sub>e impacts. Although the information gathered from this form of carbon footprinting can be done much quicker and at a smaller cost, it is less specific to

products because of the category level information collected (R. Cox, 2011; Wiedmann & Minx, 2008, pp. 5–6).

### **Standards and Major Players for Carbon Measurement**

There are a number of nascent standards that will play leading roles in the future of CLCA.

International interest by business has sparked the creation of two overarching standards, which has been developed by three different organizations;

- The Greenhouse Gas Protocol Initiative (or GHG Protocol Initiative, run by the *World Resources Institute* [WRI] and the *World Business Council for Sustainable Development* [WBCSD])
- International Organization for Standardization (ISO)

The Greenhouse Gas Protocol seems to be the most adopted standard and is currently being used by over 150 businesses including Walmart, the world's largest retailer, whereas the International Organization for Standardization is still developing the ISO 14067 standard. The GHG Protocol Initiative plans to harmonize its standard with the ISO 14067 standard once released.

More specific standards have been developed by individual countries. The United Kingdom, in cooperation with *The Carbon Trust*, developed the first product level standard in 2007 PAS2050 (BSI Standards, 2008). France recently passed the Grenelle 2 Law which includes a number of environmental directives,

including an account of the carbon emissions of consumer products in retail stores and associated labelling (Ministère du Développement Durable, 2011). The directives within France define the general principles of environmental labelling and methodology for calculations (Bockel, Touchemoulin, & Jonsson, 2011). The Japanese *Ministry of Economy Trade and Industry* (METI), linking with the voluntary carbon labelling trial, released guidelines titled “*Basic Guideline of the Carbon Footprint of Products*” for the CLCA and the labelling of products (Bockel et al., 2011). The European Union is also looking into developing a standard that would take into account the ISO and GHG Protocol international standards (Bockel et al., 2011).

Another international initiative is the *Carbon Disclosure Project* (CDP). The CDP is an independent, not-for-profit organization which has been used by product ranking and rating companies, such as CSR Hub. The CDP holds the largest database of primary corporate climate change information (mostly Scope 1 and 2) in the world (Carbon Disclosure Project, 2003).

The *Carbon Disclosure Project* includes a number of programs:

- *Investor CDP*: Climate change data is collected from companies on behalf of 551 investors.
- *CDP Cities*: Standardized reporting emission data, risks, opportunities and adaptation plans are created for cities around the world.
- *CDP Supply Chain*: On behalf of corporations, this program harnesses collective purchasing power to encourage suppliers to measure and disclose climate change information (Carbon Disclosure Project, 2003).

*The Sustainability Consortium* (TSC) is a newly formed not-for-profit organization initiated by Walmart and administrated by The University of Arkansas and Arizona State University (Bredenberg, 2011). Their mandate is to more accurately quantify and communicate the sustainability of products (The Sustainability Consortium, 2009). Sector working groups in the TSC include, but are not limited to, consumer science, retail, measurement science, electronics, food beverage and agriculture. These sector working groups are comprised of a mixture of academic experts and company members-over 75 organizations (The Sustainability Consortium, 2012a).

The TSC is making a significant push into developing coherent comparative rules for consumer products in its Sustainability Measurement and Reporting System (SMRS). The product comparison rules, or PCR's, have been created to make it easier for different brands to report product sustainability. The Consortium has also adopted the Greenhouse Gas Protocol Initiative standard, but has created specific PCR's using the same allocation rules and scopes needed

for comparison and which go beyond the GHG Protocol Initiative standard (Greenhouse Gas Protocol Initiative, 2011, p. 118; The Sustainability Consortium, 2011d).

In summary, with regard to government support and policy for standards in the display of product carbon information, Canada lags behind the UK, France, Japan and many other OECD countries. The GHG Protocol for carbon life-cycle assessment of products is the standard which many of the major groups are adopting, including Walmart and many others. Thus, if Canada were to play a bigger policy role for either voluntary or mandatory CLCA, then utilizing the *GHG Protocol* standard would be the best way forward.

Outside of government organizations, the largest and most well-funded group attempting to improve the standards and metrics by which shoppers can purchase low carbon products is *The Sustainability Consortium*. This includes companies that have a large market share in Canada. The greatest example of this is Walmart which initiated the formation of TSC (Bredenberg, 2011), looking to create sustainability labels for all Walmart products. If this were to happen in 2017 as anticipated, then it would have large impacts on Canadian shoppers.

### **Product Labeling Examples and Critique**

Providing shoppers with relevant information about product carbon impacts is an idea that has taken off in recent years. Groups as early as 2008 have been



labelling products with carbon information (Tesco, 2008). Examples in this section of product labelling are voluntary attempts at revealing the ethical impacts of products with a focus on carbon. These examples provide a landscape of current market attempts to influence shopper decisions with carbon information. Most importantly, the lessons learned from these interventions will feed into the strategies currently being developed by Canadian groups attempting their own ways of engaging shoppers with product carbon information.

### **Carbon Trust**

Since 2008, Tesco Stores, an international grocery and consumer goods chain based in the United Kingdom, has been working with the *Carbon Trust* to actively identify the carbon footprint of products available in their UK stores (Tesco, 2008). The *Carbon Trust* label found in Tesco Stores is a quantitative label that displays the carbon amount in grams or per serving as calculated by the PAS2050 standard. A recent study revealed that the carbon labels on products were difficult to make sense of without additional information (Upham, Dendler, & Bleda, 2011). As part of the recommendations there was a strong case to leverage label claims as part of a program of on-going carbon reductions year to year ( Carbon Reduction Labels, Upham et al., 2011, p. 354).



**Figure 3 Generalized Carbon Trust Label for products (Carbon Trust, 2007)**

### **Traffic Light Pilot**

A study in Australia investigated the use of a carbon label utilizing traffic light heuristic in a local convenience store. A black symbol indicated above average GHG emitting products, yellow indicated an average emission, and green, below average. Vanclay, Shortiss, Aulsebrook and Gillespie measured the purchase rate of all items undergoing CLCA three months before introducing the label, three months during the labels implementation, and three months afterwards. They did not find statistically significant changes in purchasing behaviour overall: there was a 6% decrease in purchases of “black” products and a 4% increase in purchases of “green” products (Vanclay, Shortiss, Aulsebrook, & Gillespie, 2011). When they took a closer look at inexpensive items, they found that there was a very significant 20% switch by consumers from black to green products when green labels were also the least expensive in the category (Vanclay et al., 2011). This would suggest that colour coded labels can be a strong signal to consumers if the product is competitively priced (see Figure 4.)

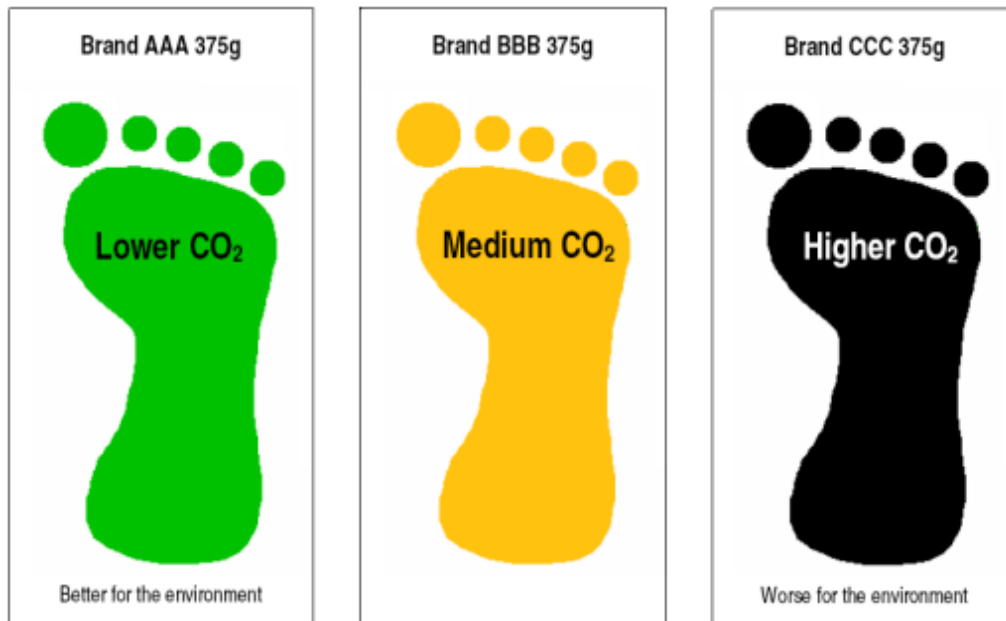


Figure 4 Traffic light label used in Australian study each footprint is colour coded "Lower CO<sub>2</sub>" is green, "Medium CO<sub>2</sub>" is yellow, "Higher CO<sub>2</sub>" is black (Vanclay et al., 2011)

### CarbonCounted

*CarbonCounted* is a Canadian not-for-profit group which has been working with Canada's leading grocery stores and retailers in the hopes of developing a carbon label similar to the *Carbon Trust* in Canada. Clients include Loblaws, the Liquor Control Board of Ontario (LCBO) and Sobey's. They have created a system dubbed *CarbonConnect* which allows retailers to generate pages that track the operational carbon footprint of all stores. It also provides a platform for retailers to encourage suppliers to input impacts of products to complete product level life cycle assessment (S. Cox & Conway, 2007b). Since its inception in 2007, the system has been useful as a reporting device for Scope 1 and 2 emissions in specific Canadian retail stores (Conference Board of Canada, 2010; S. Cox &

Conway, 2007b). However, there has been little adoption of the *CarbonConnect* by retail suppliers, the companies that create the products found in retail stores (S. Cox & Conway, 2007b). It is unclear if this is a failure of *CarbonCounted* or the cooperating retailers. There could be a number of reasons. Suppliers may not want to spend the time, effort, and money on reporting when there is a chance their product will perform worse than others. Another possible barrier is that the *CarbonCounted* label is similar to the *Carbon Trust* label, displaying only a quantitative measurement (see Figure 5.) The reports of the *Carbon Trust* label being difficult for shoppers to interpret (Upham et al., 2011, p. 352) could be a deterrent for suppliers in adopting a similar Canadian label. One of the major differences between the *Carbon Trust* and *CarbonCounted* is that the *Carbon Trust* is government funded and employs a staff of consultants qualified to conduct CLCA, whereas *CarbonCounted* provides the *CarbonConnect* platform and label and outsources CLCA activities to a list of vetted consultants or have the clients in-house staff conduct CLCA's (Carbon Trust, 2007; S. Cox & Conway, 2007b). Varying system boundary settings for supply chains amongst consultants and in-house staff conducting the GHG Protocol CLCA might be a potential drawback to the *CarbonCounted* approach, not felt by the *Carbon Trust*.



Figure 5 CarbonCounted label (S. Cox & Conway, 2007b)

### Sustain Omni-Label

*Omni-Labels* have also been explored by some groups. These are labels that provide additional information about the performance of a product in relation to environmental factors that go beyond carbon footprint.

*Sustain*, based out of UK, is “the alliance for better food and farming advocates food and agriculture policies and practices that enhance the health and welfare of people and animals, improve the working and living environment, enrich society and culture and promote equity.” In the United Kingdom, *Sustain* drafted a discussion paper outlining different ways to represent the environmental performance of agricultural products (Sustain, 2009). What followed was a sketch of what an omni-label would look like (see Figure 6.) This label has not been introduced in the market, nor has a study been conducted in regards to its usability by consumers. However, not-for-profit groups such as *Terrachoice* and TSC advocate a multi-factor approach to labeling as it lowers the likelihood that consumers will be uninformed of hidden trade-offs (Golden, 2010, p. 13; Terrachoice, 2010, p. 10).

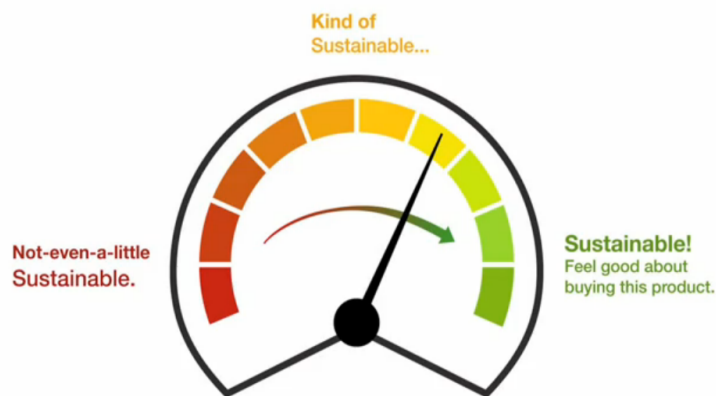


Figure 6 *Sustain's* Omni-label prototype: green (fair trade, packaging/waste) represent good performance, yellow (biodiversity, greenhouse gases, animal welfare) represent average performance, red (water, nutrition) represent poor performance (Sustain, 2009)

### Sustainability Consortium Omni-Label

*The Sustainability Consortium*, based in the United States is moving towards a measurement system that accounts for a number of social and environmental factors that consumers consider in their product purchases (The Sustainability Consortium, 2011a). In a recent TEDxManhattan lecture, reporter Fredrick Kaufman strongly critiques the efforts of *The Sustainability Consortium* (*Measure of all things*, 2011). His view point is that the mechanized measurement of hundreds of factors as a product moves through the supply chain is extremely complicated and does not lead to easily displayed conclusions. To emphasize his point, he provides a satire of the omni-label *The Sustainability*

*Consortium* will roll out after product level analysis is completed (*Measure of all things*, 2011). In this satire, the thousands of data points and measurement is simplified to a single speed-o-meter (see Figure 7.) Kaufman's concerns, though valid, completely miss the point that shoppers need product labeling they can easily understand. However, he is correct in pointing out that the label is not as transparent about the tradeoffs that may occur from the many different environmental and social factors, such as is measured by the *Sustain* prototype.



## SUSTAINABILITY SPEEDOMETER

Figure 7 Kaufman's satire of the Sustainability Consortium label, from left to right: the metre is coloured red (Not-even-a-little), yellow (Kind of), green (Feel good about buying this product) (*Measure of all things*, 2011)

In summary, product labeling must play a balancing act between providing objective accurate information, and information that shoppers will actually be able to use to compare and make shopping decisions. The results of the Traffic Light Label pilot, Figure 4, demonstrated shoppers will shift purchases

if the product is low impact and competitively priced. Expanding on this finding, the Sustain Label provides a traffic light framework which also reveals the trade-offs of other factors outside of carbon considerations. Therefore, even though it has not been tested in market trials, this would likely be the most effective label for interested companies such as Walmart to place on products in their stores. The impact to Canadian shoppers would be large if all Walmart store products by 2017 were to have these labels; as discussed previously Walmart has a large retail market share in Canada.

### **Beyond Labels: New In-Store Tools**

The aforementioned labels either in theory or in practice attempt to use CLCA standards to produce the necessary information required for an accurate label. However, these standards have been recently acquired, and often the required level of detailed data goes beyond what external evaluators can use without publicly released information by the manufacturing company.

The marketplace is filled with annual rankings. These include public and privately available rating systems and indices for corporate social responsibility, which factor in environmental concerns and reports from larger groups such as *Carbon Disclosure Project*, based in the United Kingdom. There are over 100 groups involved in rating corporate social responsibility, a majority of which include environmental concerns – and the number is merely growing (Sadowski,



Whitaker, & Buckingham, 2010). Due to the fact that there are simply too many company-level rankings, ratings and indices to discuss as background, I will discuss three multi-factor rating services that attempt to assist shopper decisions in-store and go beyond traditional labeling. The services described were analyzed using a competitive analysis framework and are described in the Comparative Landscape report prepared for Neutral Carbon Product Federal Development research project (Rose, 2012a).

### **HowGood**

*HowGood* is a CSR rating service operating in the United States, headquartered in Brooklyn, New York. It can be found in a limited number of grocery stores in the New York area. It is the most conventional shopper assist system in relation to standard packaging labels. The system rates individual products based on company level, health, environmental and social indicators created by *HowGood* (HowGood, 2011a). The content of ratings are based on over thirty indicators and come from a number of sources, however, the name of the specific sources or how each indicator is weighted to form the overall rating is not publicly described (HowGood, 2011b). This is definitely a negative factor as transparency is key to gaining consumer trust in regards to methodologies. What differentiates *HowGood* rating systems from conventional product labeling is that each product can be found in an online database of 3500 companies (Wiser Earth, 2008). If a

consumer conducts research before shopping, the *HowGood* online database provides product ratings and recommendations for better options. The real value of *HowGood* lies in the practice of providing retailers with *HowGood* ratings, which can be placed on MSI tags (shelving price tags) (see Figure 8.) This bypasses the reluctance that suppliers have for using up more space on product packaging with large information labels. It also ensures a product rating even when the supplier does not conduct CLCA measurements (HowGood, 2011a). Pairing a rating next to price can be a strong decision tool for purchasing ethically, as demonstrated by the “Traffic light label” Figure 4 (Vanclay et al., 2011). However, there is no indication on the company website as to how background information on the rating system and the *HowGood* company itself will be communicated to consumers in-stores, or what the ratings of “Good”, “Very Good” and “Great” mean in relation to the indicators being measured for in-store shoppers.



**Figure 8** HowGood label found on shelves in participating retail locations, note no balls="Not Good", one ball = "Good", two balls = "Very Good", three balls = "Great"

## Barcoo

*Barcoo* is predominately a European smart device application that enables consumers to scan a product's barcode and retrieve information about the item in relation to a number of concerns that might affect a purchase decision. *Barcoo* displays health and Corporate Social Responsibility (CSR) ratings separately. Health is indicated by the traffic light framework discussed above and uses publicly available information from the British Food Standards Agency (Barcoo, 2010). CSR information is displayed by *Barcoo*, but the content of the ratings is outsourced to an online CSR rating site called *WeGreen*. *WeGreen* utilizes a traffic light framework to indicate the product company's CSR rating based on an aggregate of many other ranking systems and quantifiable information (WeGreen, 2007). *Barcoo* also includes features such as user reviews of products and the ability to input the best local prices as well as prices at online stores (Barcoo, 2008). Using a smart device application affords the shopper with the ability to not only obtain more information about the product in-store, but to also learn about *Barcoo's* and *WeGreen's* methodology of rating products. It also provides a useful way to work around the reluctance of some retailers and product manufacturers to be transparent about product impacts. Furthermore, information about better deals in other locations could provide an extra nudge to scan items in-store (see Figure 9 and Figure 10 for display examples.) However, there is a downside to any smart device application as the act of

scanning a product takes more time than shoppers usually spend in making everyday purchasing decisions. Many factors go into the amount of time a shopper will spend deliberating a purchase decision. For those items usually found in grocery stores, routine and familiar brands have a large impact on choices (McGeevor, 2009). It is my opinion that standard in-store visual cues such as product and shelving labels prime the consumer in a way that ultimately requires less effort and creates an ease of comparability more so than smart device scanning applications. The rationale is that shoppers currently using smart device rating apps require a shopper to remember to remove their smart device out of one's pocket or purse, start the program, scan the item, view available options and correlate those options to what is available in store. In contrast, in-store cues, though they may be ignored by the power of routine (McGeevor, 2009), simply require the shopper to look at the label and compare it with other products beside it. All shopper tools described so far do not take into account the individual values of a single shopper, nor is there a prompt that takes into account if a shopper's purchase history matches the important values of the shopper.

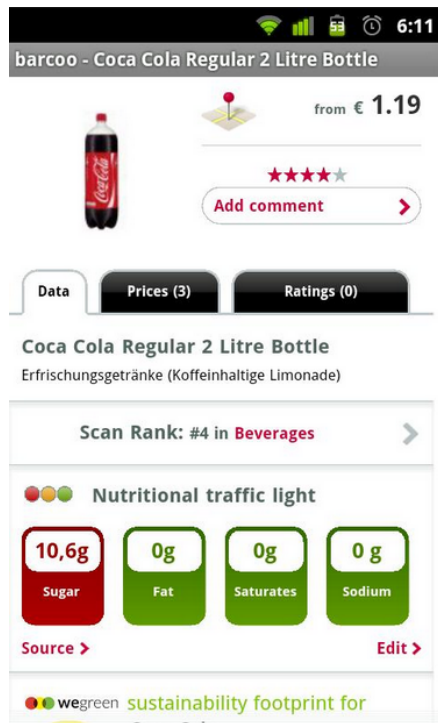


Figure 9 Android smartphone display of a scanned Coke bottle using *Barcoo* (Barcoo, 2011)

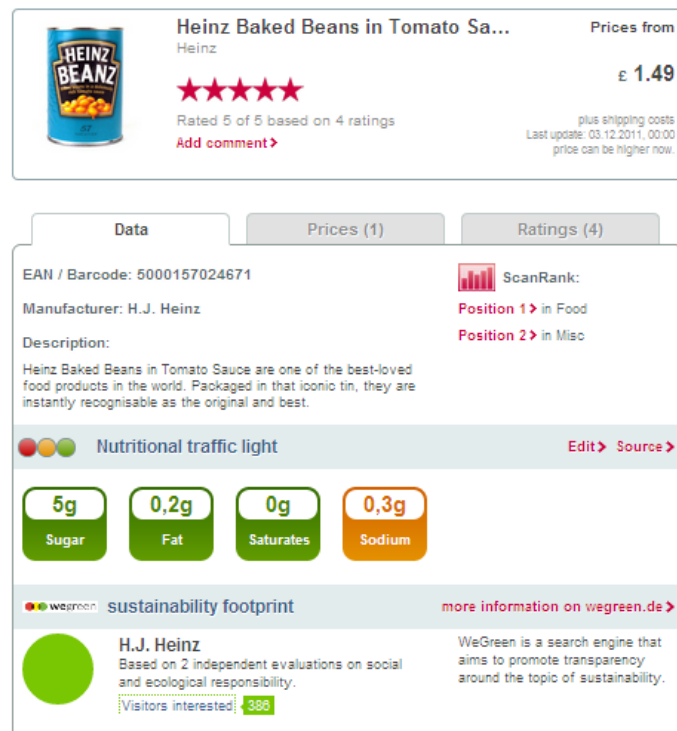


Figure 10 Website view of Heinz Beans *Barcoo* rating (Barcoo, 2008)

## GoodGuide

The most comprehensive and innovative consumer decision tool is the *GoodGuide* system. The *GoodGuide* has all the features of *Barcoo* with the added credibility that the company's evaluation framework was founded and developed by University of Berkeley life-cycle assessment expert Dara O'Rourke (GoodGuide, 2011a). Like many other rating systems, O'Rourke's evaluation system is described in the available literature, but the specific weighting of sources and indicators are not disclosed (Sadowski et al., 2010). Much of the information collected, including climate information, is sourced by other groups and usually represents information about company operations not individual product impacts (Sadowski et al., 2010, p. 13). This is demonstrated and explained on *GoodGuide.com*. In addition to their scanner application, website, rating and pricing system, the *GoodGuide* offers the "Purchase Analyzer". This program allows users to choose what indicators are most important to them, connecting this information to their online accounts at Amazon.com, Soap.com and Safeway.com to find the users purchase history. Lastly, it compares the user's performance based on the indicators chosen (GoodGuide, 2011b). This tool connects a shopper's aspirations with actual shopping history and behaviour, and provides recommendations for future purchases based on history and the shoppers chosen indicators (GoodGuide, 2011b). The ability to see one's own performance based on real-time purchasing behaviour and to receive

recommendations for improvement provides a personal baseline and goals that have never been more convenient for shoppers (see Figure 11 for a screen shot of product recommendations based on the researcher's amazon.com shopping history.) Although the Purchase Analyzer has not extended yet to the physical retail space, one could foresee this occurring in subsequent upgrades. One barrier that still exists is that shoppers need to take time to initialize the program, input personal values, and link to existing online shopping accounts.

