



PROVISION COALITION

PROCESSING FOOD SUSTAINABLY

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Developing an Industry Led Approach to Addressing Food Waste in Canada

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Executive Summary

Project Purpose

In Canada, the equivalent of 30 to 40 percent of the food produced is lost along the value chain, with much of it finding its way to landfill or composting. This food waste is worth an estimated \$27 billion each year. This indicates that significant opportunities exist for businesses along food value chains to streamline their operations, reduce food waste, and increase profit, while making better use of scarce resources, managing risk, and reducing their environmental footprint. Despite recent initiatives by companies and industry associations, the Canadian agri-food industry lacks a coordinated approach to addressing food waste.

In September 2013 Provision Coalition commissioned researchers at the Ivey Business School and Value Chain Management Centre to map the food waste challenge in the context of Ontario's and Canada's agri-food industry. Specifically, the project aimed to

- Define the nature of the food waste problem, its sub-issues and root causes;
- Identify the key entities influencing food waste in Canada; and
- Identify high level, strategic next steps for addressing food waste in Canada.

The research process was initiated and managed by the Network for Business Sustainability (NBS). This study is intended as input to a food waste working group to develop a coordinated strategy for tackling the food waste challenge in Canada.

The data for this study was obtained from three sources: 1) a literature review, 2) interviews with key stakeholders, and 3) a working session in which stakeholders validated a problem map and stakeholder map, and also identified key issues and opportunities for addressing the problem of food waste in Canada.¹

Key Findings

1. There is no clear commonly agreed upon definition of food waste in Canada and, therefore, no common measures of food waste and its impact on businesses and the environment.
2. Food waste is not a high priority for many businesses. The primary reason for this is that most businesses do not know the amount of food that they waste and its real impact on profitability.
3. Pioneers in reducing food waste tend to be larger businesses with more sophisticated management systems, more resources, and more stringent corporate social responsibility (CSR) mandates.
4. There is currently not enough data on where food waste occurs in Canada and the causes of food waste. The food waste problem map in Table 1 summarizes this study's findings on where and why food waste occurs along the value chain in Canada, food waste hot spots, and the individuals and organizations that can help reduce the waste at each stage of the value chain.

Food waste arises at all levels of the value chain, with the consumer being the largest contributor. While different factors influence food waste at the various stages of the value chain, the root causes of food waste can be classified into the following five major categories:

- Human behaviour (consumers, employees, and managers);
- Time-limited biological reality of food – particularly of fresh and unpackaged food;
- Limitations of technology or lack of advanced technology, equipment, packaging, etc.;
- Risk perception and risk avoidance, among businesses and consumers; and
- Unintended consequences of regulation.

¹ The study did not examine food waste at the consumer level other than to provide the context required to communicate the findings effectively.

Table 1. Food Waste Problem Map

How big is the problem?						
40% of all food produced or \$27 billion						
Where does food waste occur?						
Crop/livestock Production	Field (9%) Post-Harvest	Processing & Packaging (18%)	Distribution (3%)	Retail (11%)	Food Service (8%)	Households (51%)
What are the hot spots for food waste?						
1. Fruits & vegetables 2. Seafood	1. Fruits & vegetables 2. Meat 3. Grain products	1. Grain products 2. Seafood 3. Meat 4. Dairy products 5. Beverages	1. Fruits & vegetables 2. Seafood 3. Meat	1. Fruits & vegetables 2. Seafood 3. Meat 4. Bakery & deli 5. Ready-made food	N.A.	1. Fruits & vegetables 2. Meat & seafood 3. Grain products 4. Dairy products 5. Beverages
Why does food waste occur (root causes)?						
<ul style="list-style-type: none"> Climate change & weather extremes Incorrect planting & subsequent crop management Incorrect harvesting Market conditions (low price, lack of demand) Labour shortages Over-production Over-feeding Health management protocols/processes Lack of connectivity to downstream elements of value chain Regulatory standards Food safety scares 	<ul style="list-style-type: none"> Inadequate sorting Spillage & degradation Grading standards for size & quality 	<ul style="list-style-type: none"> Incoming quality Process losses Cold chain deficiencies Employee behaviour Poor machine set up Inaccurate forecasting Contamination Trimming & culling Supply/ demand issues Date codes Customers' rejections Inconsistency in quality of ingredients Food safety issues 	<ul style="list-style-type: none"> Damage Demand amplification Rejection of perishable shipments Poor record keeping allowing some products to exceed shelf life Inappropriate storage conditions Incorrect/ineffective packaging 	<ul style="list-style-type: none"> Inaccurate forecasting Food safety issues Increasing market share of ready-made food Date codes Fluctuations in delivery from suppliers Cold chain deficiencies Rejection on arrival at distribution centres or store or during handling Increasing merchandising standards Product differentiation Market over-saturation 	<ul style="list-style-type: none"> Plate composition Expansive menu options Over-serving Unexpected demand fluctuations Preparation mistakes Improper handling & storage Rigid management 	<ul style="list-style-type: none"> Excess purchases Infrequent purchases Date codes Attitudes towards food Over-preparation
Who can change the outcome?						
<ul style="list-style-type: none"> Managers Employees Value chain partners (processors, retailers) Service providers (equipment, genetics) Regulators 	<ul style="list-style-type: none"> Farmers Service providers (storage, equipment) 	<ul style="list-style-type: none"> Managers Employees Value chain partners (retailers, agricultural producers) Service providers (equipment, process engineers) Food banks Waste users 	<ul style="list-style-type: none"> Managers Employees Service providers (equipment, transport, packaging) Value chain partners (farmer, processors/packers, retailers, food service) Food banks 	<ul style="list-style-type: none"> Managers Employees Service providers (packaging, technology) Food banks Waste users 	<ul style="list-style-type: none"> Managers Employees Waste users 	<ul style="list-style-type: none"> Consumer organizations Schools Media Retailers Consumers

Source: Agri-food@Ivey and Value Chain Management Centre

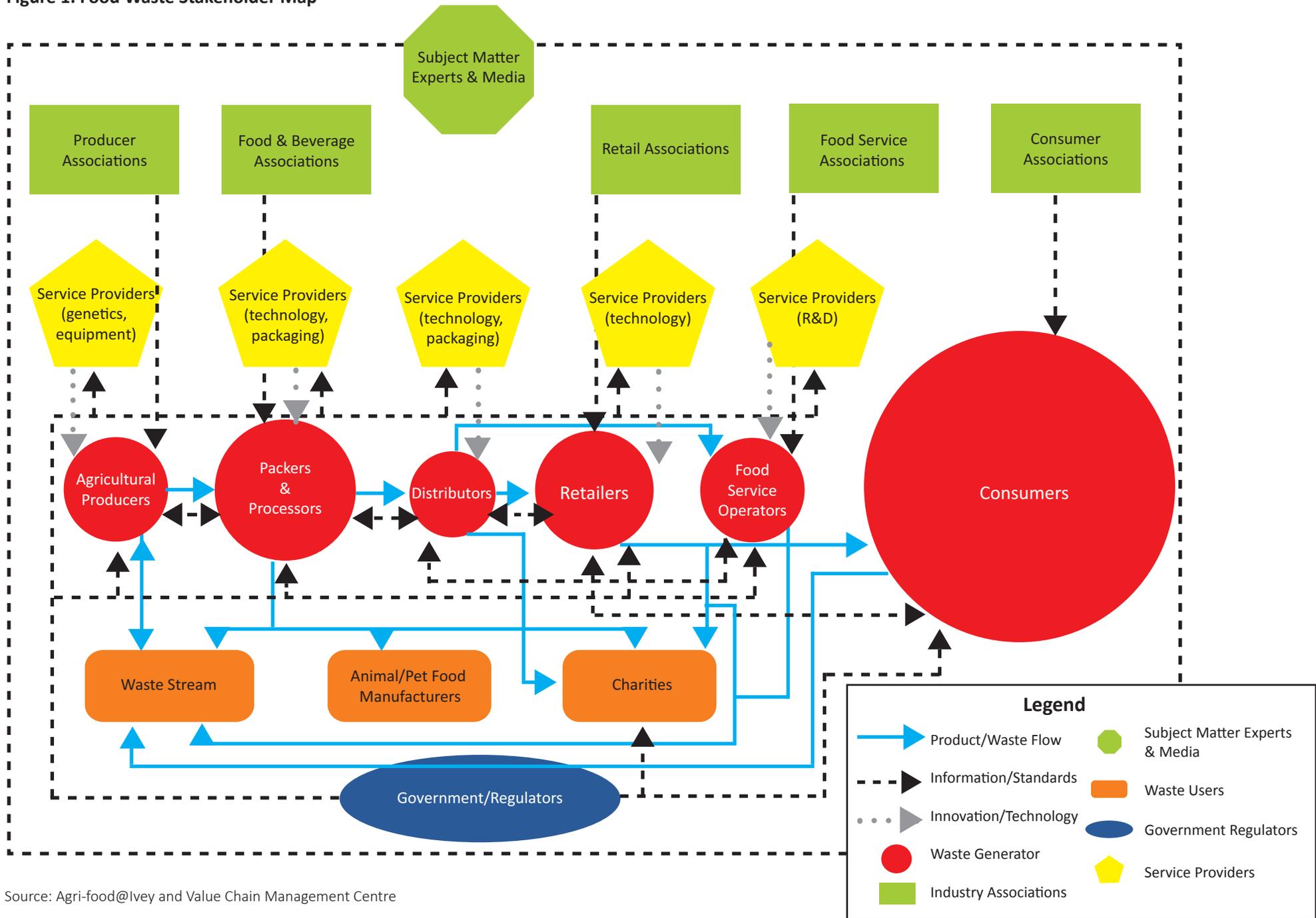
5. The main barriers to addressing food waste, particularly for preventing food waste at source, were the attitudes and behaviour of management and staff.
6. Businesses need to switch focus from waste diversion (mainly recycling) to waste reduction and maximizing value from waste. They also need a better understanding of the full range of wastes associated with food waste (e.g., energy, labour, production capacity, etc.) to strengthen the business case for reducing food waste.
7. There are opportunities to learn from the experiences in other countries. Some key lessons from successful international food waste initiatives include
 - Employ a collaborative approach with strategic partnerships between government and industry with NGOs as potential facilitators;
 - Focus on action, starting with the most interested players;
 - Provide confidential support to industry, with generic results publicized widely;
 - Begin with assessment to understand where and why waste occurs, develop and implement improvement plans, then assess and report results; and
 - Follow an iterative, continuous improvement approach when designing programs.
8. The food waste stakeholder map in Figure 1 summarizes this study's findings on the broad range of players who need to be engaged to tackle Canada's food waste challenge and the relationships among them.