The screenshot displays the GoodGuide Purchase Analyzer interface. On the left is a sidebar menu with sections 'My Stuff' (containing links for My purchases, My recommendations, Shampoo, Toothpaste, Hand Dishwashing, and My best prices) and 'My Account' (containing links for Filter Settings, Store Settings, and Logout). The main content area shows a list of product recommendations. Each recommendation includes a 'Pass' status with a thumbs-up icon, a product name, a price, and a brief description of the product's environmental impact.

Pass Status	Product Name	Price	Description
Pass ▲	Desert Essence Spa Toothpaste Sparkli...	\$4.99 (1 price)	This product does not contain chemicals that are of medium or high health concern (including known carcinogens and reproductive toxicants) or that are suspected of causing endocrine toxicity or asthma. It may contain chemicals of low health concern.
Pass	Scientifically proven hazards		
Pass	Climate Change		This product was made by a company that is taking substantive steps to lower its emissions of greenhouse gases and reduce the potential impacts of climate change.
Pass	Pollution		This product is made by a company that is taking substantive steps to reduce the amount of pollution it generates, comply with environmental regulations and operate with policies and practices that reduce air and water pollution.
<a href="#">See full rating details...</a>			
Pass ▼	Weleda Plant Gel Toothpaste	\$3.66 (2 prices)	
Pass ▼	Colgate Wisp Portable Mini-Brush With...		
Pass ▼	Desert Essence Natural Tea Tree Oil &...	\$3.14 (11 prices)	

**Figure 11 GoodGuide Purchase Analyzer recommendations for toothpaste based on personal value filter and past purchases (GoodGuide, 2011b)**

In summary, there are a number of smart device services available to shoppers which rate a products' environmental impact. In Canada, the *GoodGuide* is available to iPhone and Android users, and any mobile internet

browsers. However, after researching these interventions, I noticed they rely on concerned shoppers to make more deliberate choices than someone in a grocery store setting normally makes. This is crucial because studies have shown that in routine shopping situations, consumers are less likely to make fully conscious or rational decisions (Ariely, n.d.; Jackson, 2005; McGeevor, 2009). The digital interventions need to integrate with tasks that shoppers are already undertaking and layer ratings on top of that. The *GoodGuide* transparency tool bar comes the closest to doing this as it only reveals itself when shopping on Amazon.com and other cooperating websites. This otherwise hidden toolbar appears while a shopper browses items. It does not interrupt purchases and may be used to find other more environmentally friendly products available on the participating website.

There are many ways in which a ratings service might leverage other smart device applications already being used by shoppers, such as grocery list and personal finance applications.



## Summary

The current state of Canadian CLCA policy and the services currently available for ethical shopping reveals a number of key items that will be useful for this foresight study:

- Canada lags behind other OECD countries in terms of support for voluntary carbon labeling standards.
- *The GHG Protocol* is the most widely adopted CLCA standard.
- TSC is the largest and most well funded group undertaking the task of sustainability product labelling.
- *GoodGuide* leads the market as the most innovative digital ethical shopping ratings site.
- The CLCA *Traffic light labels* have shown noticeable changes to how shoppers chose inexpensive products.
- Smart device interventions need to better integrate with how people actually shop in physical retail environment.
- In terms of shopper information, there is a balancing act between accuracy, accountability and usability that has not quite been resolved in the market yet.

Methodology

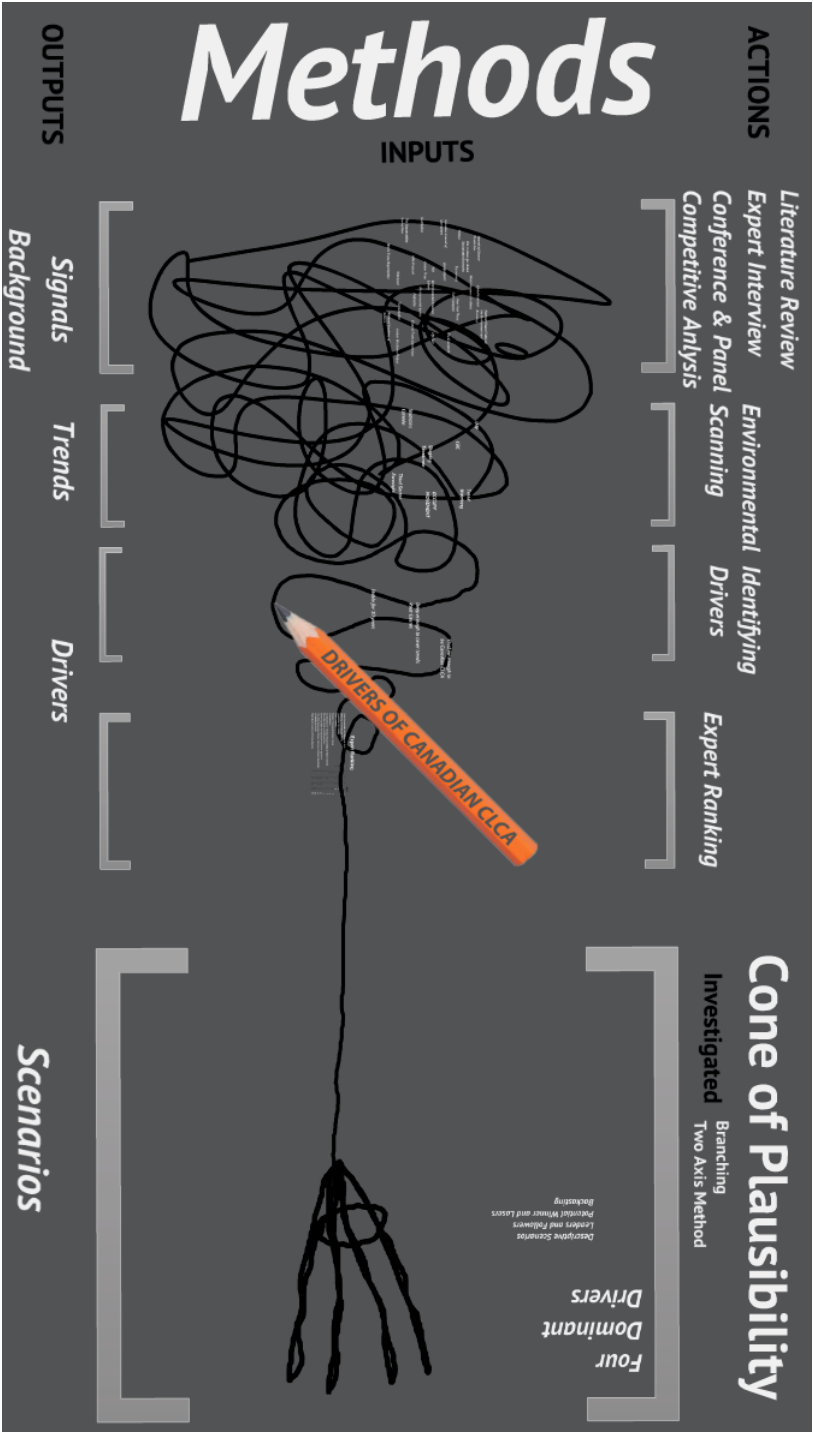


Figure 12 Overview of methods employed in this study; Actions=Methods used; Inputs = sources investigated; Outputs = outcomes of methods

## Scan Techniques and Sources

All the sources and bodies of knowledge assembled as part of the various data-collecting methods described below served at least one of four main functions relating to the study's topic: to:

- Gain relevant knowledge of the impacts of climate change and human industrialized production and consumption
- Identify the current CLCA standards and low-carbon shopper-tools and find critiques and studies of these items
- Develop drivers of change that would affect CLCA in Canada 10 years into the future
- Flesh out four scenarios based on the most recent knowledge discussed in the literature

In addition the information scanning techniques served two foresight aims to:

- Research the Cone of Plausibility and other foresight methods relevant to this study.
- Find literature that fulfils a STEEP horizon scan of drivers that may affect the development of CLCA in Canada in 10 years.

## Literature Review

A number of secondary sources were reviewed as part of a Literature Review, which is commonly listed as the first stage of any foresight study (Hines & Bishop, 2006; Popper, Georghiou, Harber, Keenan, & Miles, 2008).

Investigating articles found in the Journal of Cleaner Production, Journal of Consumer Policy, the National Academy of Science, Nature and Environmental Research Letters provided a good background to the major critiques of carbon labels, new ways of displaying carbon information, the impacts of climate change and its relation to human consumption and production.

Observing publically available reports to government was pivotal to this study. These include reports that described the current state of the ecolabel industry, the current state of rating and ranking services, a review of the types and validity of metrics used for environmental labeling, economic impacts of climate change, behavioural economics of environmentally preferable retail shopping, guidelines for motivating sustainable consumption, reports from the Canadian Council of Consumers and roundtable reports on life-cycle thinking in Canada.

Reports from large institutions such as the *World Trade Organization*, *Carbon Disclosure Project*, *Sustainability Consortium*, *GHG Protocol Initiative* and *UN FAO* were investigated to determine if they related to CLCA, or carbon ratings or carbon labeling. They provided important insights as to how these institutions may react, win or lose in alternative consumer climates 10 years into the future. News reports from a variety news sources were utilized when they related to

CLCA of retail products including the New York Times, The Economist, Environmental Leader, Fast Company and The Guardian.

Newsletters and press releases by the major players in CLCA and ethical shopping were also investigated and subscribed to, including *GoodGuide*, *Carbon Trust*, *The Sustainability Consortium*, *World Resource Institute*, *GHG Protocol Initiative* and *Carbon Disclosure Project*.

### **Interviews**

Interviews were conducted as part of this process and are listed as an available technique for foresight studies (Popper et al., 2008). Discussions with the CEO of *Zerofootprint* and their lead managers and researchers (who conduct carbon life-cycle assessment of products on behalf of client companies) directed the researcher to relevant standards and developments in the sector.

*Zerofootprint* not only aims to conduct CLCA through consulting but is looking to create product level interventions for shoppers to make climate friendly purchases. As a company, their mission is to measure, compare and change the way people shop to encourage a low carbon economy. General open-ended questions were posed regarding life-cycle assessment. The conversational approach led the staff to describe in an exploratory way what they thought the best standards were, the largest challenges and the newest developments in the field of CLCA, highlighting product level methods. These interviews provided an

important indication that the *GHG Protocol Initiative* CLCA standard was the best practice standard in Canada. I discovered that voluntary standards would make it difficult for CLCA to take hold because of the intense amount of private information and time required to conduct a full CLCA. Outside forces such as a mandate from retail suppliers or mandatory labeling from government would need to occur before a plausible ubiquitous CLCA consumer-facing tool would be available to shoppers.

### **Expert Panels and Conference**

Expert Panels and Conferences are another method for information gathering that can be integrated in the development of foresight research (Popper et al., 2008). I attended the conference “Informing Greening Markets: What makes a difference and why?”, held by the Erb Institute for Global Sustainable Enterprise at the University of Michigan. It presented major thought leaders and prominent researchers, information regarding product labeling, and changing regulations that were relevant to this study,. Expert panels brought together groups of experts dedicated to analyzing and combining their knowledge of ecolabels and rating systems. Specific subjects discussed were the business effect on company level environmental rating, drivers for companies to use voluntary environmental labels, and survey data with regard to what consumers look for in an environmental label. A keynote address addressed new

rules by the federal trade commission about the liability companies have for providing false or ambiguous environmental labels. Finally, the conference helped identify candidate experts for the ranking portion of the study, requisite for the Cone of Plausibility development.

### **Competitive Analysis**

An in-depth analysis of precedents for shopping tools was undertaken using a competitive analysis framework which I created. This included a comparison table that compared the *GoodGuide*, *Barcoo*, *HowGood*, *Project Label*, *SourceMap*, *CarbonCounted*, *Zerofootprint*, *Indexr* and *TraceProduct*. The formation of the key factors compared was developed after taking an in-depth look at each organization and their capabilities to empower environmentally preferable shopping. This was done by investigating product websites, news reports, articles, interviews and videos. A critique from Fred Winegust (Zerofootprint Zerolab coordinator) and Greg Van Alstyne (Director of Research, Strategic Innovation Lab, OCAD University) covered gaps left out in the original analysis framework creation. The final major categories of comparison included “Delivery”, “Features”, “Data” and “Scope” (for comparison tables and summaries, please see the comparative landscape report prepared as part of the Neutral Carbon Product research study, funded by the Federal Development Agency of Canada [Rose, 2012a].) The analysis gives a snap shot of a range of

options, allowing for heuristic evaluation, reflection of tool development and possibilities.

### **Scanning**

In order to create a diverse set of drivers, a broader scan of information was undertaken. Often termed “environmental scanning” or “horizon scanning,” this action focuses on the observation, examination, monitoring and systematic description of technological, socio-cultural, political, ecological, economic contexts of specific actor or area, in this case Canada (Popper et al., 2008). Furthermore, horizon scanning involves looking at weak signals that could develop into larger driving forces (Gordon, 2008, p. 138).

Sources from a parallel scan of news articles and reports on the future of advertising were utilized. Canadian specific commentary and news reports from the *Canadian Broadcasting Corporation* (CBC) on topics such as the global economic recession, the Occupy movement and the *International Monetary Fund* (IMF) were used. Furthermore, Canadian demographic information was collected from Statistics Canada. Trend tracking sites were looked at for more general trends and any data used was adapted to fit the Canadian and CLCA contexts these included Third Sector Foresight, Shaping Tomorrow and Trend Watching.



Effort was made to find and develop drivers that will have a high impact in how carbon information will be delivered to consumers in the future. Care was taken to develop drivers that operated at similar levels.

## Synthesis

To ensure that the chosen drivers fit the appropriate scale and scope for this study, a number of iterations of driver synthesis were undertaken. Below is a summary of how the information was prioritized and used for the different sections of this paper.

### Synthesizing Drivers

*“There is never a point where we can be sure we have accounted for all the drivers of change in any situation under study. We may, from time to time, be able to see a clear driver of change doing apparently predictable things.”*

(Gordon, 2008, p. 162)

This was the stance taken in developing drivers for this study. I attempted to identify forces in the current environment (based information collected, described above) that if continued would have plausible outcomes for CLCA in Canada. A number of the drivers were identified during the information collection phase.

The first stage was identifying a broad spectrum of signals (based on single pieces of information.) These signals were clustered into patterns which were

then synthesized into trends. A trend is a sequential pattern of information that describes a change directionally rising or falling, spreading or diminishing (Gordon, 2008). For example, I identified a trend showing that CLCA standards are becoming more important to countries and companies. The signals used in this trend were the creation of the PAS2050 standard in 2007 and the rising number of CLCA standards 2011-to present represented by France, Japan, European Union, GHG Protocol and ISO Standards. However, for the Cone of Plausibility method, drivers of change were required to develop scenarios. Thus the trends were evaluated for common causal roots. These deeper causal roots are what I used as drivers in this study.

Drivers of change are the less observable root causes that underpin the trends observed in the environment (Gordon, 2008, p. 141). Root causes are derived from trends that may have numerous reasons for being and can be nested in higher level trends controlled by the 'actual' unidentified driver. Consultation, critique and iteration was undergone in driver development to cautiously identify the root causes of trends.

The trends were analyzed using three principals:

- 1) Drivers needed to be highly influential to the development of a coherent transfer of carbon information to Canadian consumers.

- 2) The drivers need to be stable enough to continue ten years into the future.
- 3) Drivers needed to be shallow enough that they relate to the topic subject, yet deep enough that they cover at least more than one trend. For example, the driver “Efficiency and Value for Money,” if analyzed at a deeper level, could have been entitled “Greed.” However “Greed” is so broad it’s not useful to create scenarios around specific sector of study. On the other hand, “Efficiency and Value” for money is broad enough to be driver for a number of related trends: “CLCA used as efficiency benchmarking tool”, “Supply chain risk management and technology assessment”, “Just in time production”, “Selective CSR reporting” and “Supply chain monitoring”.

The drivers of Third Sector Foresight (TSF) were used as a model for how the drivers would be described to experts (National Council for Voluntary Organizations (UK), 2004). This model was used for all drivers in this study and included a description of approximately five hundred words and an additional section describing the implications.

Drivers used in this study that contain adapted source material or topic areas from TSF drivers are marked with “Adapted from Third Factor” in brackets

beside the title to indicate the driver information was influenced by a TSF driver. Because TSF is a UK organization, TSF driver information was adapted to fit a Canadian perspective. The rationale for using the TSF drivers followed the same driver selection principals described above. The decision to use the TSF style was that the brevity of the TSF drivers would work well in getting quick feedback from experts during the ranking portion of the study.

### **Expert Polling/Voting**

Having experts poll or vote during foresight studies is a common practice (Popper et al., 2008). As described above, drivers were created by utilizing various information scans and iterations of syntheses and summaries. These drivers were sent to experts to rank independently.

This area of study is multi-disciplinary as it crosses subject matter that a number of groups of experts would have relevant influential knowledge about. For example, experts understanding politics are required: mandatory versus voluntary CLCA reporting. An understanding of business and the private sector is necessary: the reaction of product suppliers and retailers to voluntary or mandatory CLCA reporting. An understanding of consumer rights and shopper reaction to in store cues: the consumer's response to CLCA reporting. The experts gathered for this study fit in one of these four categories. Consequently, a diverse set of experts was chosen, each of whom had their own discipline-

specific terminology. I attempted to create a set of drivers that used streamlined vocabulary and avoided potential communication problems. When choosing experts, I pooled from the main groups described above, to uphold the diversity of knowledge and influence.

Thus, an expert representative was secured from each of the following groups:

1. Those that lobby for consumer rights - a representative from the Consumer Council of Canada; representing the consumer rights and bias category.
2. Experts representing Government - a representative from the Head, Trends & Analysis, GHG Integration Section, Oil, Gas & Alternative Energy Division, Environment Canada; representing the category of politics, an inside the civil service perspective.
3. Think tanks that inform government environmental and economic policy - the VP of Policy conducting roundtable research on Life-Cycle thinking in the public and private sector; representing politics and business category from a think tank policy point of view.
4. Facilitators that work with multiple stakeholder groups to develop private standards for eco-labels – the former CEO of the Keystone Centre which facilitated Green Products Roundtable which included broad stakeholder engagement from the Sustainability Consortium and TerraChoice to develop a new entity that will be the authoritative “Judge and Jury” of the 350 ecolabels currently available in the marketplace; representing the business category perspective in voluntary systems.

Experts were sent a list of drivers; the contributors were asked to change or keep the ranking the same based on their response to two variables; driver

importance and certainty. In addition, experts were also asked to comment on gaps in the list of drivers if any or other anomalies that they noticed.

Each ordered list provided by participants was then tabulated based on rank. The average rank of all drivers were used to determine which four were the most important and would be the basis for forming the four scenarios described later in the study. These four drivers were formally manipulated in each scenario with one dominant and the others synergized, diminished and/or cancelled. The other eight drivers were included across the four scenarios to add nuance and texture where appropriate.

### **Foresight Methods**

The goal of this research is to synthesize an understanding of carbon life-cycle assessment of products, and to develop scenarios on how it might be used in the future by consumers. In this way, the scenarios could be used as a strategic planning tool for groups interested in improving the ubiquity and use of product carbon information as shopping tool for consumers.

A ten-year timeline was chosen because many of the plans by large players in CLCA, such as the TSC have already been made five years ahead and these groups have invested heavily in the five year time frame (The Sustainability Consortium, 2012b). Thus, a more interesting and uncertain time frame for a foresight activity in this field would be to describe the reaction of the outcome of

these plans in different alternative scenarios described by the key drivers.

Grounding the first five years in a similar state for the Cone makes sense in a number of ways. If the theoretical framework of the Cone is such that the dominance of key drivers create more distinct worlds as time passes, than in the short-term the effect of the dominant driver would not be as pronounced. Thus, the scenarios would be more similar in shorter time frames. Having similar activities and events in the first five years creates a common stable base by which I can creatively develop how the dominant driver begins to diverge as their influence grows and reaction differs to preplanned highly invested activities.

After reviewing a number of foresight methods, the research method that purported to be most specifically aligned to planners and strategist was *The Cone of Plausibility* (the Cone.) After conducting research in this topic area, it was discovered there are known plans and a diversity of stable drivers for CLCA. The Cone builds on stable drivers to provide alternative worlds for planners to create strategy. This is in contrast with the *Two Axis* method which builds scenarios from two orthogonal<sup>2</sup> key uncertainties or drivers. Given the plans underway and the strength and diversity of drivers the Cone was favoured over the *Two Axis* method. Furthermore, no major treaties are planned for CLCA and Canada is in its infancy with regard to government support for CLCA in the foreseeable future (see page 160 for detailed explanation.) Thus, the Cone was favoured over

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<sup>2</sup> Uncorrelated, unrelated, independent, non-overlapping

*Branching Analysis* because the Cone does not depend on future treaties and agreements, which the *Branching Analysis* method is built from.



## **Cone of Plausibility**

### **History and purpose**

The Cone of Plausibility is a foresight scenario concept originally developed in 1986 during a stationing study conducted by Rutz, McElDowney and Taylor for the US Department of Defence (Taylor, 1994a). Taylor expanded and clarified the concept so its utility went beyond military planning (Taylor, 1994a). Generally this concept is used as a planning tool in scenario reports for decision makers, policy-makers, long-range planners and others interested in comparing the consequences of actions taken today to plausible, future alternative world environments or scenarios (Taylor, 1994a). The focus on policy-makers and long-range planners fit the types of groups Canadian CLCA information would be important for, mainly the Canadian government and organizations interested in creating long range strategies to influence government and shoppers.

There are number of ways various foresight experts have attempted to create scenarios that use the Cone of Plausibility framework. At its core, all variations create scenarios that are bounded by changes in strategic elements or drivers that the foresight experts deem plausible. The idea is to be less provocative and more pragmatic about the types of worlds the audience of the scenarios will have to navigate.

### **Time frame of scenarios**

The concept is to develop different plausible future scenarios by projecting current drivers or strategic elements related to the topic under study forward.

The approach can be used in varying time frames, short (5-10 years), medium (10-20 years) or long range (over 20 years) (Taylor, 1994b), but works well with shorter time frames with a limited number of drivers (Rhydderch, 2009). As described above, the 10-year time frame works well for this study since large plans are already in motion for the next five years.

### **Types of Scenarios**

Taylor and Bishop describe a process for making scenarios that are agnostic to usual scenario stereotypes: upper or lower limits, best or worst case, or middle-of-road (Taylor, 1994a, p. 20). The intent is to describe possible combinations of future conditions that can be used as a planning package, not to differentiate each scenario as the most likely to occur or least (Taylor, 1994a, p. 20).

In Rhydderch's description of the Cone of Plausibility method, which has been adapted by the UK Ministry of Defence, an extreme scenario is created by changing at least two of the driver assumptions which form the scenarios (Rhydderch, 2009). This extreme or "wildcard" scenario has a high impact but low probability. Rhydderch, 2009, gives an example where India rejects western influences and buys energy solely from Arab nations. The use of wildcard

scenarios seem to run counter to both Taylor and Bishop's description of the general coherence of what makes up scenarios within the Cone of Plausibility. Taylor and Bishop exclude wildcard scenarios from their approach to developing scenarios within the Cone of Plausibility.

Preparing for low-probability high-impact occurrences is important for planners. One of the ways planners can incorporate these types of events in a Cone framework is to incorporate them after the scenario process is complete. Having four scenarios grounded in drivers is an excellent starting point to imagine how low-probability high-impact events might affect each scenario. In this way, planners can develop strategies around dominant drivers but also manage risk from startling and drastic events.

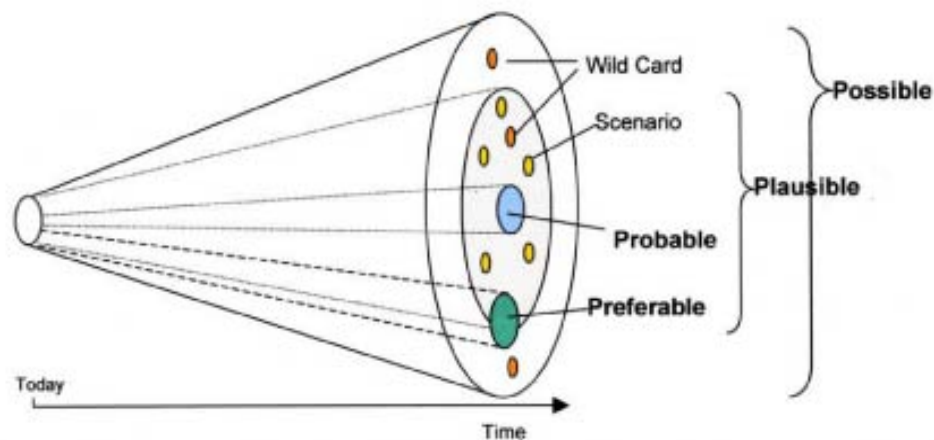
Voros describes a "future cone" independent of Taylor or Rydderch's method (see Figure 13.) The future cone is a tool used to frame different types of future's one might develop in a generic foresight process.

Utilizing the future cone, Voros provides a conceptual synthesis resulting in multiple possible futures:

- outside the Cone are all futures that go beyond current human comprehension;
- encompassing the Cone are all "possible futures", those that we can imagine coming into being (irrespective of the likelihood of them happening);

- closer to the centre are “plausible futures”, those that could happen and are based on some kind of evidence that the future might unfold in the proposed way (based on current cause and effect knowledge);
- “probable futures” are futures that are plausible but have an added feature that they have strong confidence that events will occur in the future projected (the sun will continue provide light to the earth ten years from now);
- Voros also conceptualizes preferred futures, occupying any one of the futures discussed above except those outside the future cone (Voros, 2003).

Though this conceptualization is useful for defining what a plausible future might be, Voros does not describe or provide preference to specific techniques associated with the formation of scenarios (Voros, 2003). The goal of the Cone of Plausibility method is to create four plausible futures. For this study, I use Voros’s definition of what a plausible future is.



**Figure 13 Voros' Future Cone, outlines the various ranges of certainty associated with future scenarios (Voros, 2001)**

### **Inputs to Process**

Rhydderch, Bishop, and Taylor are not completely clear as to the exact technique employed for gathering information about the topic of study. All discuss environment scanning, which could be conducted by a single researcher examining trends or through discussions with experts. Rydderch discusses coming to workshops with a broad set of information prepared for participants, which would indicate an initial scan by the workshop holders (Rhydderch, 2009). It is clear that Taylor, Bishop, and Rhydderch employ the use of experts to frame, rank and develop drivers from the environmental scan.

### **Organization of Inputs to Scenarios**

There are similarities and differences in Bishop and Taylor's methods to the input process for the candidate scenarios. Both are similar in utilizing drivers as major inputs to scenarios and both rank drivers and use the top four as the main elements to forming scenarios.

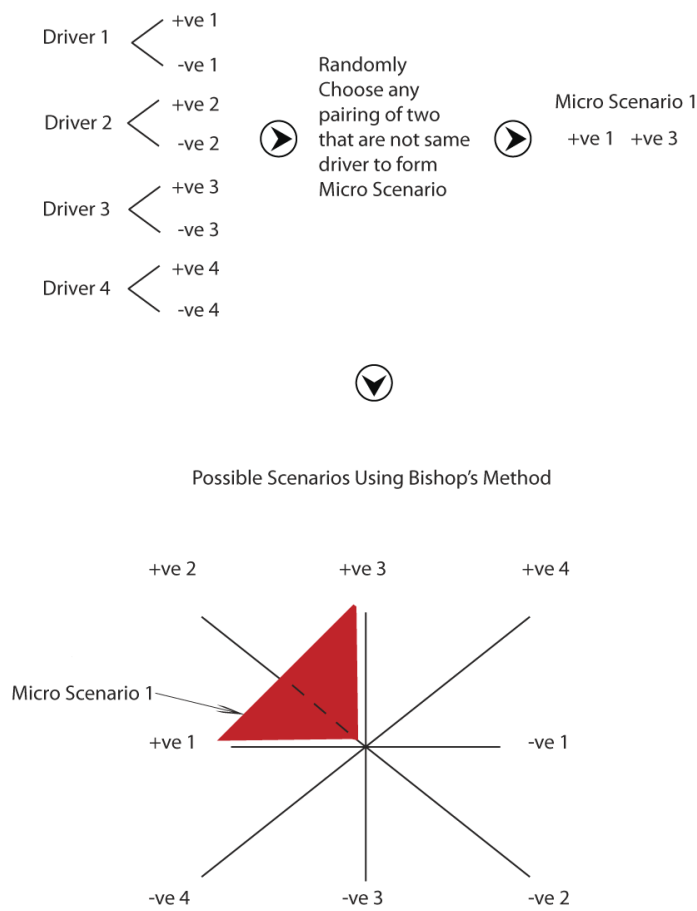
### **Scenario Outputs and Development**

Where the aforementioned methods differ somewhat is in the development of the micro, mini and macro scenarios. In Taylor's case, each of the four drivers are included in each scenario. A different driver is deemed dominant in each scenario (Taylor, 1994a, p. 19). One basic trend statement (one sentence each) is written for each driver in each scenario (Taylor, 1994a, p. 56). Presumably, these

statements will differ depending on which driver in which scenario is dominant.

This forms the micro, which differs from Bishop's description of forming micro scenarios.

Bishop is less prescriptive to choosing four scenarios and does not prescribe a set number whereas Taylor recommends four (see Taylor, 1994a, p. 29 endnote 8.) Bishop does not describe each micro-scenario as having a dominant driver, but rather a set, randomly chosen positive and negative statement reflecting the top four drivers (see Figure 14.)



**Figure 14 My interpretation of how to create a Micro Scenario using Bishop's Method.**

Both Taylor and Bishop leverage the micro-scenarios and experts to further flesh out scenarios into page-long mini-scenarios (approximately 500 words.) Taylor takes the mini-scenarios a step further than Bishop and builds the mini-scenario out into macro-scenarios which can be a more than 5,000 words.

Rhydderch creates a baseline scenario from three to seven drivers each driver includes an accompanying assumption to the logical progression of the driver. Alternative scenarios are created by changing one or more of the assumptions associated with the three to seven drivers. The wildcard is also generated in similar manner to the alternative scenarios but more extreme (Rhydderch, 2009).

Both Taylor and Bishop refer to experts and workshops as the consultation process for both prioritizing drivers and building out the micro-scenarios into mini-scenarios. The descriptions of future outcomes are first bounded by what is possible and then further bounded by what is plausible based on key drivers indicated by literature review, expert interviews and/or workshop (Bishop, 1994; Taylor, 1994a, 1994b).

### **Approach in this Study**

As the description of the methods reveal, there are a number of avenues a foresight research study can take to create plausible future scenarios utilizing the Cone of Plausibility method. For the purpose of this report, I have chosen to

synthesize methods to fit the scope and scale of the research topic “carbon information transfer of products.”

Given the flexibility of approaches described above, the logical progression of steps I chose to go with is as follows:

1. Name the twelve most important drivers that influence the planning topic
  - Literature Review, Interviews, Expert Panels, Conference, competitive analysis, Horizon Scan
2. Describe driver and implications
  - Adjusting candidate trends and drivers to the appropriate root cause level so they are relevant to CLCA in Canada ten years into the future
  - Rewriting drivers in a style that will be terminology neutral and easily read and ranked by experts
  - Ranking these drivers in order of importance myself
3. Send drivers to experts to prioritize in order of importance and certainty
  - Identify the top four drivers based on all expert rankings, describe anomalies and gaps, incorporate expert comments to scenarios
4. In each scenario develop one driver that dominates, decide logically how the other three drivers interact (cancelled out, diminished, synergize)
  - Choosing a foresight technique relevant to planners and are not dependant on international agreements occurring in the next five years
  - Inserting where appropriate the effects of the eight other drivers identified as part of the literature review. Depending on the dominant driver these other elements will play a background role and will be distributed amongst the scenarios to reinforce the logic of the alternative futures.



## 5. Create Scenarios

- Develop scenarios that paint a vivid picture of the four drivers in different states of dominance

### Rationale

I chose to use Taylor's driver dominance method over Bishop's randomization method because it would add more coherence and internal logic to the output scenarios.

I chose to develop structured vivid scenarios as they would provide the most value to groups planning to influence changes now that will have long term effects 10-years into the future. Furthermore, using a structured format allows easy comparability between scenarios and adds an extra level of coherency to scenario descriptions.

In addition to using the Cone method of describing the dominant driver and its consequence, I have included a number of process enhancements.

I created a description of *Leaders and Followers* in each scenario. By including a description of the three main groups; producers, consumers and government, I have elaborated an internal logic to how the driver affects the actions of the major groups in the system.

The additional section *Potential Winners and Losers* grounds the scenarios to how these worlds might affect potential planners in these scenarios. This is

particularly highlighted by including a Canadian list of potential winners and losers.

A *Backcast Timeline* was included in each scenario to give more coherence to scenario descriptions and an easier at a glance comparison of scenarios for potential planners. Backcasting the scenarios provide indicator events and milestones that can be updated over time to further calibrate the four scenarios, as our understanding of how CLCA is unfolding in Canada changes and new information is gathered. In this way, over time the scenario logic will be flexible and continue to be relevant to planners.

The implications section *Impact and Rate of Uptake of CLCA* highlights the effect of potential barriers, enablers and overall rate of acceptance of CLCA information. The implications section is directly dependant on the backcasting and logic of the scenario, thus implications are changed as the backcast is updated. In this way, each scenario provides relevant information to planners about the scale and speed of CLCA adoption in Canada and internationally.

The *Practical Application* section highlights key items in each scenario for planners to plan strategies around. This is a crucial component to translating the plausible future worlds into real world applications for planners.

These extra elements were undertaken in order to enhance the foresight process and to make the exercise more useful to planners. The hope is that these

additions have improved the coherence, consistency and comparability of each scenario.

The next section the “Future of CLCA” will firstly describe the drivers identified by the researcher, the results of the expert ranking, and finally the four scenarios developed from the top drivers following Taylor’s Cone of Plausibility method.

## Future of CLCA

## **Candidate Drivers**

The following candidate drivers were presented to the experts in the same order shown below. In some cases, the content was adapted from the comprehensive study by the UK group Third Sector Foresight (National Council for Voluntary Organizations (UK), 2004).

## **Weather Threats of Climate Change**

Experts predict that the frequency and severity of extreme weather events would continue to rise as the effects of global warming intensify due to the global emission of CO<sub>2</sub> increase by human production and consumptive practices (Hans Joachim Schellnhuber, 2008; Meinrat Andreae, Chris Jones, & Peter Cox, 2005). As weather-induced environmental crises continue to rise and are framed as the effects of global warming, it is likely that more and more consumers could perceive CO<sub>2</sub> emissions created by our market based industrialized economy as the cause. People would demand action in a number of ways. The overall effect could be an increased sense of immediacy and urgency to the reduction of CO<sub>2</sub> emissions by all forms of international and national society.

## **Implications**

- Fast tracked CLCA measurement schemes for industry
- Shared responsibility by industry and government to lower carbon emissions

- Re-evaluation of economic success metrics, from Gross Domestic Product (GDP) that corrects for natural capital depreciation
- CLCA could become one of many metrics developed to weight the GDP performance of nations against environmental impacts to create new measurements of economic success and resiliency
- Nations could demand mandatory CLCA of all products as a first step to regulating nationwide CO<sub>2</sub> emissions

### **Trade Competition in Relation to CLCA**

The number of countries interested in developing national standards for CLCA continues to increase as each nation tries to make sure CLCA does not put their exports at a disadvantage. Currently, the UK, France, European Union, Japan, Thailand, Australia and New Zealand (using UK standard) all have methodologies that uses the countries climate factors to assess the carbon footprint of products (Bockel et al., 2011). There are three world standards being developed that provide guidance for nations and industries wishing to create national standards for CLCA:

- ISO14067 (International Standards Organization, 2011)
- “Product Life Cycle Accounting and Reporting Standard” (Greenhouse Gas Protocol Initiative, 2010)
- PAS2050 (BSI Standards, 2008).

In Canada, there is interest in taking a closer look at CLCA as a national strategy to improve the economic well being of the private sector, and to

improve procurement choices in the public sector (National Round Table on the Environment and the Economy, 2011). Having lower carbon emission exports could be added value for negotiations of import and export between nations.

### **Implications**

- Trading countries could be at a disadvantage if a national standard is not harmonized with trading partners (CSR Asia, 2011)
- The way carbon information is displayed on products may be different in each country to reflect country export interests
- Transparency and manufacturer credibility in product claims could rise with CLCA national standards (Bockel et al., 2011)
- Low income countries (LIC) will likely have capacity disadvantages in negotiations with developed nations
- A deficiency in national data collection for LIC of climate factors may put LIC's at a disadvantage competing internationally
- A general difference in the rate of change of principal land use after 1990 may become a major liability for LIC's at negotiations (Bockel et al., 2011)
- High income countries may find locally produced items might have higher CO<sub>2</sub> content than in LIC because of the relatively more intense amounts of energy consumed to produce goods (Bockel et al., 2011)

### **Individualism<sup>3</sup>**

Failures to develop comprehensive climate change regulation have sparked individuals to stop relying on governments to act and to vote with their wallet in order to mitigate climate change impacts through individual purchases. Activism such as boycotting and buycotting, have been practiced in the past, independent

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<sup>3</sup> adapted from Third Sector Foresight

of government action. There have been conflicting reports on the increase of green purchasing trends throughout the world. The UK has seen an 18% increase in green good expenditures despite the recession (Co-operative Bank, 2010). However, in North America consumers have cut spending from mainstream brands which layer green product offerings with normal product offerings, more so than spending in general (Clifford & Martin, 2011.)

### **Implications**

- As climate change effects increase, so too could the moral imperative of individuals to lower impacts irrespective of government action
- Companies will consider CLCA to target groups that are interested in making a difference through their purchases
- The ability to connect purchases to an online profile may allow consumers to advertise their green shopping purchases
- CLCA of individual products could feed into household purchasing histories which could be used to broadcast and nudge friends family to lower carbon impacts
- This bottom up approach could have large market effects; however, if our measurements of market success remain the same, then there could possibly be a rebound effect

### **Efficiency and Value for Money<sup>4</sup>**

The economic downturn and consumer confidence are increasingly putting companies under pressure to achieve efficiency and value for money.

Multinational corporations as well as public organizations are investigating new

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<sup>4</sup> adapted from Third Sector Foresight



and more sophisticated ways to evaluate and manage supply chains and their related energy use. From the top down, people are being required to justify their spending to deliver efficiency and value for money. The tradeoff for CLCA is that it might need to show that measurement has a large pay back. 3M recently reported that to conduct an CLCA for an individual product, the associate cost is \$30,000 (The Economist, 2011). The Carbon Trust reports that it has identified a number of high value areas for brands where not only carbon emissions could be reduced, but also major efficiencies in the supply chain which have been reinvested in the company (Carbon Trust, 2011).

### **Implications**

- CLCA could provide: a cost management tool for supply chains, a risk management tool for new expenditures, preparation for emission trading schemes and a method of evaluation for supply chain review
- CLCA might have an application as: an industry benchmarking tool for efficiency performance, and a technology assessment tool.
- CLCA could provide a profit channel for marketing to improve consumer confidence through labelling, sales support and environmental reporting
- The concentration on efficiency may lower supply chain resilience associated with accidents and disasters due to streamlining redundancies

### **Data Ownership and Management<sup>5</sup>**

Shopping histories are already being tracked by online shopping sites. As ubiquitous connectivity will likely continue to drive changes in shopping

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<sup>5</sup> adapted from Third Sector Foresight

behaviours, the ability to track real-time shopping behaviours of consumers will likely continue to grow. CLCA could not only be displayed on individual products, but could be tracked as part of individual shopping histories. Retailers could provide loyalty programs for shoppers that have shopped below an average carbon budget. Once an individual CLCA of a product is linked to behaviour and histories develop, the management of individual shopper carbon impacts becomes more tangible.

### **Implications**

- Depending on privacy rules, your purchase history and related carbon footprint could be displayed publically, used as part of a rewards program, or taxed
- Emerging solutions for location based customer engagement will continue to develop and become more sophisticated (see Shopkick, 2011)
- Personal accounting software companies and banking institutions with retail connections are able to track individual transactions and create individual shopper history accounts, which provide rewards and recommendations to consumers based on behaviour
- There is a way to track the total CLCA footprint of households

### **Ubiquitous Connectivity<sup>6</sup>**

The current market penetration of smartphones will likely continue to increase and become the new norm for upper and middle class shoppers. It is estimated that in 2011, 56.5% of people in developed nations owned smart devices (International Telecommunication Union, 2011). Consumer behaviours are

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<sup>6</sup> adapted from Third Sector Foresight

changing to reflect the ability of shoppers to find information about a topic anywhere, at any time. This trend will likely increase as the use of smartphones as currency, banking and shopping devices both online and offline increases (Office of Consumer Affairs (OCA), 2010). In 2009, 51% of retail shoppers around the globe used their mobile devices in some capacity to help make a purchasing decision (Marshall, 2011).

### **Implications**

- An application for smart devices which scans barcodes and displays ratings completely circumvents product packaging labels<sup>7</sup>, an example of this form of application can be viewed at GoodGuide.com.
- Irrespective if products display CLCA information on packaging, consumers will be able to find CLCA information online while they are in a store
- Ubiquitous connectivity would make it more convenient to look up products and company information, in line with expectations of users
- Third party groups could aggregate and create applications for smartphone users to create shopping tools related to the CLCA of individual products
- CLCA information can be updated seamlessly so that consumers will see the most recent information
- Consumers and third party groups will be able to mash-up CLCA information with other information to weigh tradeoffs between CLCA and other important factors
- The impact of this trend in generalized rating systems is already evident in companies such as the *GoodGuide* where individual health, social and environmental ratings of over 100,000 consumer products can be seamlessly displayed on shopping websites such as Amazon.com

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<sup>7</sup> *GoodGuide* is currently in a competition that AT&T is now running which may make it the default application for all AT&T smartphone subscribers (AT&T, 2011) .

## Green Taxation<sup>8</sup>

Though controversial in some cases, a number of nations have already created regulations that tax high emitting activities (CBC, 2011; European Commission, 2005; HM Revenue & Customs, 1999; UNFCCC, 2011). As climate change becomes more prevalent and is linked to CO<sub>2</sub> production, the number of nations willing to tax emissions will likely increase. This could particularly become true if the metrics for economic success are changed as described above.