Recommendations

Several recommendations resulted from this study:

1. A working group should be created from the organizations/individuals expressing interest at the December 2013 working session to create momentum for change. Working group composition should be revisited at key points in the process to ensure appropriate representation for accomplishing objectives.
2. The working group must develop a clear definition of food waste and effective means for measuring it.
3. The working group should catalogue current Canadian food waste activities to determine their scope and outcomes, and how they can be coordinated more effectively. Consideration should also be given to successful activities and practices of international initiatives that are relevant to Canada.
4. The working group should develop strategies for reducing food waste and moving food waste up the value pyramid, and identify businesses willing to participate in pilot studies to test these strategies.
5. The working group should use the pilot studies to
 - Share information about the extent and nature of food waste in the chains studied with the entire industry,
 - Build business cases for food waste reduction, and
 - Inform governments on the private and public benefits of implementing legislation and developing programs that can drive reductions in food waste along the value chain.

Figure 1. Food Waste Stakeholder Map



Source: Agri-food@Ivey and Value Chain Management Centre

1. Overview: Mapping the Food Waste Challenge

Food waste has serious economic, social, and environmental implications for Canadian society. These include commercial costs associated with food waste, environmental impacts created by waste – such as the greenhouse gases carbon dioxide and methane – and unnecessary investment of finite resources in the production of agricultural products, food, and beverages that are never consumed. Despite recent initiatives by some stakeholders, the Canadian agriculture, food, and beverage industries² lack a unified strategy for addressing food waste.

1.1 Objective and methodology

An industry wide approach involves understanding the problem, determining who needs to be involved in solutions, and bringing stakeholders together to collectively develop a food waste reduction strategy. The objective of this study was to map the food waste challenge in the context of Ontario's and Canada's agri-food industry. Specifically, the study was intended to 1) define the nature of the food waste problem, its sub-issues and root causes; 2) identify the key entities influencing food waste in Canada; and 3) identify high-level, strategic next steps for addressing food waste in Canada.³ The study is intended as input to a food waste working group to develop a coordinated strategy for tackling the food waste challenge in Canada.

Research was conducted in four phases. First, a review of academic journals, media reports, industry research, consultant reports, and public literature pertaining to food waste from Canada, the European Union (EU), the United States (US), and Australia was undertaken. Proprietary research and information held by Ivey and the Value Chain Management Centre (VCMC) were also reviewed. The review, Section 2 of the report, summarized current knowledge on the food waste problem in developed countries, including where and why food waste occurs, who needs to be involved in the solution, and how the problem can be tackled. The literature review guided the development of drafts of the food waste problem and stakeholder maps, which were finalized during subsequent phases of the study. It also guided the focus of confidential interviews conducted with key stakeholders in the food waste issue in Canada and the development of a qualitative survey conducted with members of the Retail Council of Canada (RCC) in phase two of the study.

Second, stakeholder interviews were conducted to verify the relevance and accuracy of findings from the literature review in the context of Ontario's and Canada's agri-food industry. Specifically, the interviews sought to identify 1) how businesses define and measure food waste; 2) the level of importance businesses place on the food waste issue and why; 3) food waste hot spots and root causes; 4) specific practices that businesses have implemented to reduce food waste and their effectiveness; 5) barriers to reducing, recovering, or recycling food waste; 6) the role that government should play in reducing food waste, and 7) the biggest opportunities for reducing food waste going forward. Additional information on these issues was obtained from the aggregated results of a qualitative survey⁴ completed by members of the RCC and from various companies' corporate social responsibility reports. Key findings from this phase are presented in Section 3.

Third, a working session was organized in December 2013, which brought together key stakeholders to discuss the food waste issue in Canada. The main objectives of the working session were to validate the food waste problem and stakeholder maps, and to identify key issues and opportunities for addressing the problem of food waste in Canada. Highlights from the working session are presented in Section 4.

² The Canadian agriculture, food, and beverage industries will be subsequently referred to as the "agri-food industry."

³ The study did not examine food waste at the consumer level other than to provide the context required to communicate the findings effectively.

⁴ The survey was designed by the research team and administered by RCC. Grocery members of RCC represent approximately 90% of the Canadian grocery market.

Fourth, the insights from the literature review, stakeholder interviews, secondary data, and working session were used to develop high-level strategic next steps for addressing food waste in Canada. These recommendations are presented in Section 5.

2. Findings from the Literature Review

This section presents key findings from the literature review. The review begins with definitions of the food waste problem and its scale, examines where and why the problem occurs, and then identifies the stakeholders that are involved. It concludes with a discussion of experiences in other jurisdictions and lessons for Canada.

2.1 What is food waste?

Food waste is broadly defined as food or edible material (both solid food and liquids) originally meant for human consumption in its entirety (such as fruit and vegetables) or after processing (such as wheat into flour, then bread), but is lost along the food chain (Parfitt et al., 2010; FAO, 2011, 2013).⁵ Within the general concept of food waste, a distinction is often made between food loss and food waste.

Food loss refers to the decrease in the mass (dry matter) or nutritional value (quality) of food, which makes it unfit or unavailable for human consumption. Food losses take place at the production, post-harvest, and processing stages of the food value chain. Causes of food loss include biological factors, natural disasters, poor infrastructure, ineffective logistics, lack of technology, and insufficient skills, knowledge and management capacity of value chain actors. From a lean thinking or process improvement perspective, it also includes factors such as the ineffective use of feed in animal production (Red Meat Industry Forum, 2002; Gooch et al., 2013).

The term *food waste* is often used to describe only those losses that occur at the end of the food value chain (wholesale distribution, retail, foodservice, and in the home). This includes food that is discarded, regardless of expiry date. Food waste is caused by management decisions, such as production and ordering policies, and behavioural issues, such as consumer shopping and eating habits.

In summary, food loss is due mainly to process-based factors, while food waste is caused mainly by decision-based factors. In this report, the term “food waste” encompasses food loss and food waste; it does not differentiate between the two terms.

2.2 How big is the food waste problem?

A 2010 report by Gooch et al. estimated that Canadians disposed of approximately 40 percent of the food produced in 2009.⁶ This is equivalent to

- \$27 billion,
- 2 percent of Canada’s GDP,
- 70 percent of Canada’s agri-food exports, and
- 1.1 times Canada’s agri-food imports in 2009.

⁵ Regardless of whether it is directed to a non-food use such as feed or bioenergy.

⁶ Globally, estimates indicate that one third of the food produced for human consumption is wasted (FAO, 2011).

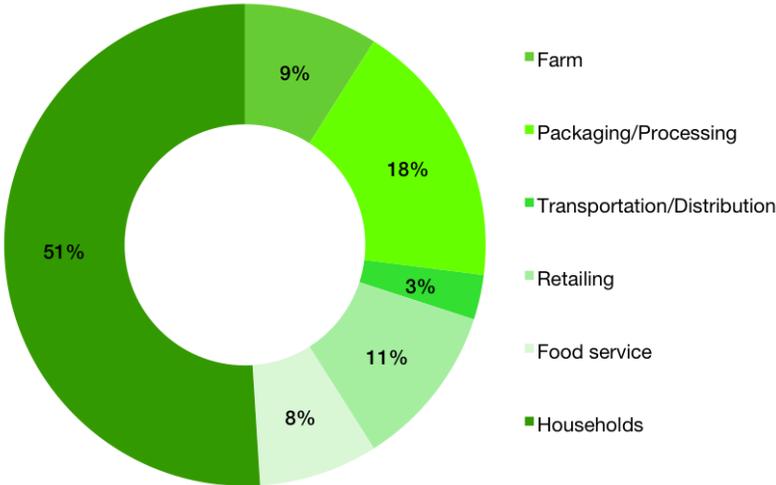
The \$27 billion estimate includes the costs associated with business-level waste, such as ingredients, labour, equipment, and transportation.⁷ It does not include the opportunity cost of scarce resources (e.g., water, land, and energy) that are used in the production, processing, and distribution of wasted food. Nor does it include the environmental cost of carbon dioxide and methane⁸ emitted from food rotting in landfills, nor the opportunity costs of organic material sent to landfill rather than being re-used. An interviewee representing the Recycling Council of Ontario estimated that as much as 30 percent of the solid non-hazardous waste stream in landfills is organic.⁹

These numbers suggest that significant opportunities exist for businesses along the food value chain to streamline operations, reduce food waste, and increase profit, while making better use of scarce resources, more effectively managing risks, and reducing their environmental footprint.

2.3 Where does food waste occur?

Food waste occurs at all stages of the food value chain (Parfitt et al., 2010). The largest contributor to food waste in Canada is the consumer (Gooch et al., 2010). More than 50 percent of the estimated \$27 billion of waste can be traced back to Canadian households (Figure 1).