### Implications

- Carbon taxes could be weighted higher on products that have higher emission CLCA's as a way to nudge groups to purchase low carbon alternatives
- Households could be given a CO<sub>2</sub> weekly rations using technology described by the data ownership management driver
- There would be a greater urgency for companies to manage supply chains to lower carbon emissions
- There would be an initial drastic reduction in CO<sub>2</sub> production but it would continue to increase if the current economic model of industrialized growth is maintained

## Credibility of CLCA Labels

*Terrachoice*, the private company that manages the Canadian *Ecologo* certificate program, declared in a recent report that 97% of green claims by companies mislead consumers in some form (Terrachoice, 2010). To combat this, there have

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<sup>8</sup> adapted from Third Sector Foresight

been attempts by the Federal Trade Commission in the US to prosecute companies with misleading claims (Federal Trade Commission, 2009; Kohm, 2011). As the standards and measurement systems for CLCA are formalized, the credibility and accuracy of the associated labels ought to increase. The perception that CLCA is an objective standardized process with legal consequences should increase the perceived credibility of CLCA labels and their subsequent use as a decision making tool.

### **Implications**

- Increased consumer trust that the information provided on an CLCA label is correct
- CLCA ratings could be mashed up and used by other parties as a credible source of information for combination rating systems
- CLCA may be increasingly used as an objective measure of success over time for companies and brands
- CLCA labels would gradually replace the vague unsubstantiated green product claims
- CLCA labels could gain relevance as a straight forward decision tool for consumers

### **Multi-Factor Labels and Rating Systems**

*Terrachoice* and a number of other certifiers and product rating companies have described the phenomena of undisclosed tradeoffs with single-factor measurements such as CLCA (Golden, 2010; Terrachoice, 2010). For example, a personal care product could be low-carbon but full of toxic chemicals, which are

bad for your health and the surrounding water table. The growth of multi-factor environmental labels that take into account carbon emissions as well as other health and environmental concerns could add a level of transparency and credibility that single-factor labels cannot accommodate. France and the Sustainability Consortium are adopting other environmental and social indicators in addition to CLCA for product sustainability (Ministère du Développement durable, 2011; The Sustainability Consortium, 2009, 2011b, 2011c).

### **Implications**

- CLCA could become one of many environmental factors that are described on products
- The complexity of the communication on multi-factor labels could relegate environmental information of products to websites accessible to smart devices rather than on product packaging
- Consumers may have the option to filter the factors most important to them while they shop; this service is already available through *GoodGuide* (GoodGuide, 2011c)
- Info glut may require graphical representations of information, or other tracking services that consumers opt into.

### **The 99% Demanding Greater Fairness in Wealth Distribution**

In many developed and developing nations, the income gap between the very rich and the middle class has been growing wider and wider. Since the 70's, the very rich have grown exponentially whereas average wages have stayed relatively constant (Thompson, 2011). The impact of the inequality between the very rich and the middle and lower classes, as well as the economic downturn,

have sparked global protest (Walters, 2011). The effects of the economic downturn mixed with inflation could lead to a greater demand on transparency and accountability in exchange for the extra cost of everyday consumer items. This may cause ripple effects which include a greater demand for transparency in governments, banking institutions, the operations of companies, the impacts of individual products on the environment and worker social justice. CLCA could represent a tool that governments and companies would use to increase transparency and restore consumer support for status quo market systems.

### **Implications**

- A display of CLCA's conducted every year could show the work being done to pass savings to consumers, where applicable
- Groups of people may be more interested in the locations and worker rights of those who work to manufacture consumer products
- Companies might have to have a stronger corporate social responsibility reporting system that will withstand intense scrutiny
- There could be more of a market for third party organizations to audit and fact-check claims made by companies for environmental and social responsibility
- In general, the public may want companies and governments to be more open about their operations and expenditures and how their decisions reflect the majority of stakeholders

### **Uptake by Major Demographic Consumer Segments**

The 2010 estimate of the population by age group for selected years shows that in increments of 5 years, Canadians between the ages of 20-44 make up roughly

2.3 million people (Statistics Canada, 2011). This number rises by four and three hundred thousand respectively in age groups 45 to 49 and 50 to 54 (Statistics Canada, 2011). These extra seven hundred thousand consumers in the highest median earning age groups (Statistics Canada, 2009) suggests a consumer buying power disproportionately higher for the older than the younger.

In the next ten years, this cohort will likely continue to rise in age and exert demand on products and services that are age appropriate. Using Environics' Canadian baby boomer tribe frame, about 19% are considered Autonomous Rebels and 21% Connected Enthusiasts; these groups would be more inclined to purchase greener products that were also healthy (Adams, 2010; Barthel, 2011). The Autonomous Rebels would be more skeptical of green washing and standards than the Connected Enthusiasts (Adams, 2010; Barthel, 2011). 48% are considered Disengaged Darwinists and would likely purchase according to traditional values of price and value, as would the 12% of Anxious Communitarians (Adams, 2010; Barthel, 2011).

### **Implications**

- Given the attitudes described above, the response of CLCA to this large demographic group could be up to 40% in Canada
- Initially this could mean over the next 10 years, a core group with a disposable income would be in the market for purchasing products that account for their life cycle impacts, despite a recession



- Albeit, the tribe of the Disengaged Darwinist represents a very large portion of the boomer group (48%) and would likely be less receptive to carbon or health claims relating to products
- Younger generations may demand that older generations take more responsibility for climate problems

### **Complexity and Tracking Responsibility of Multi-Nationals**

With globalization, mergers and acquisitions have led to the consolidation of multinational companies that own the majority of brands and products available to consumers. This trend is likely to continue as smaller companies (which are more vulnerable to a global recession) are purchased by larger companies that have larger reserves to “out live” the recession. The product offerings to consumers could likely remain the same globally or even increase, however the understanding of which company is responsible for negative impacts will probably become more complex. The ability of consumers to purchase products that are not owned or connected to multinational parent companies might diminish. CLCA represents a way to navigate a single product’s impact amongst a number of companies by measuring impacts at different points throughout the lifecycle.

### **Implication**

- CLCA could represent a tool to make the ecosystem of companies related to the delivery of a single product more transparent and traceable

- If full access is granted to consumers, consumers and stakeholders would be able to make specific demands to brands, and parent companies regarding environmental and social impacts
- Smaller companies that have less capacity for CLCA may be excluded and out competed by larger corporations
- Smaller companies may require government to provide CLCA capacity

## Results of Ranking

**Table 1 Expert Driver Rankings: A rank of 1 is a highly important and certain driver whereas a rank of 12 is least important and certain**

Driver Title	Average	Rank
Trade Competition in Relation to CLCA	3.25	1
Efficiency and Value for Money	4.25	2
Ubiquitous Connectivity	5	3
Green Taxation	5.75	4
Weather Threats of Climate Change	6.25	5
Individualism	6.5	6
Complexity and Tracking Responsibility of Multinationals	6.75	7
Data Ownership and Management	6.75	7
Uptake by Major Demographic Consumer Segments	7	8
The 99% Demanding Greater Fairness in Wealth Distribution	7.25	9
Credibility of Labels	8.75	10
Multi-factor Labels and Rating Systems	9.5	11

## Discussion of Ranking Results

The experts provided much feedback about the rankings as well as some insights about how they ranked drivers collectively.

The top four drivers are:

1. Trade Competition in Relation to CLCA
2. Efficiency and Value for Money

- 3. Ubiquitous Connectivity
- 4. Green Taxation

### **Scale of “Weather threats of climate change” driver**

In the individual rankings, experts either rated this driver the highest or lowest. One expert commented that Weather threats of climate change driver operated at a different scale than all other drivers. The reasoning was that climate change impacts are the first order reason for creating CLCA in the first place. Thus, experts either thought it was extremely important as to how consumers will view carbon information in Canada, or it will be taken for granted by consumers and other considerations will be more important and certain. For this reason, in the formation of my scenarios I will add the same level of weather threats of climate change for each scenario. In this way, I will be taking into account the feedback from experts, that adverse weather effects and their impacts, although a primary driver, is an a priori factor for creating CLCA to start with.

### **Least Important Drivers**

“Credibility of labels” and “multi-factor labels and rating systems” ranked as least important out of the twelve drivers. One expert ranked these two as the same, reasoning that they were co-equal and co-dependent. I can see the connection in that multi-factor labels and rating systems attempt to take into

account hidden trade-offs that single factor labels may have as weakness.

Credibility on the same line of thought would be full transparency in measurement and disclosure of trade-offs in the accuracy and value of the information presented. However, the difference would be that full transparency in a single factor label still excludes the in-depth analysis of other factors that a multi-factor system would need to undertake. As well, multi-factor systems may use methodologies that are less proven and the way that different factors are aggregated to form an overall rating system, may make them less credible.

### **Tied Rankings**

There were two drivers that both had the seventh place ranking related to tracking information. On the one hand, complexity and tracking responsibility of multinationals related to how companies might be held to account for climate impacts, whereas on the other hand data ownership and management focused on the change in ability of algorithms to track shopper purchase patterns. It might be fair to say that in a world of low privacy, data ownership and management would allow shoppers to be tracked by multinational companies and shoppers to track the climate change impacts of multinational companies.

### **Themes Derived from the Top Four Drivers**

It is interesting to note one major theme of government involvement that comes out of the four top drivers. This theme holds true to the top four drivers

but has been described by Liberal Strategist John Duffy as the major debate in relation to climate change action (Duffy, n.d.). That is, what ought the role of government be in relation to climate change? On the one hand is the role of government to slow down atmospheric degradation because market innovation is not happening fast enough; the drivers “Green Taxation” and “Trade Competition in relation to CLCA” illustrates this side of the debate. On the other hand, it is better for government to get out of the way because the economy is too big to regulate and regulation will hinder the fast pace of innovation required to overcome atmospheric degradation; the drivers “Ubiquitous Connectivity” and “Efficiency and Value for Money” comfortably sit on this side of the debate.

## **Conclusion**

The diversity of responses expected from a multi-disciplinary group clearly identified the top four drivers as *Trade Competition in relation to CLCA*, *Efficiency and Value for Money*, *Ubiquitous Connectivity* and *Green Taxation*. These four drivers form the basis of the scenarios described in the next section.

## Scenarios

To paraphrase Peter Schwartz, scenarios are a tool for ordering the perceptions about distinctly different future environments in which decisions might play out or be tested against. Scenarios are an organized way for us to envision the future. They resemble a set of stories with carefully constructed plots that make the significant elements of the world's story stand out (Schwartz, 1991, p. 4).

I have carefully constructed four story plots that are conveyed in a form more similar to a “decade in review” retrospective news report than a character-driven narrative. They follow a logic grounded in plans already publicly communicated five years into the future. For this reason, the first five years of each of these scenarios are very similar, whereas the last five years are more heavily influenced by the dominant driver and the interaction of the dominant driver with the other drivers that are subsequently cancelled out, diminished or synergized.

Using similar events in the next five years in all four scenarios makes coherent sense using the Cone methodology. As a main point, it speaks to the theoretical concept of the Cone: at the Cone's base, the four drivers act on one plane close together (less distinct; see Figure 15.) As they move to the future, possible differences between world's grow as the dominant forces become more and more pronounced. If one assumes as a starting point that all four drivers are

equally dominant and all groups have invested in five year plans, then allowing the first five years to be similar covers a lag time associated with the dominant driver growing in importance. Moreover, similarity of the first five years highlights, pinpoints and provides comparability as to how the reaction to these planned events are affected by predominant forces created by the driver. Finally, similar short term impacts from drivers allows for the writer to delve deeper and to concentrate more on the longer term impacts of the driver which may not appear or be relevant in the next five years.

The “Assumptions Section” describes the important elements presumed common in all scenarios. This section is crucial to outline the plausible elements that will be assumed common in all four scenarios (see page 48 for definition). A brief discussion of possible assumed factors will also be discussed to provide guidance to planners about what blind spots may be present in each scenario based on assumptions. Assumptions are crucial to the coherence and logic of all the scenarios and therefore every two years the assumptions ought be updated by planners to make sure they are still correct.

To aid in coherence, consistency and comparability, each scenario is broken down into nine sections. The “Dominant Driver” section is a summary of the world as it might be with one of the four drivers dominant.

The second section is titled “Other Drivers”, which describes which of the other three drivers are synergized, diminished or cancelled out. Synergized drivers grow in importance with the dominant driver. Diminished drivers shrink in importance as the dominant driver becomes stronger. Drivers that have been cancelled out cease to have influence as the dominant driver expresses itself in the scenario.

The third section “Leaders and Followers” describes the theme observed in the discussion of rankings. This section describes what role the three major groups, Government, Producers and Consumers take in response to the dominant driver. The Leader is the group that acts first and with the most impact in regard to the dominant driver. Followers are those that act later and are either forced to follow the leader or follow by choice.

The fourth and fifth sections “Potential Winners” and “Potential Losers” outline the significant groups who could prosper or struggle overall in each world as well within the Canadian context.

The sixth section discusses the outcome of the world in relation to the research question *“How might the transfer of carbon information at the product level change for Canadian consumers in the next 10 years?”* The section heading has been shortened to “Shopper Facing CLCA Information in the Future.” The visualization and description of the alternative futures display of carbon



information is not idealized. It is not a preferred outcome. It is how I thought the information would be displayed given the dominant driver of the world and scenario logic. This is a key point for planners as they might design strategies to overcome cases where information design is poor or where government leadership is weak. In this way, planners will be able to create strategies that operate well in each world and move towards a preferred future of their own creation.

The seventh section describes the implications of the scenario framed in terms of rate of uptake (Does the use of CLCA spread quickly? What are the timelines?) and the tangible impact of CLCA (Is CLCA voluntary or mandatory? Is it influential in decision making?)

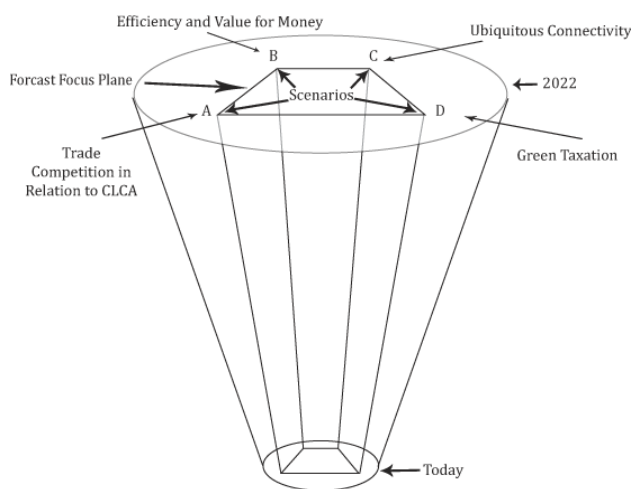
The eighth section is the *Practical Application* section which highlights key items in each scenario for planners to plan strategies around. This is a crucial component to translating the plausible future worlds into real world applications for planners.

The ninth and final section is a timeline summary that outlines the possible major events that lead to the end state of how CLCA information are transferred

to Canadian consumers. This timeline can be leveraged by readers to see at a glance the logic and dependent events of each scenario<sup>9</sup>.

These sections and indeed the dominant drivers ought to be reviewed and updated every two years to keep the scenarios plausible.

In essence, the scenarios consider the following factors: Taylor's method of describing the dominant driver and its consequence, a description of followers and leaders, potential winners and losers, practical applications, a backcast timeline, and implications that relate to the uptake and impact of CLCA information. Considering these factors in convergency allowed me to propose and illustrate the way carbon information will be displayed to Canadian shoppers ten years from now.



**Figure 15 The Cone of Plausibility of consumer facing carbon information about products in Canada ten years from now. Scenario A is entitled "Carbon Nutrition", B is "Carbon Improvement", C "Carbon Budget", D "Carbon Taxation".**

<sup>9</sup> As a quick reference, please see, Appendix 2 page 143, a table of all the scenarios and associated timelines side by side to illustrate how the timelines compare with one another.

## Assumption

The assumption section is a list of possible factors used in the scenarios that I have assumed common in all four worlds. Assumptions are important using the Cone of Plausibility method because by making assumptions, the scenario maker can concentrate and focus in on the logical progression created by dominant drivers rather than other possible events such as wild cards. However, assumptions can serve as possible blind spots in scenarios too. This is why reviewing the assumptions section every two years for accuracy and relevance is important. Updating assumptions will have ripple effects to the four scenarios described thus it is a very crucial step for planners to update assumptions as time passes.

## Assumption Impacts of CO<sub>2</sub>e

### Plausibility: High likelihood some factors happening now

For the purpose of these scenarios, I will assume there is the same severity and impacts of global climate change in each world. To do this, I have forecast a steady increase of 3 ppm CO<sub>2</sub>e each year and correlated the amount with the impact figures found in the executive summary of the Stern Report (Stern, 2006). This assumption is my own calculation based on the steady increase of 3 ppm CO<sub>2</sub>e over the last five years (see Figure 16 for overview of climate change impacts and associated temperatures.)

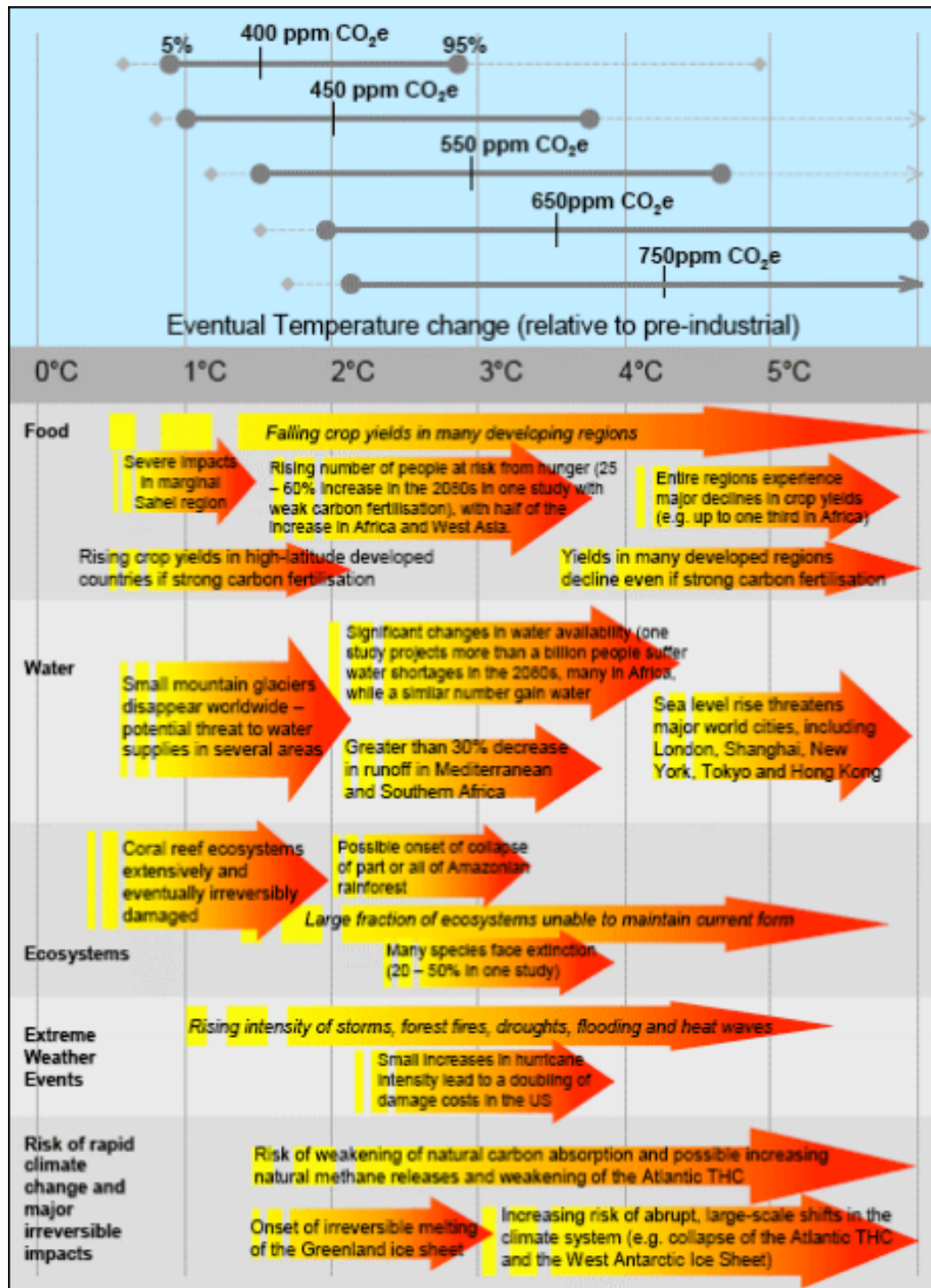


Figure 16 Carbon Dioxide parts per million in atmosphere, resulting world temperature and associated impacts (Stern, 2006)

It is the year 2022. The concentration in the world's atmosphere of carbon has increased from 393 ppm CO<sub>2</sub>e to 425 ppm CO<sub>2</sub>e. As a result, the world average temperature has increased to 1.5°C over pre-industrial temperatures.

The resulting impacts are various and international in scope. World food production has shifted to more northern and southern latitudes. Developing nations in historically fertile areas are no longer producing enough food to feed local populations. The onset of the Greenland ice sheet has started an irreversible melting and increased severe weather events plague the world.

**Assumption: Sustainable Consortium implementation plans**

**Plausibility: Moderate likelihood investment and planning already underway**

*The Sustainable Consortium* (TSC) is one of the largest academic-private partnerships that are developing Sustainable Measurement and Rating Systems (SMRS). Quarterly updates are presented online by the TSC SMRS Project Manager which describe a five year plan for the development and launch of SMRS in the largest 600 shopping categories (electronics, yogurts, produce, etc.) by 2015 (The Sustainability Consortium, 2012b). Furthermore, TSC has adopted the GHG Protocols Standard for product carbon life-cycle assessment. The *Carbon Trust* has chosen this standard as well. Therefore in each scenario I assume that the GHG Protocol becomes the best practice and the world standard

for CLCA. I also assume that TSC meets their 600-category SMRS goal by 2015 and begin to label products by 2017.

**Assumption: Technology**

**Plausibility: Moderate, change could be drastic technology is difficult to predict**

In addition to the dominant driver Ubiquitous Connectivity a number of other technological innovations are underway. These technologies include the driver Data Ownership and Management, Augmented Reality and Internet of Things. For the purpose of these scenarios, I will assume that the driver Data Ownership and Management is dependant on Ubiquitous Connectivity being dominant or synergizing when discussing other dominant drivers.

In terms of Augmented Reality, I will assume that in all scenarios shoppers will be able to use electronic assistive devices, smartphones and smartglasses that help them identify low carbon products. The crucial difference in each scenario will be the communicative display of that information, depending on the dominant driver.

In terms of the Internet of Things, I will assume that individual products will contain chips that will have tracked the entire life cycle of the product. This technology also ties into Augmented Reality, however the customized retail level communication of information to shoppers will be dependent on the dominant driver.

**Assumption: Non-Fossil Fuel energy****Plausibility: High/Moderate likelihood countries not acting**

The following four scenarios assume that current technologies in renewable energy generation remain the same, the assumption being there are no sea change discoveries that radically alter our understanding of renewable energy. The crucial difference in each scenario will be scaled depending on the leadership role that producers, consumers and government take in the dominant driver state.

This particular assumption is crucial to update every two years as it will have direct impacts on the CLCA amounts of products. The rationale for not adding evolutionary or disruptive innovation in our energy systems as a factor in the scenarios is as follows.

Despite the promise and exciting developments of pilots for Hydrogen and Fuel Cell storage batteries (CHFC, 2012). Recent reports by the International Energy Agency suggest countries as a whole are not doing enough with the energy solutions already available to reduce emissions (Harvey & Carrington, 2012). In other words it doesn't seem to be the lack of technology that is preventing our world from reducing our carbon impacts (see Figure 17 for a breakdown of current energy emission reduction technologies and its current status.)

## Summary of progress

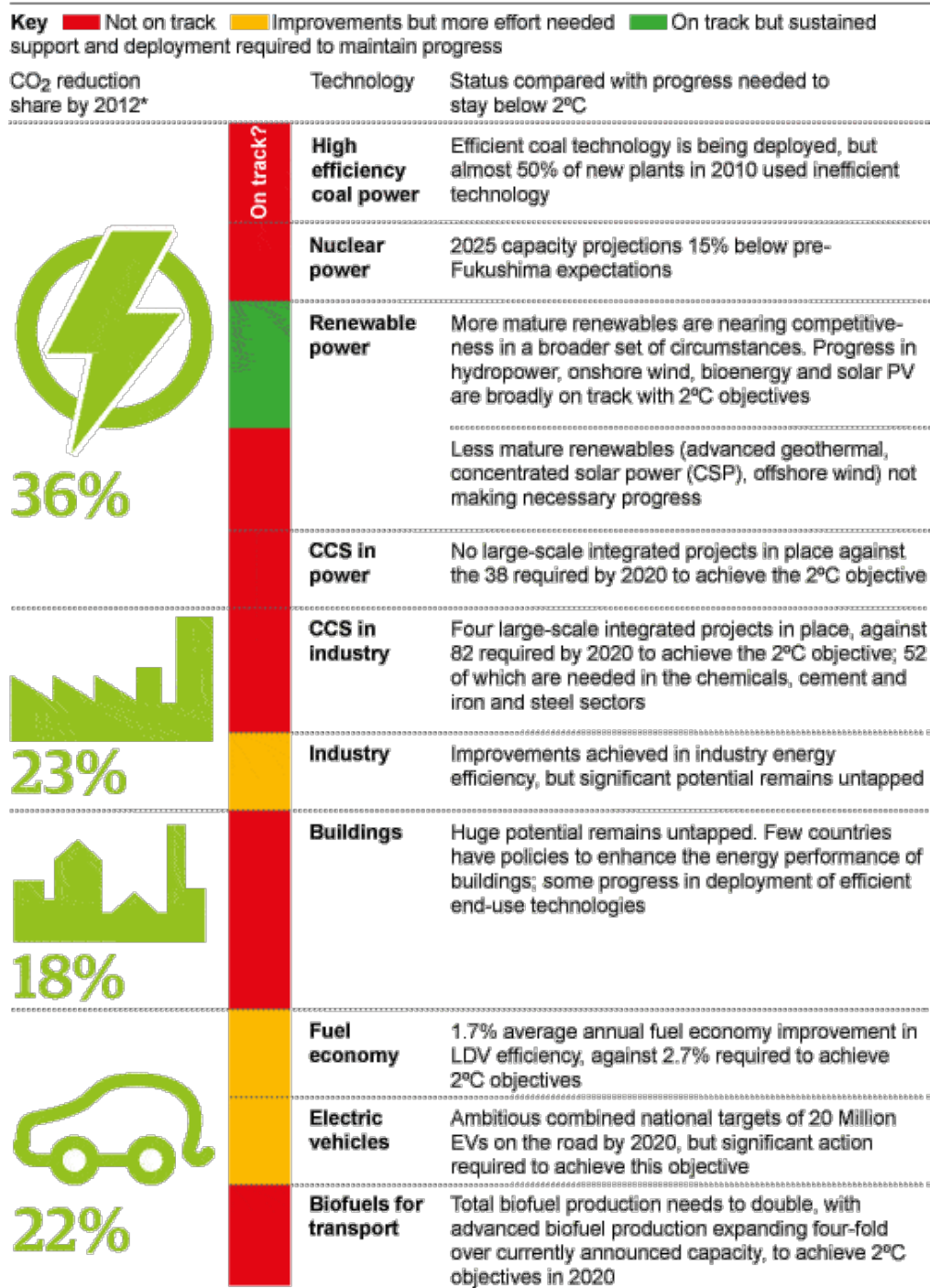


Figure 17 Progress with non-fossil fuel based power (Harvey & Carrington, 2012)



It is possible that these assumptions will prove to be incorrect in the future. I have made attempts to make the assumptions as plausible as possible based on literature review. A quick change of any one of these assumptions could serve to create a wild card event that would disrupt the logic of the four scenarios described below. As a practical way to use the scenarios as a tool the assumptions ought be updated every two years along with the backcasting events described in each scenario.

## Carbon Nutrition

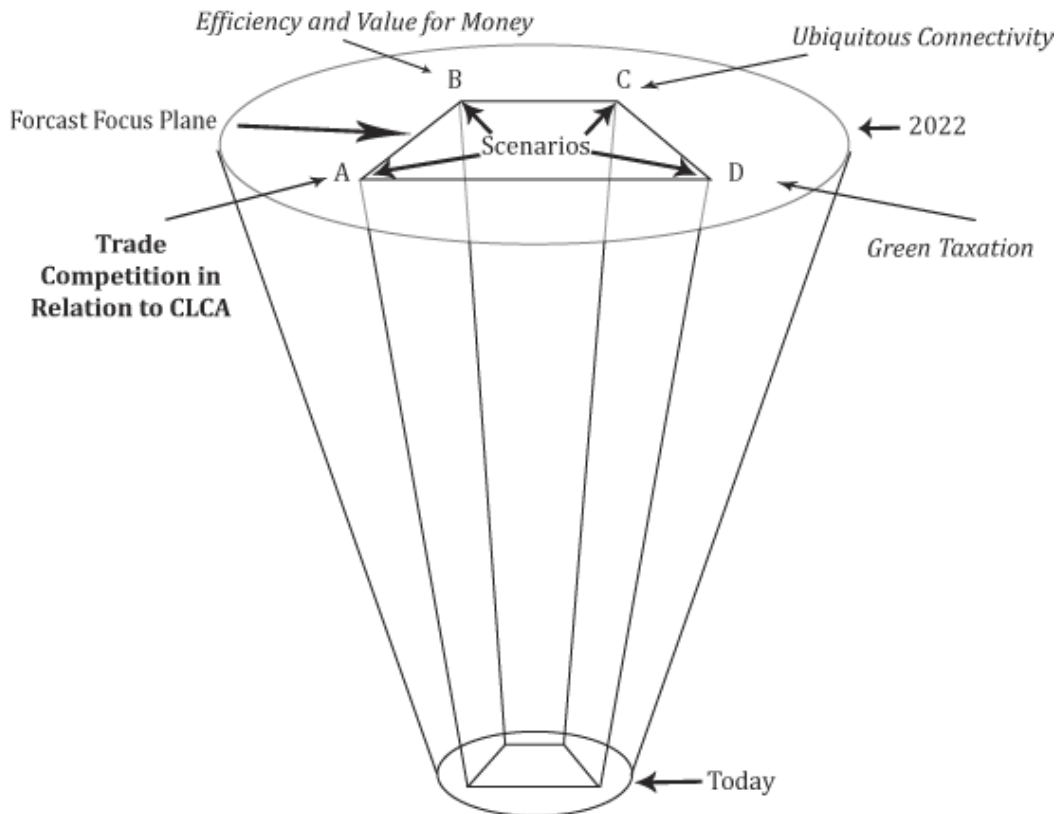


Figure 18 Carbon Nutrition scenario, dominant driver Trade competition in relation to CLCA

### Dominant Driver: Trade Competition in Relation to CLCA

As climate change impacts present themselves, the view that CO<sub>2</sub>e production is a necessary evil of economic growth and trade, becomes less common among governments. World frameworks for CLCA are firmly standardized with many of the leading countries such as England (UK), France, Australia and Japan adopting the GHG Protocol CLCA standard. Canada adopts the GHG Protocol in fear of being at a trading disadvantage. The trigger point

occurs as the United States, Canada's largest trading partner, adopts the GHG Protocol in 2016.

During the 2017 annual G20 meeting, consensus was reached to shape the world economy in a manner that prevents CO<sub>2</sub>e from growing in concord with population growth and economic growth. Pressure was placed on the WTO to put CLCA into the Codex Alimentarius as a reference document. During the ongoing Doha Round of negotiations (World Trade Organization, 2012), BRIC countries responded to increasing pressure from citizens demand for low carbon products and verified standards (Carbon Positive, 2012). Consequently, all trading countries under the World Trade Organization (WTO) have clear CLCA standard references for tracking disputes and negotiated tariffs. Governments agree that they must track CO<sub>2</sub>e emissions to first benchmark and then reverse the growth of CO<sub>2</sub>e emissions. As of 2022, there is a large trading negotiation disadvantage for countries who decide to create their own self serving standards for CLCA. However, the standardization of the display of CLCA information to domestic retail locations differs greatly from country to country in order to serve national interests. In Canada, the display of CLCA information hides the travel impacts of domestic production on labels, but includes a separate figure of the CO<sub>2</sub>e emissions resulting from international travel (see Figure 19.)

Nutrition Facts			
Per 3/4 cup (175g)			
Amount	% Daily Value		
Calories 160			
Fat 2.5 g			4 %
Saturated 1.5 g			8 %
+ Trans 0 g			
Cholesterol 10 mg			
Sodium 75 mg			3 %
Carbohydrate 25 g			8 %
Fibre 0 g			0 %
Sugars 24 g			
Protein 8 g			
Vitamin A	2 %	Vitamin C	0 %
Calcium	20 %	Iron	0 %
CO2 100 kg    International Travel    CO2 200 kg			

Figure 19 Nutrition label demonstrating the CLCA of a product incorporated into legislated nutrition labels

#### Other Drivers:

- Green Taxation (Synergized)
- Efficiency and Value for Money (Synergized)
- Ubiquitous Connectivity (Diminished)

In support of the new trade goals developed by the G20 framework, Canada develops taxes for top emitting industries nationally and increases trade tariffs on products that have CLCA's higher than domestically produced products. This also increases the incentive for local and international companies to be more efficient. These moves diminish the consumers' interest in "connected" shopping applications that reveal and display the CLCA of products using smart devices. The shopper understands that under the new trade agreements, the

Canadian Government informs shoppers of the impact of purchases based on how much they cost and the quantitative Canadian nutrition-style carbon label on products.

**Leaders and Followers:**

- Government (Leader)
- Producers (Follower[forced])
- Consumers (Followers [choice])

The Canadian government has taken a leadership responsibility role in limiting economic growth and population growth in high emitting areas and encouraging growth in activities that do not present increases to CO<sub>2</sub>e production. National and international producers are forced to follow the trade regulations and associated taxes imposed by the government, whereas shoppers willingly follow governments lead. The largest reason for this is that smart device applications exist in the market that provide more easily understandable CLCA product comparisons. These comparisons are more accurate and less political than the nutrition labels which provide a marketing advantage for national brands. However, the smart device comparisons are ignored by most Canadian shoppers overall.

### Potential Winners:

- World: Developed Countries, United Nations Environmental Programme (UNEP), The Sustainability Consortium (TSC), Disclosure Project (CDP).
- Canada: Agencies such as the National Roundtable of the Economy and Environment, Zerofootprint, Carbon Foresight, CarbonCounted

Major winners in this world are TSC, UNEP, WRI, CDP and GRI who, in 2018, create a world database of CLCA that countries utilize in order to create labels and to tax high-emitting importers. Developed nations and industries in Brazil, Russia, India and China (BRIC) are winners because they have intense efficient industrialized production and have the capacity for tracking product CLCA's. Canada's capacity for industrialized efficient technological production ensures that it is a winner in this world.

As stated in the drivers section, the National Roundtable of the Environment and the Economy (NTREE) was reviewing LCA practices in both the public and private sector for the Government of Canada. As of the end of the fiscal year 2012, the agency will be cancelled (Galloway, 2012). However, shortly after CLCA is placed in the Codex Alimentarius, Canada creates an organization similar to NTREE to pick up where NTREE left off. As trade and the amount of carbon associated with traded products becomes more of an issue, the government relies more heavily on this NTREE-like organization to inform government positioning and policy stances.

The number of domestic companies requiring CLCA increases greatly across the board, and pre-existing carbon accounting companies thrive as a result of market demand for their services. *CarbonCounted* would particularly be a winner as it already retains two of the largest Canadian grocery retailers as clients, Sobey's and Loblaws respectively. They have already set-up a software database framework that large retail operations currently use which would make it very easy for these retailers to create portals for suppliers to input and report on CLCA values. However, they rely on a list of consulting companies to do the actual CLCA work, which would enable other carbon accounting companies to thrive as consultants for these suppliers.

### **Potential Losers**

- World: Low Income Countries (LIC) and producers in BRIC that have not transitioned to efficient industrialized production
- Canada: Alberta oil Industry, Canadian transnational air transport or trucking services

Losers include LIC, who were given little voice in the original formation of the trade rules associated with CO<sub>2</sub>e; there is a bias towards intense efficient industrialized production rather than low-impact, low-technology production. Non-governmental organizations such as the World Wildlife Fund (WWF) and Food First - Institute for Food and Development Policy have offered to assist in conducting CLCA's on products and services at the LIC level. Although this increases capacity for LIC's, they still only have a fraction of the capacity of

developed nations. Old or transitioning BRIC producers that initially did not have intense efficient industrialized production also struggle with the new mandatory CLCA product monitoring.

In Canada, the Alberta oil industry becomes a liability in trade negotiations and government grants go towards lowering the carbon impact of the production and refinement as the entire world moves away from fossil fuel use. The largest loss to the Canadian oil industry is government aid towards expansion and exploration.

Though domestic transportation of goods and services are left out of the Carbon Nutrition labels, Canadian transport companies that import and export by plane or transport truck internationally lose business because of federal tariffs.

### **Shopper Facing CLCA Information in the Future**

To be clear, the resulting display of CLCA information to shoppers is not ideal in each scenario. In this scenario's logic, the result of a government-led information label is that it is inherently politically driven and relates to already formed labelling systems. Thus, there is more emphasis placed on a display of information that serve the interests of national production and is analogous to currently legislated information such as nutrition fact tables found on pre-packaged foods (see Figure 19.) In this instance, Canadian shoppers can expect



quantitative labels that show kg of CO<sub>2</sub>e. Furthermore, for international products, an extra line item is displayed due to international travel. National products may have large travel impacts as well. However, those impacts are not explicitly displayed to shoppers in the same way as international products.

The *Good Guide* and TSC offer more easily understood labels that can be used in conjunction with smart devices which display other environmental metrics outside of CO<sub>2</sub>. Generally, the majority of shoppers are disinterested in these labels because the government regulation forces the price of high emitting products up, which most people use as indicator for the sustainability of products they are shopping for. In the future even where a pair of glasses or contacts may be a smart device, the requirement of shoppers to initialize the device and to think to turn on the *GoodGuide* or TSC service is still more time than shoppers usually spend on making everyday purchases.

## Implications

### Rate of uptake of CLCA

- Between 2012 and 2017, the rate of CLCA uptake continues at a steady slow rate as pre-planned fully funded projects are completed worldwide.
- In 2016, Canadian uptake of CLCA is increased superficially by following the United States in its adoption of the GHG protocol CLCA.
- The uptake of CLCA as a governance tool for slowing down world, and consequently Canadian production of, CO<sub>2</sub>e rises rapidly after the 2017 G20.
- Capacity is increased worldwide after the world database formation in 2018.
- By 2020, Canada includes trade tariff fees associated with high emitting products and use CLCA as a tool to measure the size of tariffs.
- Nutrition labels are standardized on products by 2022.

Overall, the rate of CLCA adoption in Canada is the fastest, greatly facilitated by the adoption of CLCA in 2016 and the 2017 codex inclusion.

### Impact of CLCA

- Impact is large for Canadian and international producers
  - CLCA is used to monitor for tax and tariffs (mandatory)
  - CLCA is used to improve supply chain efficiency to lower risk of taxes and tariffs (voluntary)
- Consumer impact is low in Canada
  - The nutrition label scheme does not influence shoppers or convey information in a useful way for comparison.
  - Shoppers are influenced by price but price is influenced by the CLCA of the product.

**Practical Application**

Given the comprehensive information provided above there are a few main points that will be useful for planners when considering strategies that might operate in this world. The largest practical application is that groups attempting to strengthen and improve the quality of CLCA information in retail settings need to go through government channels and be aware of G20 and WTO stances.

Lobbying the civil service, as a think tank or advocacy group on expert panels, roundtables may be away to affect change to improve the overall information quality (accuracy and communication) of the label.

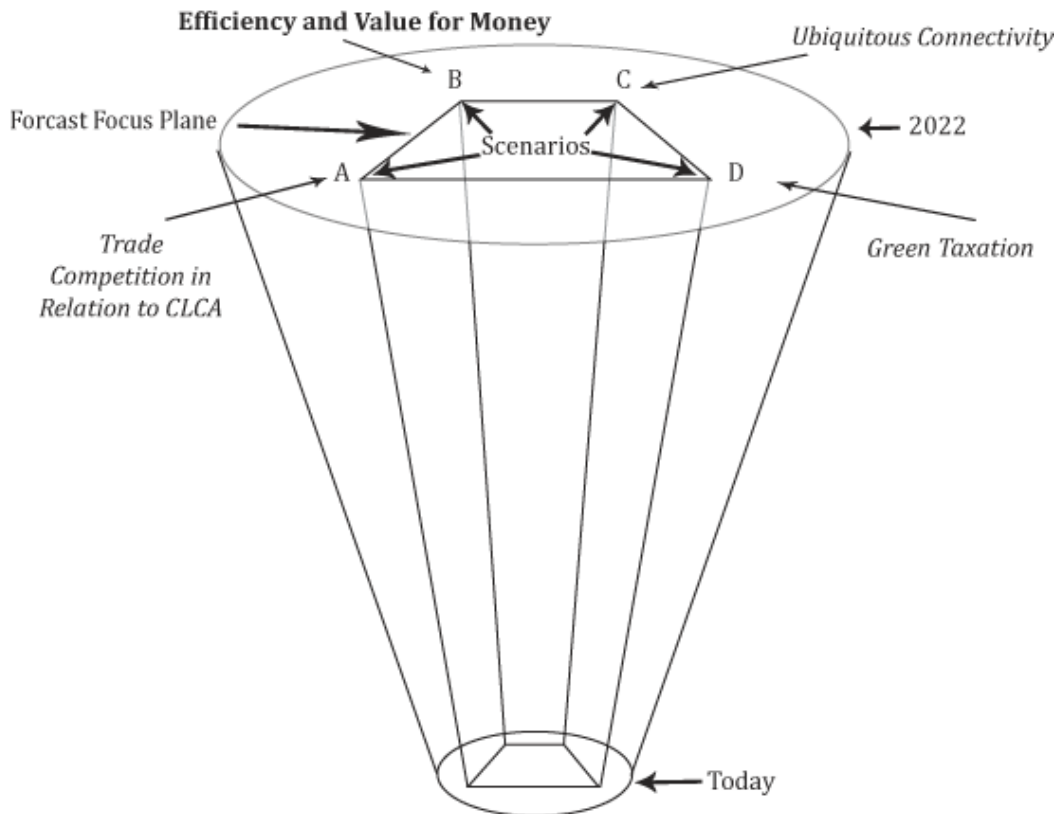
For businesses, it could be important to provide sound bites and other public relation pieces that add credibility to government policy decisions. This may be crucial if the Oil and Gas industry lobby hard as a group because they have so much to lose.

CLCA adoption occurs quickly in this world; being prepared with strategy options in the near future will be important to differentiate from other groups who will see the large opportunities that can occur in quick policy changes.

## Backcast

- 2022** Canada displays CO<sub>2</sub>e on nutrition fact labels. Users can follow links to the Government of Canada website to obtain more detailed information about individual product CLCA's for each life cycle and process stage.
- 2020** Competition ensues between countries to have best rating for domestic manufactured products, as taxes and trade tariffs take effect.
- 2019** Canada imposes tariffs for high emitting products imported internationally and taxes high emitting products produced nationally.
- 2018** TSC creates an alliance with UNEP, WRI, GoodGuide, CDP and GRI to create a world database of the CLCA of products, which governments and world citizens can use.
- 2017** A G20 meeting takes place where countries agree to detailed tracking of CO<sub>2</sub>e in trade. CLCA is added to Codex Alimentarius. BRIC negotiations on carbon tariffs for trade goods, greatly speed up world trade adoption.
- 2016** United States adopts the GHG Protocol standard and shortly after Canada adopts standard.
- 2015** TSC meets its SMRS goals (see Assumption Section.)
- 2013** GHG Protocol accepted as world LCA standard for carbon accounting products and supply chains, France, UK, Australia and Japan champion the standard.

## Carbon Improvement



**Figure 20 Carbon Improvement scenario, dominant driver Efficiency and value for money**

### **Dominant Driver: Efficiency and Value for Money**

Despite the increased erratic and severe weather events caused by global warming, by 2022 the world community has not agreed on absolute reductions to CO<sub>2e</sub> production. G20 countries set modest reduction targets that change if the target adversely affects national gross domestic product (GDP), or more generally the growth of the economy. World frameworks in CLCA are adopted by countries but remain underutilized as an enabling tool for regulation, the exception being for a few countries such as France, UK and Australia where the

GHG Protocol CLCA standard has been adopted. Canada adopts the GHG Protocol in 2016, a public relations move to gain votes, rather than as an action leading to regulation.