Figure 1. Distribution of Food Waste throughout the Food Value Chain (Farm to Fork) in Canada



Source: Gooch et al., 2010

Abdulla et al. (2013) show that food waste in Canadian homes, restaurants, and institutions increased from 4.1 billion kilograms in 1961 to 7.3 billion kilograms in 2009, a 77 percent increase.¹⁰ The national annual average over this period was 7 billion kilograms, equal to 37 percent of total food available for consumption. This is an average of 0.75 kilograms per person per day. The highest share of waste occurred with fruits and vegetables (fresh and processed), followed by meat and seafood.

⁷ Given the increase in input prices since 2009, this estimate is likely conservative.

⁸ Methane is 25 times more powerful than carbon dioxide as a greenhouse gas.

⁹ Interview conducted on November 22, 2013.

¹⁰ It is important to note that the increase in food waste outpaced the increase in food available for consumption over the same period. Food waste hit maximum levels in 2008 at 10.4 billion kilograms (Abdulla et al., 2013).

Three key factors have contributed to this trend:

- The drop in the real cost of food to consumers from 19 percent of total household expenditures in 1961 to 9 percent in 2007,
- The development of the technical and logistical capabilities required to supply fresh food from around the world year-round, and
- Increased consumption of fruits and vegetables by health-conscious Canadians.

The most recent numbers on food waste generated in Canadian homes come from the Food Waste Pilot Project¹¹. Preliminary findings show that the average amount of food waste generated per household per day was 0.5 kilograms, with just over 50 percent from fruits and vegetables (von Massow and Martin, 2013). This figure does not take into consideration food consumed away from home.

Results from the Survey of Household Spending show that an average household of 2.1 individuals spent just under \$150 per week on food in 2012 (Statistics Canada). If 20 percent of food purchased is wasted, this equates to \$30 per week or \$1,560 per year.¹² Primary causes of this waste are consumer attitudes towards food, including the tendency to purchase more food than required when discounts are available, lack of meal planning, preparing too much food, and disposing small amounts of food at a time. In addition, many consumers possess a mindset that food is both cheap and plentiful (Gooch et al., 2012; Faulder, 2014).

Consumers are often unaware of the true amount of food that they waste and the associated costs. When consumer awareness of food waste increases, for example by measuring (weighing) the waste produced by their household, their behaviour changes, resulting in less food waste (von Massow and Martin, 2013). Mainstream communication efforts that provide examples of how households benefit from food waste reduction and describe how this can be achieved are effective means for encouraging changes in consumer behaviour, particularly when supported by industry initiatives (WRAP, 2013). Examples of UK industry initiatives include retail initiatives such as “Great Taste, Less Waste” (Morrisons), “Fresher for Longer” (Marks & Spencer’s), and processor led initiatives such as Warburtons, which introduced re-sealable packaging and smaller bread loaves while retaining regular sized slices.

Beyond figures proposed by Gooch et al. (2010), Abdulla et al. (2013), and von Massow and Martin (2013), no estimates on the extent of food waste or hot spots along the value chain are currently available for Canada. Nonetheless, findings from researchers including Gooch et al. (2010) and FAO (2011) show that the three food waste hot spots along the value chain can be categorized as

1. Production losses, where products may be rejected for failing to meet quality or food safety specifications (in the field or processing facility), or from trim and separation of inedible portions;
2. Risk management and spoilage due to inadequate packaging or processing of goods at the farm, processor, retail, or foodservice points of the value chain; and
3. Consumer waste.

2.4 What are the root causes of food waste?

The food waste problem map in Table 1 summarizes the root causes of food waste at each point of the value chain, along with hot spots and stakeholders involved. The initial draft was based on the literature review¹³, stakeholder interviews, and the RCC’s member qualitative survey. The draft was validated and refined at the December 2013 working session.

¹¹ The Food Waste Pilot Project is a partnership between researchers at the University of Guelph and the City of Guelph, which was initiated in 2013.

¹² As Gooch et al. (2010) suggest, half of the food waste (i.e., 40% of total food produced) happens in the home.

¹³ Papers covered Canada (Gooch et al., 2010, 2012, 2013), the US (Gunders, 2012) and the UK (Waste Resources Action Programme, 2010).

Table 1. Food Waste Problem Map

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Why does food waste occur (root causes)?						
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Source: Agri-food@Ivey and Value Chain Management Centre

While different factors influence food waste at different stages of the value chain, the root causes of food waste can be classified into five major categories:

- Human behaviour and the incentives behind it (consumer and employee behaviour, management decisions such as lack of coordination along the value chain);
- Time-limited biological reality of food – particularly of fresh and unpackaged food;
- Limitations of technology or lack of advanced technology, equipment, packaging, etc.;
- Risk perception and risk avoidance, among businesses and consumers; and
- Unintended consequences of regulation.

2.5 Why is a value chain approach necessary?

A value chain approach to addressing food waste has the potential to produce economic, environmental, and social benefits that go beyond those which can be achieved by individual businesses working in isolation (see WRAP (2011) for UK case studies that showcase the benefits of businesses working together). The literature review identified three reasons for a value chain approach:

- First, waste produced at one point of the value chain may reduce waste at another point. For instance, it has been argued that people who eat more processed food generate less food waste¹⁴ (i.e., processed food lasts longer than fresh food, hence there is less spoilage). However, this tendency typically generates more waste at the processor level (RMIT University, 2013).
- Second, as Section 2.4 suggests, waste occurring at points further down the value chain may result from pressure further up the chain (e.g., demand amplification, product standards).

Questions that arise in both of the cases are: 1) to whom should that waste be attributed, and 2) what are the true root causes?

- Third, integrated businesses demonstrate that total benefits from waste reduction initiatives are larger when stakeholders at different stages of the value chain co-operate. Appropriate incentive structures are needed for effective co-operation between autonomous players operating at different stages.

2.6 Stakeholders – Who can change the outcome?

While food waste is a value chain problem, it is also a societal challenge. To tackle the issue, it is essential to engage stakeholders operating in the value chain, as well as from government and from society in general. This includes

- Agricultural producers,
- Businesses (including processors, distributors, retailers, food service, etc.),
- Service providers (farm input suppliers, genetics, equipment, packaging and transport providers, process engineers),
- Government and regulators (including healthcare services, schools),
- Food waste users (waste stream, charities, animal and pet feed manufacturers),
- Industry associations,
- Non-government organizations (NGOs),
- Subject matter experts,
- Media, and
- Consumers.

¹⁴ However, people who eat more processed foods generate more packaging waste.

The food waste stakeholder map in Figure 2 illustrates the range of stakeholders needed and the relationships among them in terms of 1) product and waste flows; 2) information, regulation, and standards flows; and 3) innovation and technology flows.

2.7 What industry level food waste reduction initiatives exist in Canada and internationally?

Although many businesses and industry stakeholders are aware of the food waste issue, Canada has no formal, coordinated approach to addressing the problem. Initiatives to date have been sporadic and often developed in isolation. Apart from Provision Coalition, other industry associations such as Food and Consumer Products of Canada, the Retail Council of Canada¹⁵, and The Packaging Association (Canada) have initiated studies to determine the extent of the food waste problem, the causes of food waste, and the barriers to managing waste. They are also facilitating actions by their members to reduce waste. Waste stream initiatives, like those of the Recycling Council of Ontario, also assess and address the problem. Some of the most successful initiatives include the Waste-Free Lunch Challenge¹⁶ and the 3RCertified Waste Reduction and Diversion Program¹⁷. Charities, for which food waste represents an opportunity to acquire food for their programs, have undertaken initiatives to encourage more food donations. For instance, Food Banks Canada developed the Safe Food Handling Program¹⁸, the Retail Food Program¹⁹, and the Capacity Building Fund Program²⁰. Finally, individual businesses are key players in food waste reduction. A number of pioneers are pushing for zero-waste to landfill and other innovative solutions in their companies and throughout their supply chains.

To identify lessons that can be applied in Canada, the review also examined food waste reduction efforts in regions that have made greater progress. Two initiatives were particularly successful in coordinating efforts to facilitate changes in the attitudes and behaviours of businesses and households: 1) the UK's Food Chain Centre and Waste Resources Action Programme, and 2) the US Food Waste Reduction Alliance.

2.7.1 Government supported initiatives: Food Chain Centre and Waste Resources Action Programme (UK)

The UK Food Chain Centre (FCC) ran from 2002 to 2007 as part of the government's strategy for sustainable farming and food. FCC produced value stream maps for 33 chains and over 100 companies. This allowed companies to better understand customer value, improve process management and operational effectiveness, and reduce product loss, which was tracked from primary agricultural production to the customer. It ultimately led to reported savings of £13.7 million (~\$25.4 million).

The FCC completed some of the first studies in food waste commissioned by the Waste Resources Action Programme (WRAP), a government funded initiative. Established in 2000, the program was initially developed to create markets for recycled products. WRAP's work evolved over time and in 2005 a voluntary agreement was launched, known as the Courtauld Commitment, aimed at improving resource efficiency and reducing waste within the UK grocery sector. Now in its third phase, the agreement has a greater focus on food waste prevention. All major UK grocery retailers as well as major food and beverage manufacturers are signatories. The current phase outlines a partnership between WRAP and the signatories to address targets in retail and manufacturing food waste, household food waste, and the recycled content of packaging. This phase of the agreement runs until 2015.

¹⁵ Retail Council of Canada is focused on building a harmonized approach on organic waste across jurisdictions, and is looking to share best practices among members and externally. The group has also started a share group among the other key Canadian food waste stakeholders for organizations to tackle issues more collaboratively.

¹⁶ The Waste-Free Lunch Challenge is an elementary school program initially designed to challenge students across Ontario to go waste-free for a whole week. The program is now national.

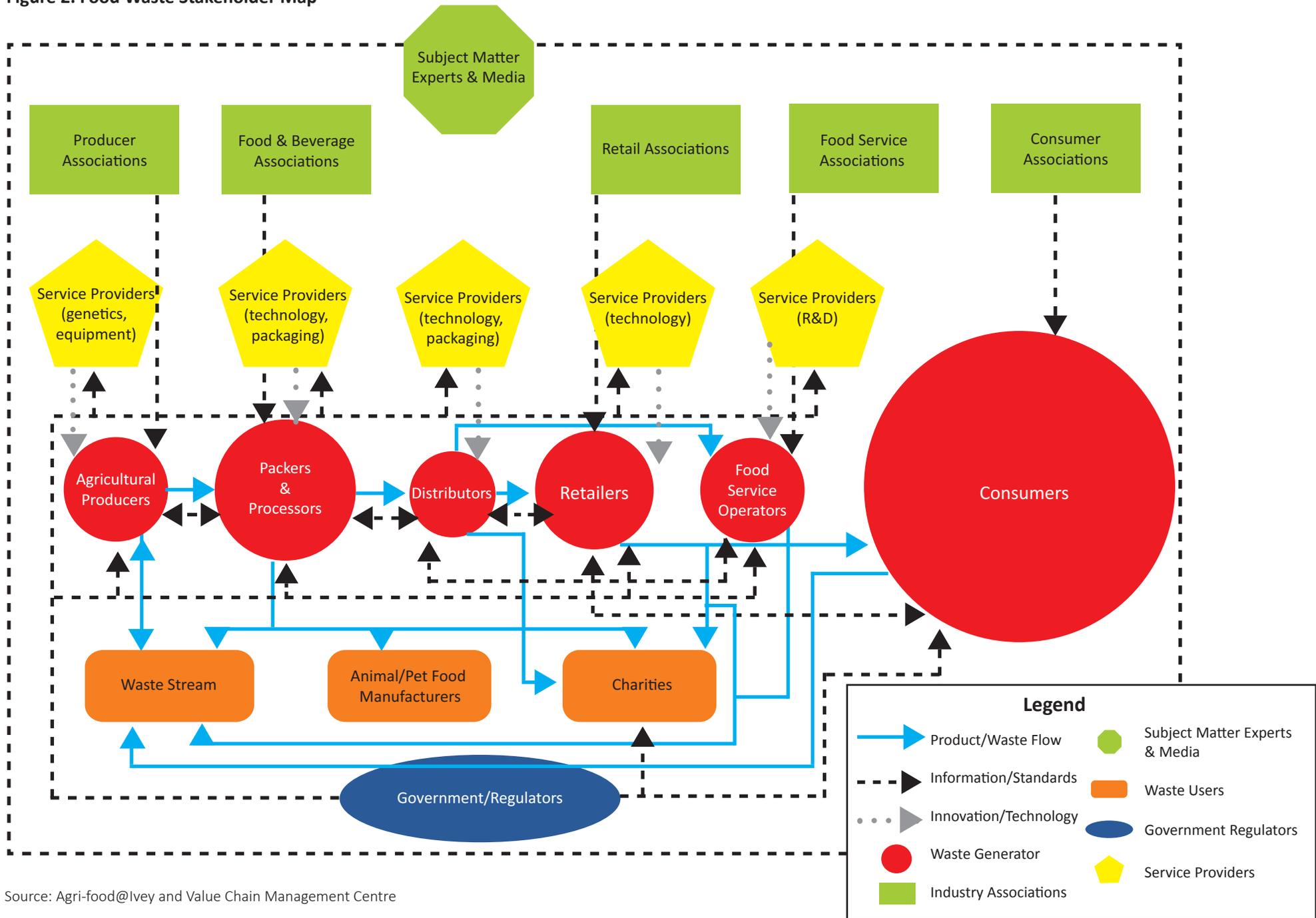
¹⁷ The 3R Certified Waste Reduction and Diversion Program is a voluntary certification program that recognizes organizations taking a leadership position in waste reduction and diversion.

¹⁸ The Safe Food Handling Program was designed to educate member food banks on safe food handling.

¹⁹ The Retail Food Program is a national agreement that connects more than 500 retail stores to more than 200 local food banks. Retailers involved in the program included Loblaws, Target, and Walmart.

²⁰ The Capacity Building Fund Program was aimed at enabling member food banks to acquire and distribute more food and to develop the infrastructure for fresh food.

Figure 2. Food Waste Stakeholder Map



Source: Agri-food@Ivey and Value Chain Management Centre

WRAP has improved the quantification of food waste and works closely with retailers and manufacturers to help them reduce waste using lean manufacturing principles. Appendix 1 lists a selection of WRAP's reports relevant to the Canadian context.

2.7.2 Industry led initiatives: Food Waste Reduction Alliance (US)

The Food Waste Reduction Alliance (FWRA) is a cross-sector industry initiative launched in 2010. It focuses on addressing food waste among food manufacturers, grocery retailers, and restaurants. It is led jointly by the Grocery Manufacturers Association (GMA), Food Marketing Institute (FMI), and National Restaurant Association (NRA). Appendix 1 lists the accomplishments of FWRA's initiatives to date. FWRA's most important accomplishment is the assessment of food waste from manufacturers, retailers, and wholesalers using secondary and, more recently, primary data.

2.8 What can Canada learn from others?

2.8.1 Establishing the building blocks of success

While WRAP was primarily a government based initiative and FWRA was primarily an industry led initiative, the programs' successes result from a number of common features. They include

- **Collaboration** – a collaborative approach with strategic partnerships between government and industry, primarily facilitated by NGOs;
- **Action Orientation** – an action oriented focus, which involves the most interested players and pioneers from the start;
- **Confidentiality** – confidential support to industry with generic results publicized widely;
- **Measurement** – initial assessments on where and why food waste occurs that support the business case for food waste reduction by enabling businesses and consumers to track food waste and, as a result, make informed management decisions; and
- **Incremental, Iterative Approach** – an incremental and iterative approach with a long term vision enables continuous improvement to process and programs.

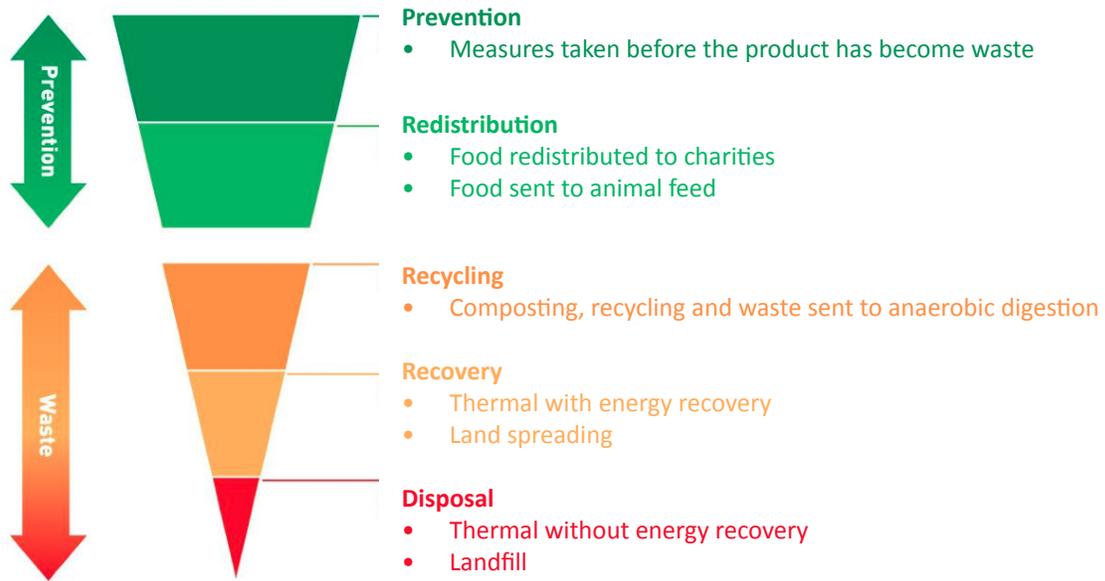
These features are relevant as lessons for Canada. In Canada, companies and industry associations are starting to tackle the issue of food waste. However, the collaboration required to achieve real change is not fully developed. Canada has yet to achieve the depth of analysis conducted by FCC, WRAP, and increasingly by FWRA. This analysis is needed to produce a business case for reducing waste. Collaboration and analysis will be the building blocks for establishing a concerted food waste reduction initiative in Canada.

2.8.2 Determining priorities

WRAP and FWRA succeeded by determining priorities to assist industry and create societal benefits. Figure 3 illustrates the waste management hierarchy developed by WRAP (2013). It ranks waste management options according to their attractiveness from a sustainability perspective (from most desirable to least desirable), and reflects EU laws pertaining to the reduction and management of organic waste. It is very similar to the waste recovery hierarchy developed by the US Environmental Protection Agency (Figure 4).