In response, the world's largest distribution companies impose strict tracking CLCA on suppliers and more optional and vague policies are put forward for absolute reduction of CO<sub>2</sub>e in supply chains. This tracking has created a framework for benchmarking the performance of supply chains. This new perception of responsible big business by governments and consumers is leveraged mostly to expand production in new markets. However, compared to the slow progress of the international agreements following the Kyoto protocol, there is a rapid change in world supply chains towards more efficient systems. Specific absolute CO<sub>2</sub>e information is kept from shoppers facing product labels and is utilized more for improvement of efficiency. The requirement by multinational distribution companies such as Walmart for product level tracking and labelling is facilitated by academic and industry group partnerships such as the Sustainability Consortium. Academic and private sector knowledge is leveraged to create easy to understand labels that gauge overall sustainability rather than CO<sub>2</sub>e alone. Companies that have had real CO<sub>2</sub>e reductions in the previous year often report these as product claims rather than as a unique label (see Figure 21.)



Figure 21 Example of Improvement Labels, in this case the product performs average overall but excellently for carbon reduction, reducing supply chain CO<sub>2</sub>e by 50% (Adapted image from (Asda Bodmin, 2011; Sustain, 2009; The Sustainability Consortium, 2009))

### Other Drivers:

- Ubiquitous Connectivity (Synergized)
- Trade Competition in Relation to CLCA (Diminished)
- Green Taxation (Cancelled Out)

Individual companies such as Walmart create their own smart device application to show supply chain progress over time. The quantitative CLCA information is used by companies solely to upgrade supply chain efficiency where the benefit outweighs cost. Retail negotiators have real-time information about supply chain efficiencies that can be viewed anywhere, anytime. This

“panoptical” approach creates a surveillance situation, whereby the simple threat of being observed at a moment’s notice ensures that supply chains are kept in check and retail goals are enforced.

Tools such as *GoodGuide* and other rating sites expand to incorporate Augmented Reality, adding product comparisons and recommendations based on shopping history. The merging of shopping lists and purchase history provides a value great enough for shoppers to begin taking time to look at the *GoodGuide* applications ratings while making in-store purchasing decisions. The demand for managers and branch officers to tap into supplier efficiency and value for money from the convenience of their cellphones increases the driver of Ubiquitous Connectivity.

The proactive moves taken by retail companies lowers the urgency for the Government of Canada to make CO<sub>2</sub> a trade negotiation issue. The excuse that negotiating CO<sub>2</sub> emissions “would violate pre-existing trade agreements and might cause WTO penalties” diminishes the driver for trade competition, except for the UK, France and Australia who compete to have the cleanest supply chains. The UK and France use their influence on the European Union (EU) to place pressure on trade between Canada and the EU. This is largely ineffective because China and the US remain the most important trading countries for Canada.



As mandatory reporting and labelling enters the marketplace, the poor performing supply chains, mostly in older BRIC industries, complain to the WTO that large retail companies headquartered in the United States are unfairly creating trade barriers. They argue that retail companies are unfairly taxing supply chains without the capacity to monitor or improve their operations, even though some of these countries have actually lowered the taxes specifically associated with older producers to aid in attempts to upgrade and monitor operations. There is a trend by many countries to lower taxation of older major emitting supply chains in the hopes that the extra revenue will be used to upgrade facilities.

**Leaders and Followers:**

- Government (Follower [choice])
- Producers (Leader through retailer coercion)
- Consumers (Followers [choice])

Canada becomes a follower, justifying the lack of regulation by claiming that the leading factors of increased CO<sub>2</sub>e emissions, population growth and economic growth are too big to try to control. It is up to companies and the market to innovate out of the problem of emissions and climate change.

Government bureaucratic rules would hinder the fast rate of innovation required to slow down the effects of climate change.

Private distribution companies (retailers) innovate and take the lead. They do this by bullying suppliers to conduct CLCA on their supply chain and to label their results using the distribution companies labelling framework. Their leadership is tested when, in 2018, the WTO blocks carbon labelling on products citing the “unfair trade barriers the label creates.” Instead of giving up, a court case ensues with the backing of consumers around the world who think more ought to be done to lower CO<sub>2</sub>e emissions from old unsustainable systems. Few question the retail companies’ motives, even though they are not all altruistic; the good will of consumers has allowed these large box-store companies into towns that previously banned their construction. Furthermore, these companies have begun an expansion by buying up small organic stores and franchising them with the same staff to carry the distribution companies’ products. With the extra revenue from member retail companies, TSC purchases the *GoodGuide* for a record breaking figure and now applies the reporting and labelling framework to all products previously rated by the *GoodGuide*.

Consumers are forced to take on a follower roll at first, but when the WTO ruling occurs and the court case ensues they follow by choice and support the leadership of private retail companies. Consumers and non-governmental organizations band together to support the retail companies and to put extra pressure on the WTO, particularly during the 2019 World Summit.

### Potential Winners

- World: Walmart, TSC, CDP, Developed and BRIC countries with pre-existing efficient supply chains.
- Canada: *Zerofootprint*, Carbon Foresight

The major winner in this world is Walmart as the largest retail company of many who lead the effort to force supply chains to report and label their environmental impacts on the products they produce.

Likewise the academic and private sector partnership that Walmart founded, TSC, thrives as membership increases. Two major Canadian companies, Sobeys and Loblaws, both join the consortium 2020 after the WTO reverses its decision.

2011 marked the first year that Walmart required suppliers to report to the CDP (Walmart, 2011). By 2022 all retailers that are Sustainability Consortium members require their suppliers to report to the CDP.

Those supply chains that are already industrialized, efficient, and use the latest technological production win in this world. This includes suppliers in developed countries and many industries in BRIC countries.

In Canada, *Zerofootprint* prospers because they joined TSC successfully in 2014. Membership was facilitated by references from OCAD University where *Zerofootprint* has had a history of successful research partnerships.

## Potential Losers

- World: LIC producers, BRIC producers that have not upgraded equipment, WTO and *GoodGuide*
- Canada: e3 solutions, CarbonCounted

LIC producers lose because governments cannot lower taxes or provide programs for reporting and efficiency upgrades. WWF and Food First is able to convince member companies of TSC to commit funds for aiding the required reporting and efficiency upgrades so that products can be sold at Walmart and other TSC member locations. However, capacity is still small compared to developed country suppliers.

The BRIC suppliers that complain to the WTO are the largest losers and are boycotted internationally for their actions. After the WTO reversal, the perceived ability of the WTO to control trade is put into question and its legitimacy as an organization is placed in doubt.

In Canada, e3 solutions could potentially lose in this scenario due to their inexperience working with academic institutions. They are also slow to join the TSC. Furthermore, some of the clients they accept are the original supply chains in North America that sided with the BRIC supply chains attempting to create a WTO ban on sustainability labelling. *CarbonCounted* are losers in this scenario because their two main clients, Sobey's and Loblaws, discontinue their contract

as they join the TSC to adopt reporting and labelling schemes supported by the TSC.

### **Shopper Facing CLCA Information in the Future**

I have chosen to emphasize a logical outcome rather than an ideal one for each scenario. The result of businesses leading CLCA is that labels are easier to understand but are less transparent in revealing absolute carbon emission information. Thus, when a products' supply chain efficiency improves, percent savings from the year before is displayed as a product claim. TSC labels appear on all products in member retail locations, which include large Canadian stores such as Loblaws and Sobey's. These labels give an overall sustainability rating using the traffic light framework for easy comparison (see Figure 21 for an example of what Improvement Labels might look like.) After the TSC purchases, *GoodGuide* smart device applications are developed for products that are not found in TSC member stores using the information sources and metrics that *GoodGuide* leveraged in the past. Generally, the highest response amongst consumers is for the most improved or sustainable products which are lowest in cost.

### **Rate of uptake of CLCA**

- Between 2012 and 2017, the rate of CLCA uptake continues at a rapid rate as Walmart and TSC continue to put pressure on suppliers.
- The uptake of CLCA improves at a continual level in Canada as the few national producers benefit from having the capacity and technology to easily monitor the CLCA of products in the supply chain.
- In 2018, the World Trade Organization (WTO) blocks mandatory CLCA requirements enforced by TSC retailers.
- By 2020, the WTO reverses decision and CLCA starts to become a normal practice of most producers.

Given the above events, the rate of CLCA adoption is slow. Uptake of CLCA is faster in the Carbon Taxation and Carbon Nutrition scenarios because of the court battle and potential ban of labelling by WTO.

### **Impact of CLCA**

- Impact is medium for Canadian and international producers
  - CLCA can be avoided by not supplying products to Walmart or other TSC member retailers (voluntary)
  - CLCA is used to improve supply chain efficiencies and to gain entry to the large market share of consumers which TSC members hold (voluntary)
- Consumer impact in Canada is high
  - Generally shoppers purchase items that are inexpensive and perform well using the TSC label
  - The improvement claims are enough to convert some shoppers to purchase more expensive products as a reward or reciprocation presumably for the hard work undertaken to upgrade supply chains efficiency

## **Practical Application**

There are a number of main points from this scenario that will be useful for planners now when considering strategies that might operate well in this world. The largest practical application is collaboration with leading groups such as TSC and Walmart.

Playing an active role as a member within the “Consortium Working Groups” such as the *Consumer Science* group will allow interested groups access to a powerful entity in this world that is shaping the future of carbon information in retail settings.

Instead of lobbying for regulation, it could be important for businesses to lobby for grants for innovation to create complementary services for producers and consumers within the TSC framework. In fact, requesting sponsorship grants from large producers could be the key to receiving adequate funding for strategies and interventions. A body of knowledge could be created which makes a case for an investment need highlighting how much more engaging information needs to be in a voluntary system than a mandatory system.

In this scenario, a blocking event is highlighted. A practical application for this would be to develop strategies that work well even when labelling is potentially blocked from retail settings.

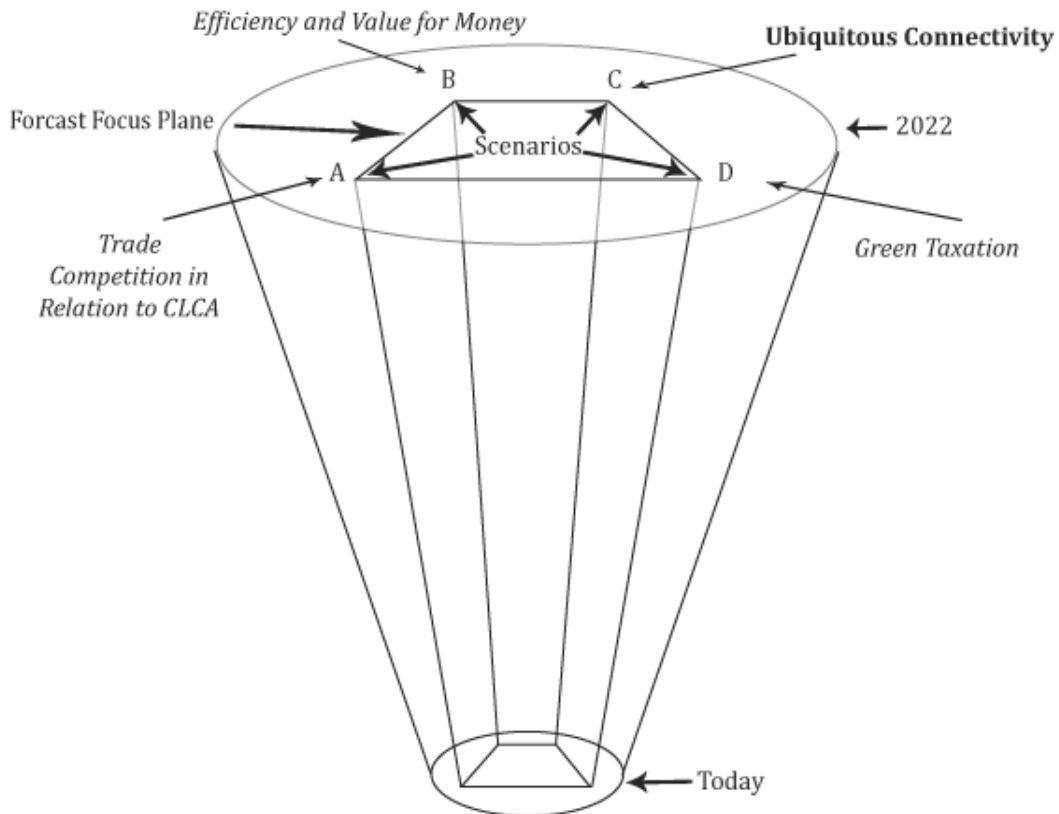
Furthermore, strategies around identifying niche groups that would want to pay more to receive product information ought to be undertaken and leveraged in implementation strategies. Alternatively, strategies that highlight and easily identify the best value (\$) lowest carbon product options could be developed.

### **Backcast**

<b>2022</b>	TSC and member companies have most comprehensive labeling system, tangible label, smart device application, virtual label and shopping site toolbars and participating company shopping account tracking.
<b>2020</b>	Sustainability Consortium purchases the <i>GoodGuide</i> .
<b>2019</b>	Global protest during the 2019 World Trade Summit specifically related to CLCA labelling. WTO reverses decision.
<b>2018</b>	World Trade Organization (WTO) blocks carbon labelling. court cases ensue between WTO and TSC.
<b>2017</b>	TSC labels begin appearing in Walmart stores.
<b>2016</b>	Canada adopts GHG Protocol CLCA standard with no intention of enforcing mandatory CLCA monitoring and reporting.
<b>2015</b>	TSC meets its SMRS goals (see Assumption Section.)
<b>2013</b>	GHG Protocol accepted as world LCA standard for carbon accounting products and supply chains.



## Carbon Budget



**Figure 22 Carbon Budget scenario, dominant driver Ubiquitous Connectivity**

### **Dominant Driver: Ubiquitous Connectivity**

By 2022, the increased erratic and severe weather events caused by global warming have not moved the countries of the world to take on a larger governance role. World standards created earlier in the decade provide a framework that companies can use to track carbon associated with individual supply chains. In an increasingly connected world, the clean technology industry takes a closer look at how to leverage these standards as a way to bring about market transformation.

In response, start-ups use the free exchange of information and ubiquitous connectivity to begin tackling the problem from the perspective of enabling consumers. In a world where privacy is low and access is high, large multinational companies are willing to give supply chain and product information freely and have done so regularly to the CDP. In many cases, the information is leaked and thus it is better for companies to share the information openly.

The 2017 attempt by TSC to label products in stores is thwarted by a WTO ruling banning sustainability labelling. This spurs an increased focus for the TSC to concentrate on ‘virtual means’ of engaging with consumers.

As part of its mandate to continually create new ways to nudge shoppers to buy ethically, the *GoodGuide* teams up with Intuit and TSC. Together these three organizations create a service called “Carbon Budget” which can be inserted for free into online personal financing services, such as “the Mint.com”. This service enables consumers to create carbon budgets and seamlessly track impacts of purchases in real time. For the first time ever, consumers can track their carbon impacts before shopping, while shopping and after shopping. Consumers can review impact histories and create absolute goals for reduction. The initial international launch in 2020 includes Canadian markets and gains much attention. Those shoppers who use personal financing websites overwhelmingly adopt the Carbon Budget add-on. However, for those who do

not track their spending, the Carbon Budget service is of little use. For those that are uninitiated, it takes time to set up an account and the goal-setting value proposition doesn't fit well with how these shoppers undertake a purchasing task.

As companies begin to see a potential shift in consumer demand (at this time 40% of shoppers use a free personal financing website to manage and track funds worldwide), they quickly begin CLCA audits of products despite large costs in some cases. This information is sent to CDP and is then aggregated into the *GoodGuide* service, which continually gives better and better information. Those companies that submit CLCA information are added to the system and because they have differentiated themselves, they are candidates for recommendations within the Carbon Budget service. This service is in addition to the budget. The recommendation service tracks purchases routinely purchased and compares them against possible lower carbon alternatives. If lower carbon alternatives are found, then recommendations are given to users as they shop through their choice of email, social media service or smart device.

Generally, shoppers respond well to the service, particularly when there is an availability of product choices and the Carbon Budget fits or lowers the monthly spending. Challenges and contests are made to encourage shoppers to post their carbon budget progress publicly on social media. This service is

ubiquitously available to anyone in the world because the carbon amounts originally depend on estimated quantities using input-output models rather than CLCA information (see R. Cox, 2011.) In Canada, mass adoption is triggered when shoppers can walk into stores and view products through augmented reality, or simply hold them against a smart device to check if the product is within budget (both financially and carbon related) before purchase.

**Other Drivers:**

- Efficiency and Value for Money (Synergized)
- Green Taxation (Diminished)
- Trade Competition in Relation to CLCA (Diminished)

Green Taxation is diminished in this world, whereas Efficiency and Value for Money is synergized. As Carbon Budget becomes a popular device, old supply chains scramble to upgrade systems. Taxes are diminished to help companies finance upgrades. The large market share the Carbon Budget service holds provides a rationalization for products suppliers to conduct CLCA efficiency upgrades, even though at times there is the risk of a low Return on Investment.

The WTO ruling in 2018 prevents the mandatory physical carbon or sustainability labelling of products. This lowers the overall awareness of the specific supply chains that are the highest emitters. In this way, Trade Competition in relation to CLCA is diminished. There is less pressure by countries,

including Canada, to compete against others to have the supply chains with the least carbon impact, or to negotiate trade agreements with carbon emissions as a major negotiation element.

**Leaders and Followers:**

- Government (Follower)
- Producers (Follower [forced by consumer])
- Consumers (Leader)

Governments take a follower role by choice. The flourishing ubiquitous connectivity of consumers and associated innovations have proven to Canada that less regulation will create quicker and more practical solutions to global warming. Regulation would merely slow down and hinder the rapid pace of innovation required to stop and heal climate degradation. Thus, countries have not regulated absolute reductions.

Producers take a follower role and are forced to respond only when consumer demand is high enough to justify action. Despite the free flow of information, traditional multinational companies are unwilling to invest in efficiency measures related to CLCA unless there is a profit to be made by savings or consumer demand through sales. Their response is reactionary and attempts to keep the status quo where they have high profits and power.

Consumers take a leadership role and leverage enabling technological services to easily and conveniently create goals, make choices and limit spending to stay within a climate friendly budget. As more and more consumers follow “Carbon Budget” recommendations, companies are forced to respond by actively upgrading supply chains and offering low carbon products.

### **Potential Winners**

- World: WTO, *GoodGuide*
- Canada: CIBC (President’s Choice Financial), Loblaws (President’s Choice)

The two main winners in this world are the WTO and the *GoodGuide*. The WTO wins because they were able to prevent world trade disruptions from occurring by mandatory labelling schemes. However their lack of understanding of the new wave of technological innovation causes the ruling to be sidestepped by virtual services that do more than traditional labelling schemes could ever do.

The *GoodGuide* is a major winner because the WTO ruling drives consumers towards online and smart device rating services, *GoodGuide* being the most respected. Furthermore the success of the Intuit, *GoodGuide* and TSC partnership, enables the *GoodGuide* to expand and thrive.

In Canada, President’s Choice Financial and Loblaws stores are winners because as the Carbon Budget becomes more popular, they have the infrastructure to quickly understand how to individually receipt items to online

banking platforms to aid Carbon Budget shoppers in tracking and reporting weekly or monthly Carbon Budgets.

### **Potential Losers**

- Carbon Trust, CarbonCounted, BRIC and LIC
- Sobey's, Canadian carbon consulting companies not associated with TSC

The Carbon Trust carbon label is banned after the WTO ruling causing the Carbon Trust to shutter the program, rather than take the route of the Sustainability Consortium in alliances.

CarbonCounted in Canada continues to help retailers report to the CDP but completely shuts the plan to place carbon labels on store products.

BRIC and LIC older supply chains are forced by market demand to upgrade systems despite a successful move to block mandatory carbon labelling and reporting. Ironically, as these companies attempt to compete with suppliers already a part of the Carbon Budget recommendation engine, they voluntarily develop carbon labels on their own packaging, which are promptly ignored as green washing.

In Canada, Sobey's is outdone by Loblaws because as an organization, it is slower to transition online grocery receipts to individual items as it has little understanding as to how online banking works. Loblaws, on the other hand, is a major player in online banking with their PC Financial brand.

Carbon accounting companies in Canada that do not form ties to TSC are outdone by those who join membership as retailers and producers in Canada clamour to be a part of the Carbon Budget recommendations system.

### **Shopper Facing CLCA Information in the Future**

This display of carbon information is the closest to a preferred scenario because it solves the long standing problem of tangible goals for shoppers to reduce carbon footprints. It also provides a measurement framework whereby the company maintaining the service can report (if large enough user base) country wide progress to reduce carbon footprint. However, this disruptive innovative concept only comes about when a drastic ban on all sustainability labels, enforced by the WTO. The context is not ideal but the intervention is.

One could imagine other possible scenarios where it was mandatory for all citizens to use this tool. In this way, the government would mandate a carbon rationing system that could provide bonuses and incentives for groups living within carbon budget or the government could get immediate knowledge of how a raised tax in one high carbon product changes overall carbon emissions for the country.

In this scenario, there is little government action and the WTO bans sustainability labelling. The Sustainability Consortium starts a joint venture with the *GoodGuide* and Intuit, using the rating tool as a way to side step the WTO



ruling and offers the tool across the world including Canada. With the use of smart devices, shoppers are able to see product carbon amounts and compare these amounts to their budget in-store through web browsing and linked personal financing accounts. The service is called “Carbon Budget” (see Figure 23 and Figure 24.)

“Carbon Budget” is a service that tracks in real-time product carbon amounts and compares it against a shoppers’ monthly carbon budget; by default an individual is given a Kyoto Protocol budget. Shoppers can instantly publish their carbon budget scores to their social media platforms. Furthermore, recommendations are given based on shopping behaviour for low carbon alternatives which allow shoppers to stay within budget.

The overall effect is that Carbon Budget becomes the most adopted digital shopper tool and makes the *GoodGuide*, Sustainability Consortium and Intuit the lead rating system for carbon.



Figure 23 Adapted image from Mint.com interface, a fictional view of the “Carbon Budget”, in this display a shopper is viewing all budgets for the month, the arrow indicates the Carbon Budget.