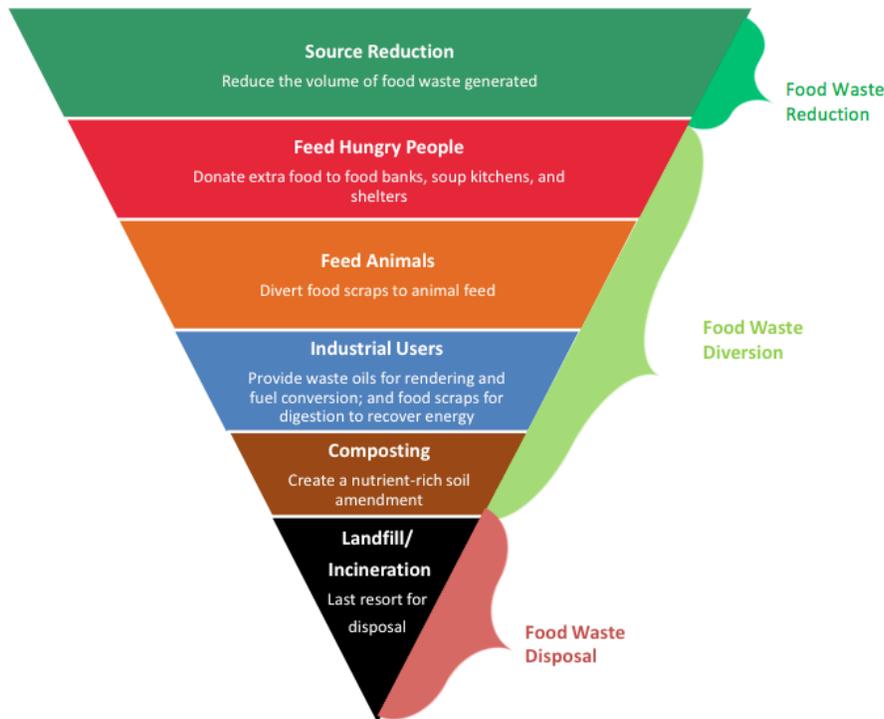
In both cases, the first priority is waste reduction (addressing the sources and causes of waste). When waste cannot be avoided, the second best option is redistribution of food waste (e.g., feeding people in need or sending it to animal feed). The third best option is recycling through composting or anaerobic digestion. If infrastructure is available and accessible, waste should go through anaerobic digestion rather than composting, as anaerobic digestion generates not only nutrients but also energy. Disposal is the least attractive option.

Figure 3. Waste Management Hierarchy



Source: Waste Resources Action Programme, 2013

Figure 4. Waste Recovery Hierarchy



Source: US Environmental Protection Agency, as cited in Business for Social Responsibility, 2012

3. Key Findings from the Stakeholder Interviews

To better understand the nature and causes of food waste in Canada, and approaches suited to reducing food waste along the value chain, semi-structured interviews were conducted with key stakeholders. Appendix 2 lists the organizations interviewed. Individuals interviewed included five representatives from processors of meat, baked goods, fruits and vegetables, and snacks and beverages; two representatives from retail; two representatives from food service; one consumer representative; two representatives from a food bank; one recycling association representative; and six subject matter experts from retail, consulting, and academia. Key questions explored during the interviews included

- How important is food waste reduction? Why or why not?
- Do businesses track food waste? If so, how is food waste tracked?
- What are the hot spots for and root causes of food waste?
- What are some of the barriers (either internal or external) to reducing food waste, recovering food waste to create an alternative source of revenue, redirecting to food banks, or recycling?
- Are there collaborations with other industry stakeholders to reduce food waste and what forms do they take?
- What are some of the most impactful changes and improvements that businesses have made with respect to products, processes, organization, and marketing strategies to reduce food waste?
- What role should the government play in reducing food waste?
- What are the biggest opportunities going forward?

The semi-structured interview format allowed consistency in questions and subsequent analysis across interviewees, while permitting follow-up questions to explore participant responses more thoroughly. The seven key themes that emerged from the interviews are presented below.

3.1 Lack of clear, commonly agreed upon definition of food waste and measurement approach

The interviews confirmed that there is no commonly agreed upon definition of food waste in Canada. Therefore, an effective approach to measurement of food waste and its impacts does not exist. Instead, concepts like waste, loss, yield, scrap level, and shrink are lumped together. Food waste and organic waste (which may include, for instance, dead plants and plant waste) are used interchangeably. It is not clear whether food waste should include edible parts only or inedible parts too. The same applies when distinguishing between preventable and unpreventable waste. It is also unclear whether or not organic waste from wastewater treatment should be included in measurements. Lastly, there is no agreement on whether or not food donations should be considered waste and incorporated into the measurement and reporting of food waste along the value chain.

Without a clear definition of food waste and the ability to measure, along with clearly defined waste management routes, it is not possible to objectively and accurately benchmark business performance. Maximizing the value of insights is challenging without these building blocks. Common definitions are critical to objectively and accurately measure the impact of food waste reduction initiatives on businesses, the home, the environment, and society.

3.2 Food waste is not a high priority for all businesses

Interviews began by asking how significant businesses consider the overall food waste issue to be for them, particularly from a financial perspective. Some businesses view the cost of food waste as \$70 per tonne²¹, the cost of the waste disposal fee. While these businesses are considered to be in the minority, many businesses share similar sentiment. Most commonly cited reasons as to why businesses do not consider food waste important include:

²¹ This is an estimated average for Ontario.

1. Business are not aware of the extent of food waste;
2. Businesses believe it is cheaper to dispose of food waste than to manage it in a way that drives reduction, reuse, or recycling;
3. Businesses fail to connect the dots, i.e., they do not tie food waste to costs, such as the costs of raw material, electricity, water, labour, and production capacity; and
4. Businesses do not understand that change is possible.

Businesses that perceived food waste as an important issue cited several reasons, including

1. True costs – the realization that the true cost of waste extends far beyond disposal fees and includes the cost of raw material plus all value added in the process (i.e., the cost of water, energy, labour, production capacity, etc.);
2. Slim margins – with slim margins, reducing waste and costs can mean the difference between profit and loss;
3. Brand equity – businesses, in particular those operating in premium markets, view the strength of their brand as reliant on the production of consistently high quality products and cannot afford recalls or negative public perceptions;
4. Differentiation strategy – how a business manages food waste can send a strong message to consumers and help differentiate businesses from competitors, and
5. Corporate sustainability – businesses that have a corporate sustainability mandate view food waste as an important issue.

The pioneers in proactively reducing food waste appear to share a number of characteristics. They tend to be larger businesses that incur higher disposal fees, are more sophisticated in their management systems, have more resources, and are driven by broader corporate social responsibility (CSR) mandates. The most progressive leaders are those who take action on food waste by involving the CSR team together with food engineers, packaging specialists, process engineers, finance departments, etc.

3.3 Opportunities to benefit financially from reducing food waste are real

Respondents stated that many businesses, particularly SMEs, do not perceive the link between food waste and financial performance. However, that link is very real as illustrated by Fruition Fruits & Fills, a 40-employee manufacturing plant producing fruit fillings, pastry fillings, icings and toppings, owned by Tim Hortons²². The plant implemented a waste discharge reduction project (designed by Enviro-Stewards) through participation in a program managed by the Bloom Centre for Sustainability that generated savings of \$490,000 per year. The savings were achieved through in-plant prevention measures that led to

1. 80 percent reduction in loading to the sewer,
2. 70 percent reduction of waste sent to landfill (equivalent to 43 garbage trucks per year),
3. 30 percent reduction in greenhouse gas emissions, and
4. 260 percent return on investment in the first year²³.

In addition, every year the in-plant measures save enough

1. Electricity to power 75 homes,
2. Natural gas to heat 59 homes, and
3. Water to fill 15 Olympic-size swimming pools.

The achievements of this project motivated the company and its workforce to implement further improvements in other areas of their operations, resulting in even greater financial outcomes.

²² For more details, see http://sustainabilityreport.timhortons.com/planet_corporate.html.

²³ For more details, see <http://clean50.com/project/enviro-stewards-tim-hortons-waste-discharge-reduction/>.

3.4 A wide range of waste reduction practices exists

The interviews revealed that a wide range of internal waste reduction practices are being used across Ontario's and Canada's agri-food industry, including

1. Employee training,
2. Improved food safety and traceability systems,
3. Better maintenance of production equipment (i.e., to reduce downtime),
4. Improved operating techniques (e.g., improved butchering techniques to increase yields),
5. Better control of production processes (e.g., to avoid formulation errors),
6. Improved ordering and forecasting methods and tools,
7. Product re-purposing,
8. Improved cold chain,
9. Development of zero-based waste standards (i.e., maximum value that can be achieved)²⁴,
10. Benchmarking across facilities,
11. Standardized process control replicating best practices across facilities,
12. New virtual merchandising standards in the produce department within retail stores²⁵,
13. Price reduction on blemished produce in retail stores,
14. Strict standards and operating procedures (i.e., with respect to expiry dates),
15. Vendor take-back programs, and
16. Improved distribution methods.

Respondents also cited efforts where businesses and organizations are collaborating to reduce food waste. The following practices were mentioned as most impactful from direct financial or brand equity perspectives:

1. Education and policing processes with farmers to make sure they respect medication withdrawal periods²⁶,
2. Work with suppliers on pack sizes and extended shelf-life through improved packaging,
3. Work with suppliers on reducing food miles so products get to market quicker and fresher,
4. Range rationalization²⁷,
5. Education of retail and foodservice customers on the advantages of specific sizes and product specifications with respect to food waste, and
6. Collaboration of processors and packaging manufacturers with retail and foodservice customers to improve shelf life and product presentation.

The interviews revealed that information presently shared by businesses, including information on successful food waste reduction practices, is limited in detail and scope. Helping businesses learn to collaborate and share information will be an important step toward reducing food waste.

3.5 Complex barriers to addressing food waste hold industry back

Respondents were asked to identify what was holding more businesses back from implementing food waste reduction initiatives. The barriers cited by respondents, particularly in terms of addressing food waste at the source, primarily relate to attitude. This includes how current attitudes and incentives support (versus challenge) habitual and currently accepted behaviours.