## Set a Budget

Choose a Carbon Budget Category

☐ Once

☒ Every Month ☐ Every Few Months ☐ Once

Amount  kg ☐ Roll over balance at the end of each month

Figure 24 Carbon Budget users can create their own carbon budget but there are a number of preloaded options by default the budget is the Kyoto Protocol

## Implications

### Rate of uptake of CLCA

- Between 2012 and 2017, the rate of CLCA uptake is slow. The Greenhouse Gas Protocol Standard for CLCA wins out as the standard in which countries and companies report on products and supply chains.
- The uptake of CLCA slows at a continual level as companies favour the status quo profit models over cost saving potentials realized by conducting benchmarking audits.
- In 2018, France, UK, The Sustainability Consortium and others attempting sustainability and carbon labelling of products are blocked by the World Trade Organization (WTO). The WTO rules to have the mandatory product labels banned by trading countries, stating that “labels unfairly penalize trading countries without mandatory schemes.”
- In 2020, The Sustainability Consortium, *GoodGuide* and Intuit side step this labelling ban with personal financing accounts in order to empower shoppers to self-regulate the climate impact of their individual purchases.
- By 2022, traditional supply chain leaders are disrupted by those supply chains that are recommended by the “Carbon Budget.” Supply chains take notice and begin quick upgrades, ironically placing carbon reduction claims on product packaging to gain market share. However, consumers perceive these moves as green washing.

Given the above events the rate of CLCA adoption is slower than all other scenarios; however the impact of the Carbon Budget to inform and change shopper behaviour is larger than all other outcomes.

## Impact of CLCA

- Impact is high<sup>10</sup> for Canadian and international producers
  - By 2022, the Carbon Budget is a common shopper tool, heavily influencing routine shopping decisions
  - CLCA is voluntary. Producers are only forced to take notice as consumers choose low carbon alternatives. By 2022, traditional market leaders are forced to report CLCA and upgrade systems.

Overall CLCA does not become widely used until Carbon Budgets enter the market and hybridizes CLCA with Input-Output models.

## Practical Application

Practical strategy points from this scenario are somewhat similar to the Carbon Improvement scenario. The largest practical application is collaboration with leading groups such as TSC, *GoodGuide* and Intuit.

Playing an active role as a member within the “Consortium Working Groups” such as the *Consumer Science* group will allow access to a powerful entity in this world that is shaping the future of carbon information in retail settings. Furthermore, a multi-disciplinary understanding of consumer science, interaction design and behavioural economics, would position a group to develop effective technological fixes in this world.

As a business it could be important to, instead of lobbying for regulation, to lobby for grants in innovation from government to create complementary

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<sup>10</sup> Although, for the majority of the decade CLCA has been low because there was no large market mechanism to force suppliers to upgrade.

services for producers and consumers within a human computer interaction framework. A body of knowledge could be created which makes a case for the investment needed; highlighting how much more technologically based information systems ought to conform to shopper needs and routines.

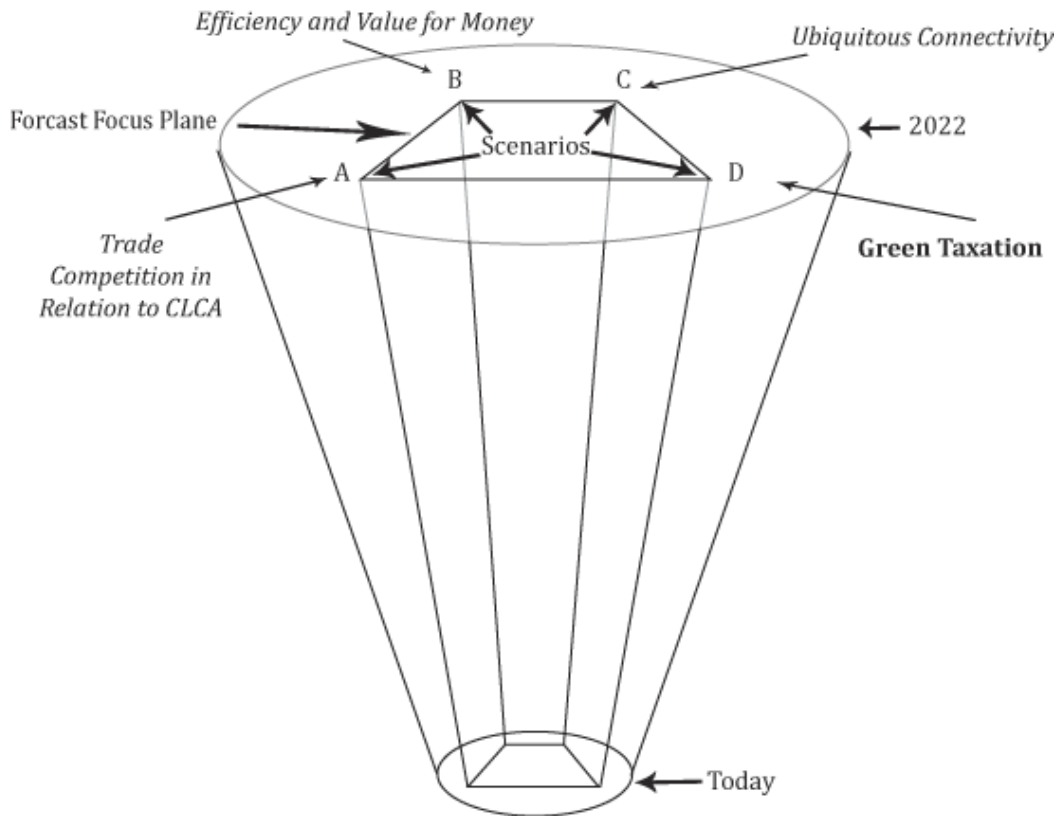
In this scenario, a blocking event is highlighted. A practical application for this would be to develop strategies that work well even when labelling is blocked from retail settings. Disruptive innovations that shake large complacent producers out of “status-quo” thinking could also be away to provoke change in this sector.

Furthermore, strategies around identifying niche groups that would want to pay more to receive product information ought to be undertaken and leveraged in implementation strategies. Strategies that reveal shopping histories and provide recommendations to shoppers as they find and purchase items, are high value in this world. Competition may come from similar applications that go beyond low carbon goals but also health, lifestyle and monetary budget.

**Backcast**

- 2022** From fear of being out-competed by TSC members, traditional leaders quickly adopt CLCA and input findings into the Carbon Budget service.
- 2020** Carbon Budget is launched internationally using Input-Output model. TSC members have the added benefit of CLCA information hybridizing the carbon information being displayed to users as recommendations.
- 2019** Global protest at the next World Trade Summit has no effect without court case. Sustainability Consortium teams up with Intuit and *GoodGuide*.
- 2018** World Trade Organization blocks carbon labelling.
- 2017** Sustainability Consortium labels begin appearing in stores.
- 2015** TSC meets its SMRS goals (see Assumption Section.)
- 2013** GHG Protocol accepted as world CLCA standard.

## Carbon Taxation



**Figure 25 Carbon Taxation scenario, dominant driver Green Taxation**

### Dominant Driver: Green Taxation

By 2022, the increased erratic and severe weather events caused by global warming have finally moved the countries of the world to take on a larger governance role. Carbon taxation is viewed as the quickest and fairest way to control carbon emissions. Absolute reductions have been agreed upon for each country and are regulated individually. World standards created earlier in the decade provide a framework for companies to track carbon associated with

individual supply chains. Canada's stance is that the problem needs to be approached with the same importance and action that was taken during the Second World War.

All Canadian companies are required to conduct CLCA for products. Negotiated in advance by the United Nations, individual countries create yearly reductions targets which then create the framework for placing a tax percentage value on products that fit in four emission intensity categories. At first, the carbon taxes strain the economy and shoppers begin to "carbon ration" their weekly purchases. However, as systems of extraction, distribution, power generation and manufacturing change to reflect the high cost of carbon, so do the prices of products as they shift into low carbon categories, meeting yearly reduction targets. CLCA becomes the go-to tool for finding efficiencies in supply chain and mitigating risk. A country's annual reduction in carbon emissions becomes as important as the yearly GDP of the country.

Carbon is taxed by leveraging a number of metrics. CLCA of a product is divided by the retail cost of the product. This figure is divided by the yearly CO<sub>2</sub>e emissions of the country divided by the annual gross domestic product (Zhoa, Deutz, Neighbour, & McGuire, 2012). Thus the ratio scales to the countries GDP and to the retail value of the product. Products with high ratios are taxed heavily, products with low ratios are taxed less so. Shoppers quickly understand the



relationship between a product CLCA and cost. Furthermore, retail tags provide a pictorial indicator of what the tax will be with the associated product (see Figure 26.)

Product rating companies such as the Sustainability Consortium do not compete with the government tax label; instead they create labels for products that concentrate on factors outside of CO<sub>2</sub>, such as water use, toxins, health of workers as well as many others. Because the tax disproportionately affects the poor, government programs are created from the carbon tax revenue to assist groups with the cost of living.

#### **Other Drivers:**

- Efficiency and Value for Money (Synergized)
- Trade Competition in Relation to CLCA (Synergized)
- Ubiquitous Connectivity (Diminished)

Efficiency and value for money is synergized as CO<sub>2</sub>e is taxed for high emitters. A percentage of the revenue goes towards low interest loans that companies can obtain from governments to upgrade supply chains to be more energy efficient.

International imported products are not excluded from taxes in Canada. In some cases international products pay lower taxes than national products. This

new playing field of taxes forces trading countries to compete by upgrading their supply chains faster than others.

Ubiquitous Connectivity is diminished in the sense that it is not the main enabler for consumers to look up product characteristics and choose between products in the same store. However, Ubiquitous Connectivity may help to find stores with the highest percentage of low taxed items. There is a boom in stores such as Whole Foods and farmers markets who have the highest percentage of low carbon products.

#### **Leaders and Followers:**

- Government (Leader)
- Producers (Follower [forced])
- Consumer (Follower [forced])

In general, countries such as Canada take a leadership stance. Free market innovation is not happening fast enough. Governance must ensure a slowdown of atmospheric degradation in the form of carbon emissions. Government regulation enhances the ability of the economy to creatively solve increased emissions by making incentives to innovate from carbon intensive activities.

Producers are forced to follow and pay attention to the CLCA of their products. The governments of the world have transformed CLCA into a measured value that greatly affects the sales that producers rely on.

Consumers are also forced reluctantly to pay the actual price of products.

At first, great hardship is wrought as people live in conditions similar to the rationing days of World War Two. However, as new forms of production and power generation emerge, the burden of the carbon taxes recedes.

#### **Potential Winners:**

- UN and CDP
- Organization like NTREE, Canadian Carbon consulting companies, CarbonCounted

The UN is a clear winner in this world. They have been able to orchestrate a worldwide consensus on targets and tax frameworks to meet goals for creating a low carbon world economy.

The CDP is a winner because the UN charges the CDP with the responsibility to add to its already large volunteer reporting database to include the mandatory reporting required by the UN agreements.

The National Roundtable of the Environment and the Economy (NTREE) is already reviewing LCA practices in both the public private sector for the Government of Canada. As of the end of the 2012 fiscal year, the agency will be cancelled (Galloway, 2012). However, as taxation begins, the government creates an agency similar to NTREE and picks up where they left off. This organization becomes an invaluable advisor as how best to roll out the variable taxing scheme.

The number of domestic companies requiring CLCA increases greatly across the board. Pre-existing carbon accounting companies thrive as a result of market demand for their services.

*CarbonCounted* is particularly a winner as it already retains two of the largest Canadian grocery retailers, Sobey's and Loblaws, as clients. It has already set-up a software database framework that the retail operations currently uses, which would make it very easy for these retailers to create portals for suppliers to input and report on CLCA values.

#### **Potential Losers:**

- World: WTO, BRIC
- Canada: Alberta oil industry, fossil fuel based shipping companies, mainly air transport and diesel trucking.

The WTO is overshadowed by international agreements created by the UN and UNEP. Under these agreements, WTO agreements are allowed to be broken if they inhibit the taxation of products in the top two emissions categories.

All BRIC countries have supply chains with tenacious energy appetites that could use an upgrade. To remain competitive with developed countries' supply chains, whole systems of energy use and production are disrupted.

In Canada, Alberta oil industry is hit hard, as there is a complete turnaround on how the government approaches the industry. Instead of subsidizing the industry, the government actively taxes emissions generated by

extraction and refinement, effectively shutting down operations and expansion. These taxes feed into retraining a once-thriving workforce to create a low carbon economy based on renewable energy generation.

As carbon taxation rolls out, noticeable differences in product prices between items that are locally produced and imported items begin to appear in the Canadian market. As local producers expand due to low cost demand, large carbon-intense logistic and transportation services shrink.

### **Shopper Facing CLCA Information in the Future**

In this world the context is preferred, *carbon taxation*, however following the logic of the world the delivery of taxation is not. There is a large gap in the communication of how shoppers can readily adapt and locate low cost low carbon items. Without a tool to identify and locate these items, the public will be at a disadvantage initially in terms of paying higher than expected prices for items. However, this will likely change as new ways of producing and transporting items provide a variety of cheaper options.

Canadian shoppers will see product labels that clearly indicate the environmental cost of products in monetary sales tax terms. The details of these “Carbon Taxation labels” will be able to be viewed online where the cost in CO<sub>2</sub>e is broken down at each stage of the products life cycle. Those that view the

details of the online label will be able to demand specific action by product developers.

TSC members will also add extra labelling to products, a “Sustainability Score” which expands on other factors such as social justice, water and other considerations. As discussed in the “Dominant Driver” section, information labels will be placed on retailer price tags to inform shoppers of how individual product perform and what the respective sales tax will be (see Figure 26.)

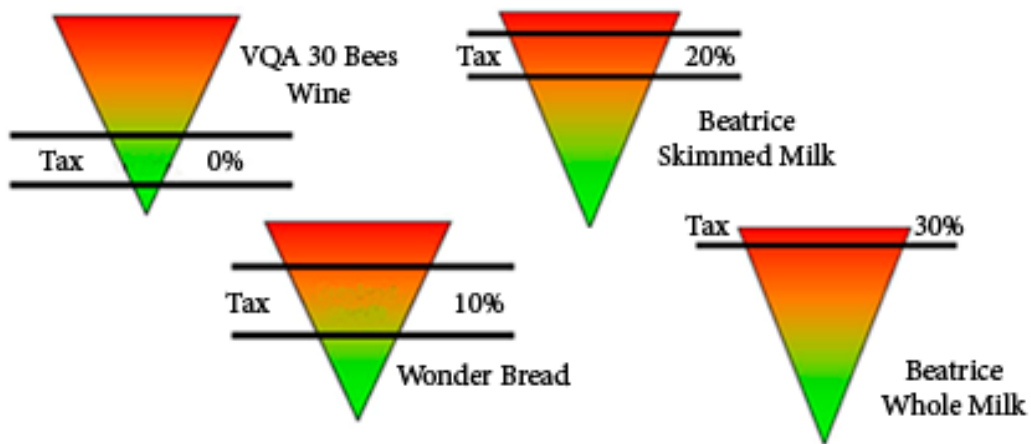


Figure 26 How Tax labels might look for various grocery products displayed on retail tags. The framework provides variable taxes rates based on the carbon intensity of products; product categories adapted from Zhao et al., 2012

## **Implications**

### **Rate of uptake of CLCA**

- Between 2012 and 2017, the rate of CLCA uptake is slow. The ISO Standard for CLCA wins out as the standard in which countries and companies report on products and supply chains, in short order TSC drops GHG standard and uses ISO Standard when it comes out in 2013.
- For the first five years, TSC is the leading proponent of conducting in-depth CLCA's of products.
- In 2018, a UN agreement is made to tax carbon.
- In 2019, producers are put on notice and must report on CLCA to their countries through the CDP. Those that already report to the CDP gain an advantage.
- Mandatory CLCA is required by governments by 2020 as taxation scheme begins.
- By 2022, CLCA becomes a normal part of a company reporting to the government, and retail level taxation labels are found everywhere in Canada.

For the first part of the decade, CLCA uptake stays relatively constant to current day adoption. However, after the UN agreement in 2018 and the Canadian taxation in 2020, there is a dramatic sea change of CLCA uptake. This is the second fastest scenario with respect to the rate of uptake of CLCA. The fastest uptake of CLCA occurs in the scenario where Trade Competition in Relation to CLCA is the dominant driver.

### **Impact of CLCA**

- Impact is large for Canadian and international producers

- Companies that have low CLCA's expand and begin to buy-up companies who have poor CLCA ratings.
- New and old forms of production are adopted to shift away from carbon intense activities.
- Consumer impact is high in Canada
  - Initially the impact on consumers are high, rationing occurs and black markets develop
  - The large cost of high emitting products causes shoppers to purchase low carbon products and services.
  - As industry shifts to new and old forms of production, so does the cost of purchasing everyday products that were once more carbon intense.

### **Practical Application**

Given the detailed information provided above there are a few main points that will be useful for planners now when considering strategies that might operate in this world. The largest practical application is that groups attempting to strengthen and improve the quality of CLCA information in retail settings need to go through government channels and be aware of UN negotiations.

Lobbying the civil service, as a think tank or advocacy group on expert panels, roundtables may be away to affect change to improve the overall information quality (accuracy and communication) of the label.

As a business it could be important to provide sound bites and other public relation pieces that add credibility to government policy decisions. This may be



crucial if the Oil and Gas industry lobby hard as a group because they have so much to lose.

CLCA adoption occurs quickly in this world, being ready with strategy options in the near future will be important to differentiate from other groups who will see the large opportunities that can occur in quick policy changes.

Furthermore, in this world in particular providing a way for shoppers to quickly find a store or bulk location that houses low cost low carbon staples may be an important transitional tool as the economy changes from high-carbon to low-carbon.

#### **Backcast**

<b>2022</b>	Label created to show actual cost of product and percent sales tax linked to the carbon intensity of the product.
<b>2020</b>	CLCA of products becomes mandatory.
<b>2019</b>	CLCA is leveraged to tax carbon in products, TSC members benefit from early adoption of CLCA reporting.
<b>2018</b>	United Nations agrees that every country must regulate and tax carbon to attain absolute carbon reductions.
<b>2017</b>	Sustainability Consortium labels begin appearing in stores.
<b>2015</b>	TSC meets its SMRS goals (see Assumption Section.)
<b>2013</b>	ISO accepted as world CLCA standard.

## Conclusion

These internally consistent scenarios paint a picture of how the next 10 years might play out in relation to CLCA and its utility to Canadian consumers as a decision making tool. Using the Cone of Plausibility framework, I have been able to flesh out four plausible futures that answer the overarching research question and describe the uptake rate and impact of the CLCA.

After crafting these scenarios to follow the dominant driver logic, I have come to a number of conclusions for those who may want to create Canadian strategies that improve the rate of uptake and impact of CLCA in the market.

In Canada, the rate of CLCA uptake depended heavily on how the World Trade Organization reacted to labelling by the TSC and the WTO's relative power in each world. In the Carbon Nutrition scenario, the G20 summit and the WTO are the groups responsible for creating trade frameworks for the embodied CO<sub>2</sub>e of products. This causes CLCA to be adopted quicker than the Carbon Taxation scenario, where the UN forces carbon taxes that are less aligned with the financial officers of the various countries. In the other two scenarios the WTO actively attempts to ban required CLCA reporting and labelling. The rate and uptake of CLCA differed based on the reaction of private business. In the Carbon Improvement scenario, multinational retailers actively fought the WTO and won,

thus having a faster rate of uptake than the Carbon Budget scenario where the WTO ban is not legally fought.

The value for future strategy would be to follow the WTO's reaction to the GHG protocols CLCA standard, as the WTO is currently monitoring the progress of volunteer carbon labelling in France, Japan and the UK (Baddely & Wolfe, 2011). The World Resource Institute as the organization responsible for the GHG Protocol Standard ought to make an effort to induct the CLCA standard to the Codex Alimentarius which the WTO recognizes as a reference set of standards to settle trade disputes (Beaton, 2011).

The impact of CLCA information tools depended on the a priori mandatory, volunteer or blocked carbon labelling schemes not on the quality of information given to shoppers. There are a number of behavioural economic theories that support this relationship. For example, for shoppers the messenger of information is a crucial consideration, in mandatory schemes the messenger is the government and may be more trusted than a private group. Also, a mandatory scheme would make CLCA a default for all products, defaults are also a very powerful nudge in influence behaviour (Institute for Government, 2010; McGeevor, 2009; Thaler & Sunstein, 2008). Thus, the inventiveness and engagement of carbon information to Canadian shoppers declined proportionally to how mandatory CLCA reporting and labelling needed to be.

In a utilitarian way, the scenario with the largest CLCA influence was the one that affected the most number of groups. Though Carbon Budget was the most innovative channel for CLCA interaction with consumers, it was purely voluntary and allowed supply chains and products to claim ignorance to their actual absolute CO<sub>2</sub>e impacts. Carbon Taxation had the most impact because it was the scenario that was more closely tied to the price concerns of consumers and was mandated by law. Carbon Nutrition had the least innovative way to engage consumers, however, in a more limited way than Carbon Taxation, it placed a mandatory reporting framework on product producers, and added a dollar value associated with the products carbon impact. Whereas the Carbon Improvement labels are mandatory for producers that supply TSC members, they did not raise the cost of those products that emitted the most. Instead consumers could shop at locations that were not apart of the TSC or knowingly buy products that had poor performance according to TSC labels.

Currently, all CLCA product labelling undertaken in Canada is voluntary. In the absence of concerted campaigns to force through mandatory CLCA, proponents ought to consider strategies that improve the CLCA communication that engage shoppers in voluntary programs. Utilizing human-centred design techniques or including behavioural theory *before* introducing voluntary labels or services ought to be undertaken to have more effective results. Furthermore, parallel efforts ought to be made to use the leverage points within the WTO and

government of Canada to push for mandatory reporting, particularly as weather threats intensify.

The usability and quality of CLCA information displayed to Canadian consumers in each scenario were dependent on the strengths and abilities of the leaders in each scenario to design effective information. For instance, in the Carbon Improvement scenario, labels have the most aesthetics with the least detailed information. In the Carbon Budget scenario, the information was the most immersive and engaging because it connected to and enhanced consumer tools already massively adopted by the public. Finally, in both the Carbon Nutrition and Carbon Taxation scenarios, information was displayed in such a way that did not attempt to persuade shoppers to make decisions.