²⁴ Instead of standards built around process execution (i.e., improvement over last year's outcome). It is important to note that the amount of scientific research required to build zero-based standards is prohibitive for SMEs.

²⁵ One interviewee provided an example of new standards that led to 30% waste reduction, while increasing sales as a result of fresher produce.

²⁶ Not abiding by medical protocols leads to meat being rejected for human consumption.

²⁷ There is a trend among food manufacturers and retailers that they can increase sales through differentiation, which results in a large number of low volume SKUs. Reducing the range of SKUs, particularly in fresh food categories, can be effective in reducing waste.

Some of the barriers identified as inhibiting the development and implementation of initiatives that are effective in preventing food waste at the source included

1. Extent and nature of food waste are not known
 - a) Root causes of many businesses' food waste also remain unknown
2. Short-term management perspectives and a focus on cost and efficiency
 - a) Reluctance to invest in food waste reduction projects that require significant upfront capital or additional resources (e.g., labour) without generating immediate savings
 - b) Inherent or built-in waste in the system, mostly due to focus on overall efficiency at one point in the value chain or the production and distribution of food²⁸
3. Distance of travel for raw material
 - a) Even if manufacturers and packers collaborate closely with growers, products still travel long distances. Factors like cold chain issues and harvest date impact product quality and waste
4. Seasonal demand
 - a) Seasonality drives the need for part-time workers during peak times. There is limited time and money to train staff on how to reduce waste. Even though they are often placed in positions that do not have a major impact on production or processing, lack of training leads to increases in food waste.

Responses specifically related to barriers that impact the ability or motivation of businesses to reduce the impact of food waste through recovery as an alternative source of revenue included

1. Insufficient volume of waste, resulting in the proposed initiative being economically unviable;
2. Lack of rendering or animal feed manufacturing capacity in remote areas;
3. Infrastructure for anaerobic digestion is limited in some areas due to shortage in feedstock supply (including food waste);
4. Focus on diversion rate, regardless of how food waste is diverted (recovered as alternative revenue versus recycled).

In terms of redirecting food to charities, the following barriers were mentioned by respondents:

1. Brand protection – processors/packers that do not produce under their own brand name cannot give a product away that has a non-safety related issue (e.g., wrong coding).²⁹
2. Food safety concerns – if product has passed code date, can it still be used to feed people? Also, charities' capacity to handle food donations safely is a concern.
3. Lack of infrastructure – charities often lack the infrastructure (e.g., refrigerator capacity) needed to store appreciable quantities of perishable products.
4. Logistics – it is a challenge to get produce to charities without creating difficulties for the supplier (e.g., need for daily pick-up to alleviate pressure on suppliers' storage facilities).
5. Short shelf life products – charities are inundated with short shelf-life products (e.g., fresh baked products).
6. Religious or standard-based barriers – due to religious reasons or standards set by public institutions (e.g., School Boards having established thresholds for sodium levels), charities may be unable to accept donated food.

Other barriers identified by respondents in relation to the reduction and recycling of food waste included

1. Required technology or access to technology being cost prohibitive for SMEs;
2. Inability to segregate at the source, due to lack of appropriate infrastructure at specific facilities and/or municipalities;
3. Lack of appropriate behaviour by management (e.g., the focus on reducing easily observable costs such as labour) or employees (e.g., resistance to implementation of required processes);

²⁸ Types of waste that occur from efficiency focused behaviours include: labour, shrink, automation, inventory needs for unexpected fluctuations in demand, high merchandising standards, return systems, and management of in-store inventory by suppliers.

²⁹ Concerns of this type have led to corporate policies that prevent food donations.

4. For franchise chains, a lack of commitment from otherwise independent franchisees; and
5. Waste management built into lease agreement (e.g., restaurants inside malls, hospitals, universities). This drives the culture of these companies or institutions.

3.6 Government needs to play a role in food waste reduction

Respondents were asked about the role that government should play in reducing food waste. On the whole, respondents were skeptical about the effectiveness of regulations as a primary mechanism for reducing food waste and would not support a government led approach. Respondents view the primary role of governments to be one of motivating and enabling change. Most respondents believe that governments should be included in discussions on how to reduce food waste, with the key roles that provincial and federal governments could play in driving effective change including

1. Municipal governments should increase tipping fees to reflect the true cost of hauling waste away (e.g., from a long-term environmental perspective);
2. Municipal or provincial governments should introduce legislation that prevents organic waste from going to landfill;
3. Separate the definition of food waste from an industrial versus household waste perspective;
4. Provincial agencies and ministries should develop a common set of definitions of food waste, and associated monitoring/response practices;
5. Provincial agencies and ministries should develop a common set of food waste management routes that are consistent with food safety priorities;
6. Harmonize food waste regulations and practices across municipalities and provinces;
7. Share best practices;
8. Provide seed-type funding to support the development of programs that encourage SMEs to better track and manage their waste streams and train employees (e.g., bring back programs such as the Bloom Centre for Sustainability's On-site Technical Assistance Program for Manufacturers,³⁰ formerly the Toronto Region Sustainability Program);
 - a) Government should consider not only the costs of running the programs, but also the extra-revenues generated from taxes on technology investment and additional corporate profits that are generated as a result of these programs.
 - b) In the Fruition Fruit & Fills' case, the government contributed \$4000 through the Toronto Region Sustainability Program³¹ towards sharing the cost of conducting the assessment work that led to the \$490,000 in annual savings. These savings translated into higher bonuses for employees (the company shared a portion of the savings with its employees) and higher profits for the company. Assuming a marginal tax rate on the additional money of 28.5 percent (for the employees and the company), the savings translated into \$140,000 per year of extra-revenue to the government (i.e., almost 3,500% ROI) (Taylor, 2011).
9. Introduce school curricula to develop knowledge and skills (such as food planning, cooking with leftovers, and food preservation methods) that are important for encouraging the development of attitudes and behaviours that lead to reduced food waste;
10. As food waste is linked with obesity and the quality of food consumed, influence portion size control and nutritional advice through the development of appropriate healthcare policies; and
11. Improve communications around what "best before" and expiry dates mean in terms of food safety and nutritional value.

Encompassing an array of factors and institutions, governments are viewed as playing an important role in reducing food waste, particularly from a public good perspective, by influencing the attitudinal changes that respondents stated as being crucial to the sustainable reduction of food waste.

³⁰ Co-funding for comprehensive on-site pollution prevention assessments ended in June 2012.

³¹ The Toronto Region Sustainability Program provided SMEs in the Greater Toronto Area with a 50% cost share funding incentive (up to a maximum of \$4,000) towards conducting a pollution prevention assessment, along with technical assistance during the implementation of the pollution prevention strategy. Research has shown that the 50% cost share was a top driver for participation in the program (Granek and Hassanal, 2006).

3.7 The highest impact opportunities exist in changing management and consumer behaviour, and fostering collaboration

Respondents see three distinct opportunities to produce measurable benefits for industry, the environment, and society, by encouraging and enabling reductions in food waste. Together, they reflect lessons learned from the literature review: that implementing the industry wide changes required to achieve a measurable reduction in food waste depends on facilitating purposeful changes in business and government culture, along with individuals' attitudes at work and in the home.

3.7.1 Influencing changes in attitude and behaviour

The first opportunity is in producing the attitudinal changes required to support and enable subsequent changes in behaviour by increasing stakeholder awareness about the benefits that can be achieved from reducing food waste. Achieving this will rely on mapping activities, measuring current performance, and the ability to determine root causes along specific food value chains. This will provide detailed objective insights that can be benchmarked and acted upon. Such insights will include

1. Where are the hot spots in Ontario and "x" industry or sector?
2. What are the barriers in addressing the problem?
3. What are the interventions that have been successful and why?
4. What are proven best practices and how were they achieved?
5. How have specific businesses benefited from the identified best practice interventions and how can the lessons learned be shared with the wider industry to replicate the results?

3.7.2 Household behaviour

The second opportunity relates to where the majority of waste occurs – in the household. Respondents believe that significant opportunities exist to reduce food waste by motivating changes in consumer behaviour, especially those surrounding their purchasing decisions. Avenues that should be explored in relation to consumer behaviour include:

1. Determine if consumers are as particular about product quality as retailers believe, and, therefore, whether specifications can be modified to reduce waste; and
2. Determine whether a strong relationship exists between the practice of discounting products and food waste, and the extent to which it differs between different categories.

3.7.3 Increased collaboration

Opportunities also exist to reduce food waste by encouraging greater collaboration across the functional departments of individual businesses, between multiple businesses, and along the entire food value chain. The extent of this opportunity is shown by respondents stating that they are already experiencing a greater willingness among businesses to tackle challenges collaboratively than ever before. Motivating and enabling collaboration across the agri-food industry will rely on:

1. Proven examples and best practices of where businesses are collaborating, and the benefits
2. Training and capacity building opportunities services for businesses to enhance individuals' management capabilities; and
3. Networking and learning events, targeted at different sectors of the industry.

The focus of the report now moves to describing the working session at which findings from the literature review and primary research were presented to industry for discussion and verification.

4. Stakeholder Working Session

4.1 Objective and overview

The objective of the food waste working session held on December 17, 2013, was to commence the process of developing a coordinated and effective approach to addressing food waste in Canada. The session brought together 25 interested stakeholders (i.e., five representatives from processors, three from retail, four from industry associations, three from waste stream, two from government, one charity representative, and seven subject matter experts) to discuss the food waste challenge and identify the steps needed to move forward and begin to successfully address the food waste problem. The working session program is found in Appendix 3 and detailed outcomes from each of the four discussion groups formed during the session in Appendix 4.

The session began with an overview of why reducing food waste is important to the Canadian agri-food industry and what is currently known from a Canadian context. Materials presented included findings from the literature review, results from the stakeholder interviews, along with the draft food waste problem and stakeholder maps. Preliminary results from a survey conducted by Food and Consumer Products of Canada into the challenges and experiences of its members relating to food waste and root causes were also presented.

The presentations were followed by an interactive session at which attendees were asked to comment on the draft food waste problem and stakeholder maps. With a few minor exceptions, the maps were deemed accurate representations of the current state of food waste occurring in Canada. Delegates from other businesses and organizations, including The Packaging Association (Canada), the Recycling Council of Ontario, and the Regional Municipality of York, then provided an overview of the initiatives that they had undertaken in relation to reducing food waste.

To assist in identifying the nature and determinants of food waste within different sectors of the agri-food industry, attendees then broke into four groups. Each group focused on a different level of the food value chain – i.e., Farming and Processing, Retailing, Foodservice, and Consumers. In addition to identifying root causes and obstacles or barriers to reducing food waste in their “level,” each group was asked to propose potential solutions for high impact areas – i.e., scenarios that offered the greatest opportunity to produce measurable reductions in food waste over the short to medium terms. Each group presented their findings to the full audience for discussion. A subsequent concise discussion touched on identifying what a Canadian food waste initiative should try to achieve, how, why, and when, along with who should be involved, their roles, and how to access the necessary resources. The session concluded by proposing to form a working group to determine next steps and develop a plan for addressing food waste in Canada. Those in attendance were invited to participate in that working group.

4.2 Discussion highlights

Important points that arose during the general and group discussions are summarized below. They are not listed in order of priority.

The need for better information

- 1. Detailed studies are needed to quantify the magnitude of the food waste problem**, beginning by determining how to objectively measure food waste and its impacts.
- 2. Many of the metrics currently used exacerbate (not reduce) food waste.** One example is the tendency to gear decisions around volume and focusing on minimizing costs at one level of the value chain – often at another’s expense – versus ensuring the effective utilization of assets and waste minimization along the full value chain.

- 3. Trade-offs exist between food waste and packaging waste.** Understanding those trade-offs can help businesses make better decisions around packaging. For example, packaging can increase shelf life (e.g., bananas, cucumbers). Also, if smaller portions are desired, they have to be portion-packaged. More packaging might result in less food waste across the value chain, but methods for efficiently recovering and recycling packaging will be more important than ever.

The need for immediate and coordinated action

- 4. There is not enough activity in Canada** to address the food waste issue and current efforts are insufficiently coordinated. The most effective solutions will be those that encompass the entire food value chain versus single firm approaches.
- 5. Many of the same issues impact many levels of the value chain and are created by the same root causes.** Most differences are in how the issues manifest themselves, not their cause.
- 6. Many aspects of food waste are pre-competitive issues.** Companies that are normally competitors can work together to identify areas where they can reduce food waste and develop strategies that can be implemented across companies or an entire industry.
- 7. Businesses must shift focus** from diversion rate to waste reduction and maximizing value from food waste minus the cost of managing it.
- 8. A concerted effort** to tackle the challenge posed by food (and packaging) waste means **municipalities and other levels governments must collaborate more effectively.**
- 9. The diversion of food waste highlights important legal issues, which must be addressed by both businesses and government.** They include risk management and potential litigation if a food borne illness occurs from donated food.

Changing attitudes

- 10. Targeted research, dissemination, and training efforts are needed** to tackle the cultural and behavioural changes required to address the food waste challenge at an industry level. Ignorance and incorrect assumptions are among the key barriers to food waste reduction in food chains and in the home.
- 11. Sharing success stories will help make the business case** as to why food waste reduction is important to any company.
- 12. Food waste solutions should consider the entire range of benefits,** such as reduced disposal costs, labour, energy, and environmental impacts. Organizations could quantify the value of alternative solutions in terms of commercial value, but also social value, which is particularly relevant to the use of food in food banks, soup kitchens, and shelters.
- 13. There are opportunities to learn from other regions and other companies,** since many countries and some firms are further ahead in addressing food waste.

In addition to these shared perspectives on building an effective food waste program, a number of attendees expressed interest in participating in a working group to establish a long term food waste reduction initiative.

5. Recommendations and Next Steps

Considerable work is required before Ontario and Canada can be considered leaders in combating food waste. Comparatively little of what has occurred in Canada to date has focused on reducing waste at source, the primary focus instead has been on redirection and recycling. Reasons for this include that the latter approaches are often easier than reducing waste at the source, and that many (arguably most) businesses still do not understand how reducing food waste can markedly increase profitability. The inability to communicate the financial benefits of reducing food waste with proven examples of success is an essential area where Canada lags behind other regions. Coordinated international initiatives, such as the UK's Food Chain Centre (FCC) and Waste Resources Action Programme (WRAP), and the US Food Waste Reduction Alliance (FWRA), help provide information on the impact of food waste reduction in those countries.

The following recommendations reflect the suite of research findings presented in this report. They also reflect the need for Ontario to build the capabilities to enable businesses and the environment to profit from reducing food waste. Finally, they reflect the reality that, while resources are being invested into achieving business and industry level outcomes, the full array of opportunities will never materialize without greater collaboration occurring between industry and all levels of government. Without effective collaboration, it will also be extremely difficult to achieve the attitudinal changes that respondents stated as being critical to reducing food waste and its impact on the economy and the environment.

The following high level recommendations resulted from this study:

- 1. Establish a working group with a mandate to reduce food waste.** Directly involving the most interested stakeholders and pioneers from the start will create momentum for change.
 - a) Invitations should first be extended to the organizations and individuals that expressed interest in addressing food waste at the December 2013 working session.
 - b) Additional participants should be recruited to ensure the engagement of necessary stakeholders to achieve the group mandate. The food waste stakeholder map (Figure 2) should serve as a guide to identify the range of stakeholders requiring representation in the working group.

- 2. Catalogue current Canadian and internationally relevant initiatives on food waste.** Cataloguing Canadian initiatives and their progress is an important first step, but one that should be updated annually. This is critical to facilitate effective knowledge sharing among stakeholder groups and to avoid duplication of efforts.
 - a) The working group should catalogue current Canadian food waste initiatives to determine their scope and outcomes. Successful initiatives should be used to showcase strategies that the industry can use to make the case for food waste reduction. Unsuccessful initiatives can also provide important lessons for industry.
 - b) Consideration should also be given to international initiatives and practices that demonstrate potential relevance to Canada. The WRAP and FWRA initiatives identified in this paper should serve as a starting point.

- 3. Develop a shared definition and metrics.** The definition of food waste should serve to define the working group's goal and scope. This, in turn, will inform the strategies developed or adopted.
 - a) The working group must develop a clear, unanimously agreed upon definition of food waste. When formulating this definition, the working group should take into consideration the issues raised in Section 3.1 of this report.
 - b) Once a definition has been established, the working group should identify initial means to effectively measure food waste.

4. Develop strategies.

- a) **Reduction** - The working group should begin by identifying strategies that focus on food waste reduction.
- b) **Redistribution, recycling, and disposal** - Once reduction strategies have been developed, the working group should continue to develop strategies that address food waste with redistribution, recycling, and lastly, effective disposal.

5. Develop and conduct pilot studies.

- a) **Identify candidates** - The working group should identify businesses willing to participate in pilot studies to test the strategies.
- b) **Implement case studies** - Case studies should incorporate the following features:
 - i. **Collaboration**: A collaborative approach with strategic partnerships between government and industry, primarily facilitated by NGOs;
 - ii. **Action Orientation**: An action oriented focus, which involves the most interested players and pioneers from the start;
 - iii. **Confidentiality**: Confidential support to industry with generic results publicized widely;
 - iv. **Measurement**: Initial assessments on where and why food waste occurs that support the business case for food waste reduction by enabling businesses and consumers to track food waste and, as a result, make informed management decisions; and
 - v. **Incremental, Iterative Approach**: An incremental and iterative approach with a long term vision enables continuous improvement to process and programs.

6. Disseminate the results of the pilot studies.

Once the pilot studies are complete, the working group will use the insights gained to facilitate knowledge sharing and best practices:

- a) **Public**: Communicate the results of the pilot studies to the public to raise awareness and set the foundation for consumers to reduce household waste;
- b) **Industry**: Share information about the extent and nature of food waste in the value chains studied with the entire industry to help businesses build the case for food waste reduction; and
- c) **Government**: Inform governments on the private and public benefits of implementing legislation and developing programs that can drive reductions in food waste along the value chain.

Following the evaluation and communication of pilot studies, the working group will be well positioned to identify priorities going forward.

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Appendices

Appendix 1. Reports and achievements of foreign food waste reduction initiatives

WRAP's reports relevant to Canada:

- Understanding Consumer Food Management Behaviour (July 2007)
- Helping Consumers Reduce Fruit and Vegetable Waste (September 2008)
- Seal Integrity and the Impact on Food Waste (March 2009)
- Waste Arising in the Supply of Food and Drink to Households in the UK (March 2010)
- Reducing Food Waste through Retail Supply Chain Collaboration (March 2011)
- Opportunities for Resource Efficiency in the Food and Drink Sector (June 2011)
- Resource Maps for Fresh Meat across Retail and Wholesale Supply Chains (June 2011)
- Fruit and Vegetable Resource Maps (June 2011)
- Food Waste Collections to SMEs: Developing the Business Case (June 2012)
- Waste Mapping Guide (March 2013)
- Self-Assessment Review for Food and Drink Manufacturers (March 2013)
- Estimates of Waste in the Food and Drink Supply Chain (October 2013)

FWRA's accomplishments to date:

- Proactively brought three major food associations together (2010)
- Undertook first assessment (Tier 1) of food waste based on publicly available data and interviews with selected members of the GMA/FMI Leadership Committee and key external stakeholders (March 2012).
- Undertook second assessment (Tier 2) of food waste from manufacturers, retailers and wholesalers based on primary data collected directly from companies (April 2013). Data was collected via a survey of targeted FWRA members in the manufacturing and retail/wholesale sectors; restaurant data will be captured in the next iteration of the survey (results are expected to be published in the spring of 2014).
- Emerging Solutions and Best Practices subcommittee to release Best Practices Guide for companies to increase food donation and reduce food waste to landfill (to be published in the first quarter of 2014)
- Emerging Solutions and Best Practices subcommittee to identify some of the new technologies that companies can pilot or adopt to reduce the amount of food waste generated, increase nutritious food sent to donation, and recycle unavoidable food waste by diverting it from landfills to beneficial alternatives like compost, animal feed, or energy.