Unfortunately, this meant more work for shoppers to evaluate and compare one product against another in retail location. This problem was moot in both scenarios however, because the price point increase for products with large carbon emissions forced shoppers to buy low costing low-carbon products.

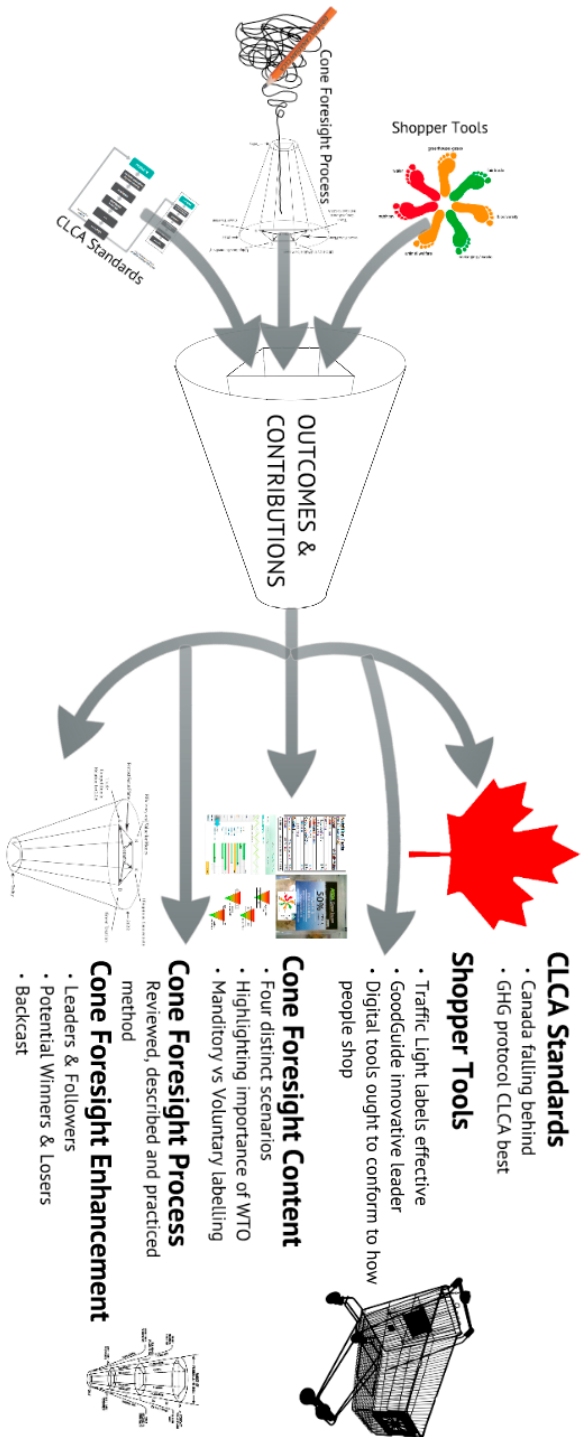
If Canada were to enter a mandatory CLCA scheme, there would be great potential for design firms to approach government to assist in launching labels and shopper tools that are engaging to average Canadian citizens. Through federal development research, the Government of Canada has already been

exposed to human-centred design techniques and concept sketches that relate to purchasing neutral or low carbon products.

These conclusions clearly demonstrate the value of the scenarios as strategy tools for both private industry and the public sector. In this way, these groups will be empowered to think ahead about the various strategies they wish to employ to encourage consumers to lower their carbon impacts.

## Conclusion

Figure 27 Map of the inputs, outcomes and contributions of the entire study



The goal of this research is to synthesize an understanding of carbon life-cycle assessment of products, and to develop scenarios on how it might be used in the future by consumers. In this way, the scenarios could be used as a strategic planning tool for groups interested in improving the ubiquity and use of product carbon information as shopping tool for consumers. A Canadian viewpoint was emphasized in order to aid local groups in creating informed strategies. A 10-year time frame was selected as it is more valuable to reflect upon unplanned directions, rather than comment on plans that are already heavily invested in and whose critical path has been chosen.

The reader has been walked through the patchwork state of CLCA standards, as well as an evaluation of which standard is the most widely adopted and why. This comprehensive worldwide investigation of CLCA standards revealed two crucial conclusions that were fed into the scenarios, two conclusions that are significant to groups planning for better CLCA in Canada:

- a. Compared to many other OECD countries Canada is falling behind.
- b. The GHG protocol CLCA standard seems to be the most broadly accepted standard.

An in-depth analysis of the current landscape of shopper tools has been conducted wherein important tools are described, best practice labelling techniques are discussed and gaps in service are highlighted. The significance of



this is that, rather than reinventing the wheel, better strategies can be created with the understanding that the *GoodGuide* leads in digital innovation, *Traffic light labels* have effects on shoppers, and smart device interventions need to better integrate with how people actually shop in the physical retail environment.

Throughout this study, the information is made relevant to Canadian groups interested in innovating in the CLCA space. This was done with the hope that this study will be used as a planning tool for local groups so that Canada can catch up with world-leading countries in the area of CLCA. Groups planning carbon information interventions for retail shoppers will have an understanding of four plausible but distinct futures. These groups will be able to imagine how strategies might play out in each alternative future, customized to a Canadian setting. The overarching value of this will be to make more robust plans today that do well in any one of the four scenarios.

As part of this study, I conducted a thorough review of practicing foresight experts who have used and described the Cone of Plausibility. This study describes clearly what I think is the best practice for executing Taylor's Cone foresight process: Identify key drivers, edit drivers so they can be compared at same level, verify and prioritize drivers based on expert input, develop scenarios

based around key driver. This articulation ought to help other foresight practitioners conduct new Cone of Plausibility studies.

Furthermore, the entire process was enhanced by including other foresight methods in scenario development, for example, backcasting. Overall a number of additions were made to the Taylor method including: manipulating the other drivers based on key driver dominance, layout clearly the leaders, winners and losers in the worlds, create a backcast of events to describe the world and above all leverage these factors to describe the outcome of the original research question. The significance is that others researching the Cone and its possible application will have a case study using the method, with scenario process enhancements that I think add a greater sense of comparability and coherence to all scenarios collectively.

In addition to these enhancements, a further enhancement of the Cone was made to highlight the practical application of each scenario for strategists. Each scenario highlights the types of strategies and perspectives' planners ought to consider when making plans for the future.

The assumption section outlines a number of factors kept the same in each scenario. The section highlights possible factors and their likelihood. As time passes these assumptions ought to be evaluated for accuracy every two years. For example, if the TSC was to disband within the next two years this would

greatly affect how all scenarios play out. Alternatively, if cold fusion was discovered to create perpetual energy at little to no cost, then this would also drastically change the scenarios. In effect, these assumptions are the barrier that allows scenario developers to concentrate on dominant drivers not wild card events. A change to the assumption section will affect the logic and coherence of the scenarios.

Wild card events can be important to create contingency plans in times of great uncertainty and risk. By definition the Cone of Plausibility does not use wildcards; however a novel way to incorporate wild cards to these scenarios would be to add a low-probability high-impact event to each scenario after the foresight expert has created the scenario. In this way, planners will be able to test out and see how the logic of the world would react to the event. From that point, planners could create contingency strategies to lower their exposure to risk.

The overall contribution of this study is to provide a tool for discussion and planning for groups interested innovating in the CLCA shopper retail space. As mentioned above, these groups benefit, not only from the scenarios, but also from two other portions of this study: the scan of available literature that compares standards around the world to the Canadian context, and the analysis of precedent shopper tools in retail settings.

A direct next step of this research will be to test out the design concepts developed as part of the Canadian federal development research project titled “Neutral Carbon Product” (Rose, 2012b) in each of the four scenarios. By developing strategies for implementation in each scenario, a better case can be made as to their validity and success in the Canadian marketplace. Furthermore, testing out and developing the Cone to include wild card events after scenario formation might prove to be a salient way to offset the risk associated with excluding low-probability high-risk events in scenario formation. If the execution of this is deemed useful, the Cone may prove to become a more robust and commonplace foresight technique within the foresight and planning community.



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## Appendix A: List of Experts

- Kimberly Curran – Environment Canada: Emerging Fuel Issues
  - A representative from the Head, Trends & Analysis, GHG Integration Section, Oil, Gas & Alternative Energy Division, Environment Canada; representing the category of politics, with an inside the civil service perspective.
- Rene Drolet – National Roundtable of the Environment and the Economy: VP of Policy “Commissioned by the Government of Canada to help assess how Life Cycle Approaches could contribute to long-term sustainability in Canada.”
  - The VP of Policy conducting roundtable research on Life-Cycle thinking in the public and private sector; representing politics and business category from a think tank policy point of view.
- Peter Adler – Former President and CEO of the Keystone Center: Facilitated the “Green Products Roundtable” which included 35 members representing different perspectives, including manufacturers, retailers, purchasers, distributors, certifiers, and other experts and thought leaders.
  - The former CEO of the Keystone Centre which facilitated Green Products Roundtable which included broad stakeholder engagement from the Sustainability Consortium and TerraChoice to develop a new entity that will be the authoritative “Judge and Jury” of the 350 ecolabels currently available in the marketplace; representing the business category perspective in voluntary systems.
- Venkat S. Somasundaram – Consumer Council of Canada: Young Consumers Network Director
  - A representative from the Consumer Council of Canada; representing the consumer rights and bias category.

## Appendix B: Table comparing the backcast of all four scenarios

Year	Carbon Nutrition		Carbon Improvement		Carbon Budget	Carbon Taxation
2013	GHG Protocol is world CLCA Standard		GHG Protocol is world CLCA Standard		GHG Protocol is world CLCA Standard	ISO CLCA Standard becomes world standard
2015	TSC meets SMRS goals		TSC meets SMRS goals		TSC meets SMRS goals	TSC meets SMRS goals
	2016	United States and Canada adopt CLCA	2016	Canada adopt CLCA		
2017	G20 meeting agree to detailed tracking of CO <sub>2</sub> e, WTO Codex Alimentarius reference		TSC labels begin in stores		TSC labels begin in stores, unsettling reports to WTO from disadvantaged trading countries	TSC labels begin in stores
2018	TSC, UNEP, WRI, GG, CDP and GRI create world database of CLCA		WTO blocks TSC and other carbon labels. court action begins betw TSC & WTO		WTO Blocks Carbon Labeling	UN agreement to tax carbon
2019	Tariffs and taxes for high emitting products imposed in Canada		Global Protest WTO Summit. WTO reverses decision. companies benefit		Global Protest WTO Summit. TSC GG <sup>11</sup> and Intuit team up together	CLCA is used as a way to tax products, TSC members benefit
2020	Competition betw countries to have #1 rating for domestic products		TSC buys GG		IO model used for Carbon Budget TSC leverages CLCA info from members	CLCA of products mandatory
2022	Canada displays CO <sub>2</sub> on nutrition fact labels.		TSC #1 labeling system: TL <sup>12</sup> , VL <sup>13</sup> , Site <sup>14</sup> , Tracking		Competition with TSC develops as other non-members conduct CLCA and input to CB <sup>15</sup>	Label created to show actual cost and sales tax linked to carbon
Result	Irrespective of labels, consumption of high emitting products is reduced b/c <sup>16</sup> cost		Carbon consumption is reduced by producers > consumers b/c of efficiency strategy		Carbon consumption is reduced by consumers > than producers b/c of budget tracking	Cost is label, consumption of high emitting producers is reduced b/c cost

<sup>11</sup> GoodGuide

<sup>12</sup> TL= Tangible Label (on package or shelf)

<sup>13</sup> VL= virtual label (smart device)

<sup>14</sup> Site = website

<sup>15</sup> CB= Carbon Budget

<sup>16</sup> b/c=because

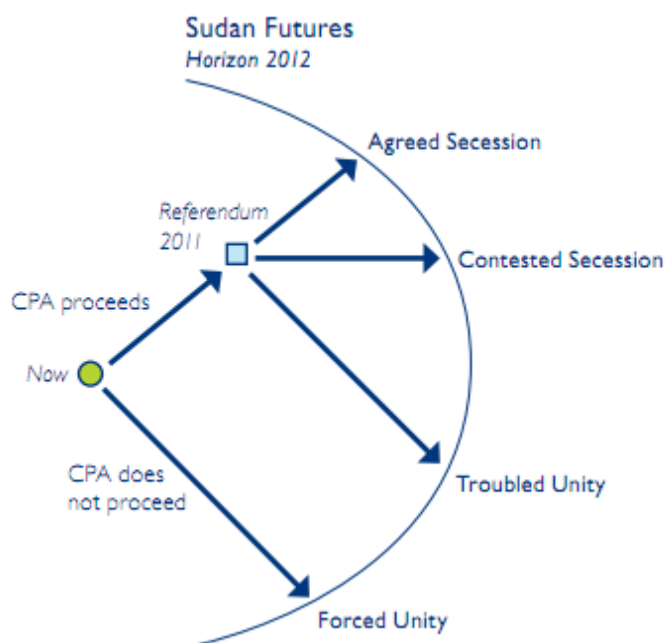
## **Appendix C: Choice of Foresight Methods**

### **Branching Analysis Method**

The branching analysis method is an approach to developing scenarios where key events are planned for the future but the outcomes of the event may go in different directions (see Figure 28, Rhydderch, 2009). While this method fits well to upcoming predictable occurrences, such as international treaties and agreements, the majority of world carbon life-cycle assessment standards are set to be completed within the next year. Secondly, the use of life-cycle assessment of supply chains will occur irrespective of future government agreements, for example Walmart and a number of major multinational firms have already adopted the greenhouse gas protocol carbon life-cycle assessment standard for products (The Sustainability Consortium, 2011d). Thirdly, as a planning tool it would be more internally coherent to construct scenarios based on drivers that are agnostic to future agreements that have yet to be identified. For example, once standards are developed, what are the drivers that affect the use of CO<sub>2</sub>e information by consumers? For example many identified drivers have no agreement timeline planned or nor will they in the future for example the driver “Efficiency and Value for Money” will be a consistent driver for private business irrespective of international agreements. Finally, Canada is just beginning to look

at life-cycle assessment (National Round Table on the Environment and the Economy, 2011) as a decision making tool in the public service and a way to support private industry as a competitive tool. However, there is a lack of discussion about life cycle assessment being a specific consumer tool, nor have conferences or future dates been established to discuss carbon life cycle assessment in the Canadian context.

Therefore in relation to the research question of the study, the current planned events and activities that would form the input into a branching analysis method seemed to be more suited to agreements and standards that are already taking place. They are more focused on the metrics rather than how the information will be transferred to consumers.



**Figure 28 Example of branching analysis Sudan futures (Rhydderch, 2009)**

## Two Axes Method

The process of the two axes method identifies trends, drivers, key events and then prioritizes the drivers into a set of the highest impact most uncertain drivers. The top critical uncertainties form the two dimensions (axis) yielding quadrants or areas of differentiation for scenario formation. The analysis of trends, key events and drivers are used to fully flesh out the areas created by the critical uncertainties. Quadrants represent the extremes of the axes and can be used to form the scenarios (see Figure 29.) Narrative or descriptive scenarios are developed by the researcher that fall within the quadrants developed (Rhydderch, 2009). At the core of the two axes method are two critical uncertainties, of high impact high uncertainty. It is important to identify uncertainties that are independent of each other. In this way, the foresighter is mapping out axes that are not correlated with each other so trends will populate separate areas of the matrix more clearly to form scenarios. The critical uncertainty captures the two extremes of a possible driver that would influence the outcome of the research topic in question. This method gets closer to developing scenario agnostic to specific events or treaties in that it takes into the account the relative importance of different drivers. However, the nuance of this method is that it assumes that the driver is not stable and can go into the extremes of two different directions. Contrasting the branching method the two

axes method simplifies scenarios into two major uncertainties, whereas the branching method could have and usually has more options.

The decision to not use this method was made because the two axes method depends on key uncertainties within two drivers whereas the current state of CLCA has a number of stable drivers and projects that are relatively certain. The Cone of Plausibility method takes a set of drivers that are relatively certain and projects them forward applying one driver as dominant in relation to others in four different scenarios.

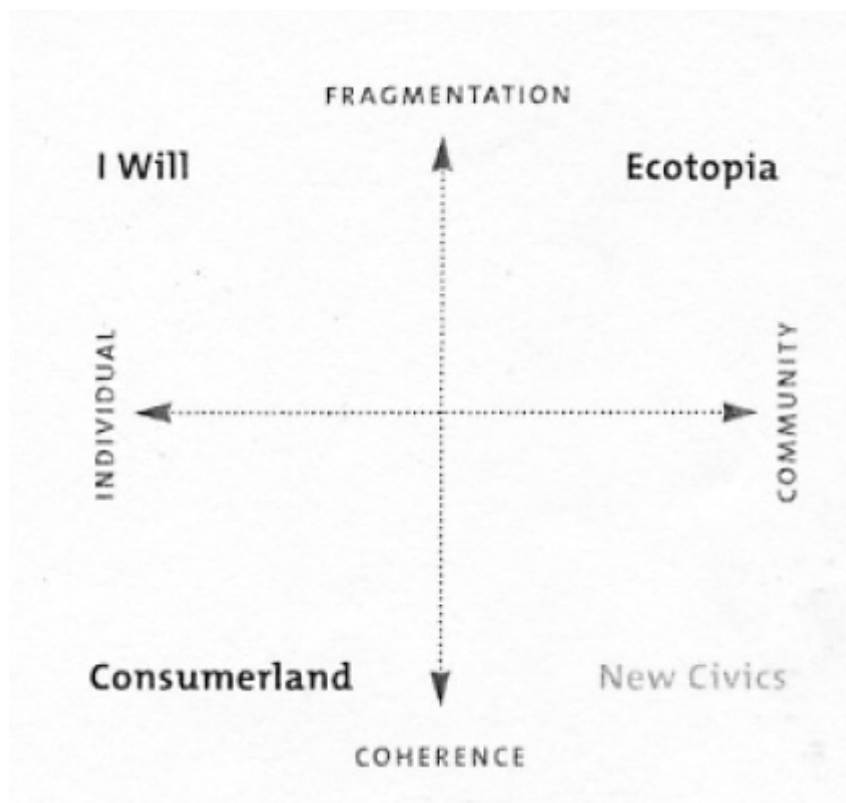


Figure 29 Example of the two axes method for organizing scenarios around the research question “What will be the general tenor of commercial life on a global scale in the year 2020?” Horizontal is the driver “desire”: ‘community dominant’ or ‘individual dominant’, Vertical is the driver “social structure”: ‘coherent’ or ‘fragmented’ based on the extremes of the drivers the four scenarios “I Will”, “Ecotopia”, “Consumerland”, “New Civics” is created (Wilkinson, 1995)

### **Cone of Plausibility**

The goal of Taylor version of the Cone of Plausibility is to develop plausible future scenarios based on a diverse set of drivers related to the topic under study. The idea is not to make stereotypical scenarios such as business as usual, worst case, best case, wild card etc., but to identify the top four dominant drivers related to the research topic and project them forward to get a plausible picture of four scenarios based on which driver is dominant.

The rationale is that by assuming that the drivers will continue to be strong into the future. Thus, planners will be able to identify strategies now, that will accommodate the most important issues affecting the future outside of a wildcard event (see page 45 for a more detailed explanation of the Cone of Plausibility and the approach that will be undertaken in this study.)



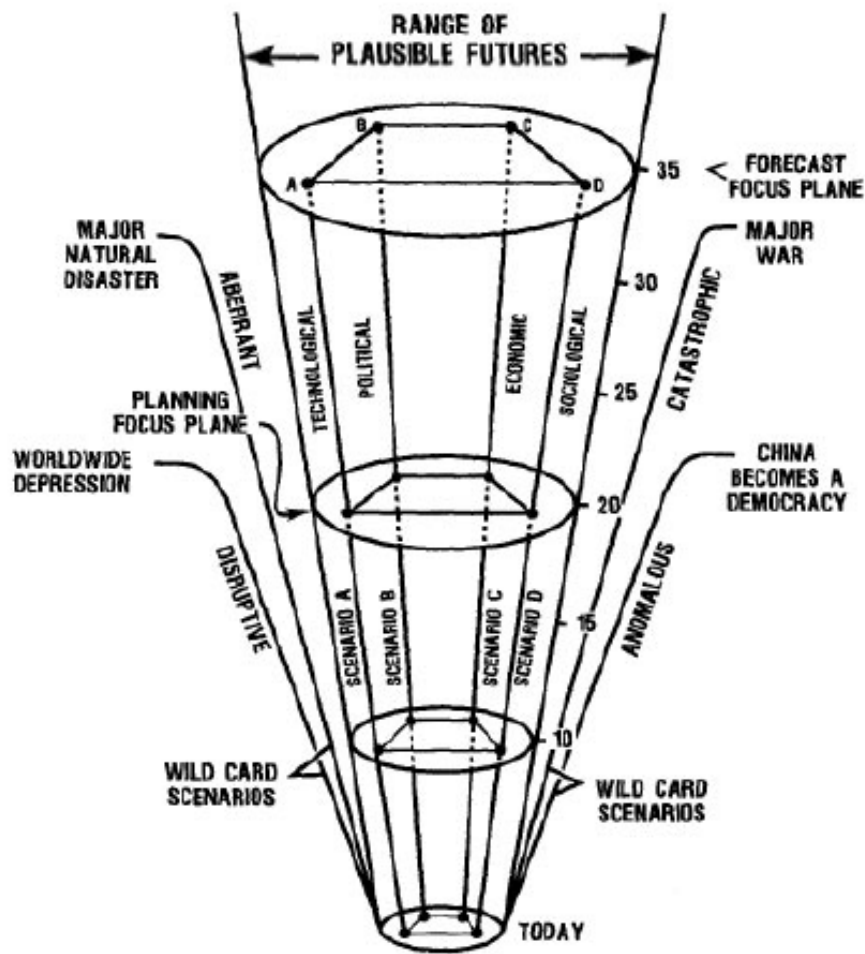


Figure 30 General Cone of Plausibility for scenarios projected 35 years into the future adapted from Taylor, 1994a