Appendix 2. Organizations and individuals interviewed

Processors/Packers	
Maple Leaf Foods	Anne Tennier, VP Environmental Affairs
Pride Pack	Gary Turner, VP & GM
VG Meats	Cory Van Groningen, Co-owner (also President of ON Independent Meat Processors Association)
Weston Foods	Walter Kraus, VP, Environment & Corporate Responsibility (also Member of Baking Association of Canada and Provision Coalition Board Member)
PepsiCo Foods Canada	Helmi Ansari, Director Sustainability and Productivity
Retailers	
Loblaws	Sonya Fiorini, Senior Director Corporate Social Responsibility
Longo's	Mike Longo, VP Fresh Merchandising
Food Service	
Loblaws	Sonya Fiorini, Senior Director Corporate Social Responsibility
Longo's	Mike Longo, VP Fresh Merchandising
Consumers	
My Sustainable Canada	Tania Del Matto, Executive Director
Charities	
Food Banks Canada	Craig McGurn, Manager National Food Sharing Jennifer Beech, Program Coordinator
Waste stream	
Recycling Council of Ontario	Jo-Anne St. Godard, Executive Director
Subject matter experts	
	David Smith, former VP Sustainability Sobeys & VP Marketing Whole Foods
Deloitte	Valerie Chort, Sustainability Lead Deloitte Canada Olivier Jan, Director Deloitte France
Enviro-Stewards	Bruce Taylor, President
University of Guelph	Ralph Martin, Loblaw Chair in Sustainable Food Production Michael Von Massow, Assistant Professor Hospitality and Tourism Management

Appendix 3. Food waste working session program (December 17, 2013)

Objectives of the session:

- Validate food waste stakeholder map and problem map
- Explore findings from this research and research from other organizations
- Explore root causes and barriers regarding food waste
- Identify high impact solution areas to focus on in 2014
- Identify potential participants for future working groups

Main components of the meeting:

- Welcome and set up, participant introductions, and note on reason for gathering
- Overview of research findings: context, what researchers found and what it might mean
- Industry activities: overview of other waste projects and data (Food and Consumer Products of Canada, The Packaging Association (Canada), other)
- Group discussions
 - What are the root causes of food waste?
 - What are the obstacles or barriers to solving?
 - What are the high impact areas to focus on for solutions?
- Reporting of group discussions
- Building a roadmap for action
 - Discussion on solutions:
- Who are the high influence stakeholders?
- What are the key information gaps?
- What are some recommended approaches?

Appendix 4. Breakout session discussion notes

This appendix includes a summary of the breakout session discussions from the working session on December 17, 2013. The objective was to capture the key points from discussions, which would form an input to the working group. There was insufficient time to delve into each of the topics.

Farm to processing sector discussion

The discussion focused on waste from farm through processing but also on the impact of decisions at that level on managing food and associated waste through to distribution to retail and foodservice. *An opinion was voiced that the amount of waste shown on the map at distribution is low.*

Overarching theme

There was a general agreement that the amount of food waste that currently occurs from field through to processing and packaging results from inadequate incentives for change. The two most visible issues resulting from inadequate incentives are ineffective **management** and the lack of investment in appropriate infrastructure.

Management

Farm Management: Participants believed that the amount of waste that occurs both on farm and post farm gate predominantly stems from three interrelated management factors:

- Many issues stem from long production cycles and a reluctance to incur high production changeover costs as farmers struggle to run commercial businesses. This can result in produce not being sufficiently “fit for use,” which, in turn, impacts their customers’ operations.
- Differences in the type and size of farms have reduced agriculture’s ability and motivation to develop effective on-farm management practices.
- Differences in the scale and capacity of farm enterprises may be incompatible with the scale of highly concentrated processing and retail channels, resulting in significant field and/or post-harvest losses where product flows are uncoordinated.

Process management: The extent of food waste that occurs in processing plants primarily stems from a number of factors:

- Management is mostly focused on minimizing the effects of food waste, not reducing waste over a sustained period of time.
- There is ineffective communication of standards and requirements from processing to farms.
- SMEs lack the knowledge and resources (both human and financial) required to implement effective waste management practices.
- Many businesses are reluctant to change behaviour because they do not have the appropriate standard operating procedures or “guidelines,” so they stick to what they know even if they know it is producing suboptimal outcomes.
- Product specifications are too rigid or impractical.
- There is unwillingness by farmers to consider how making changes for environmental considerations may alter a crop’s appearance without impacting taste or shelf-life.

Knowledge

Two groups could play a larger role in providing managers with the knowledge and motivation to reduce food waste. However, service providers and public servants who could provide advice often lack the knowledge required to motivate the adoption of appropriate management behaviours.

The most impactful gap is a base of knowledge required to address the attitudinal silos and the resulting disconnects that exist along the value chain. Addressing this deficit in knowledge will rely upon proving the business case for reducing food waste by the following:

- **Effective metrics and measurements**
 - Current metrics are geared at volume and cost at one level of the value chain, rather than the effective utilization of assets along the value chain. For example, decisions on the farm may be based on maximizing crop yield versus maximizing the internal qualities that matter to a processor.
 - Systems and service providers do not provide accurate measurement of waste and its impact on performance. For example, waste audits do not provide reports such as “This is where the waste occurred, this is why it occurred and how it cost you money in unnecessary cost or lost margin, etc.”
- **Sub-optimal category management**
 - Improving forecasting as part of category management. One example of best practice is retailers that have established a benchmark where 80 percent of their anticipated demand is locked in, with the remaining 20 percent of anticipated demand fluctuation being filled when an order is actually placed.
- **Training**
 - Creating the skills and confidence to reduce food waste, particularly at source, by more effectively managing the determinants of quality - such as genetics or harvesting practices.

Infrastructure

Many processors (both SMEs and large corporations) know that they can reduce the amount of food waste that they produce, though do not act on the opportunities. The primary reasons cited for this include

- Ineffective support, from a pre-competitive perspective, by industry associations and governments (the latter of which is exacerbated by difficulties in strategically coordinating municipal, provincial and federal agendas);
- Lack of collaboration between municipal, regional, provincial, and federal governments on the definition of waste, waste stream management, and associated regulations;
- Processors unable to install the optimum equipment as corporate office is more focused on the hurdle rates to recoup the investment, especially when there are more obvious (and financially rewarding) demands on resources;
- Regulations with punitive tools intended to document polluting outputs and maintain a status quo add cost and complexity to installing efficient technologies;
- Infrastructure required to enable SMEs to separate their food waste from other wastes may be cost prohibitive, often because it is offered only as a “one size fits all” service;
- Funding programs targeted at encouraging businesses to invest in upgrading equipment perceived as being too complex, time consuming, labour intensive (e.g., to complete applications), demanding (e.g., informational requirements), and/or impractical; and
- Opportunities to install proven solid and wastewater anaerobic digesters exist, though technology continues to face regulatory barriers in the Canadian environment.

Farm to Processing – High potential opportunities for improvement

Discussion	Detail	Potential opportunities
Ineffective infrastructure	Current infrastructure and policies not suited to enabling SMEs to cost effectively adopt best possible waste management practices	Enable more effective management of food and packaging waste by all sizes of business
Management practices	Sub-optimal management practices occur along the entire value chain, resulting in unnecessary levels of food waste	Motivate adoption of more environmentally sustainable business practices
Packaging arrangements	Impractical or rigid packaging arrangements drive waste, particularly in perishable slower moving food items	Reduced waste in the store and restaurant
Drive innovation in meat, through improved production and consumer education	Need to reduce imbalance in demand for parts of carcass, through communicating recipes, etc. Need to communicate to consumers the hidden costs associated with producing AAA beef	Reduce waste along the value chain at source: on-farm feed, trimming and disposal of fat at processing, disposal of less desired cuts in store
Assortment optimization	Reduce the number of SKUs	Less waste at processing and in retail stores
Balanced financial incentives	Need to increase effectiveness of incentives for change. For example, only biogas operators benefit from diverting waste from landfill.	Encourage processors to divert food waste from landfill by offering additional revenue or means of offsetting costs
Establish means for effective value chain communication	Lack of connectivity along the value chain is a major cause of food waste. It also prevents the development and implementation of continual improvement programs	Sustainable food production by reducing waste at source, and enabling more effective value chain management
Best practice networking and benchmarking	Lack of appropriate benchmarking and delivery methods for motivating change through proactive sharing and application of knowledge result in continuation of the status quo	Need to prove the business case, driving more effective investment by industry and improved government programs
Category management practices exacerbate waste	Category management and sourcing arrangements that focus on driving efficiencies by maximizing volume at lowest possible cost increase waste along the value chain and in the home	More accurate forecasting and adoption of strategic management practices would help minimize food waste along the entire value chain

Retail sector discussion

The discussion around retail focused on several areas:

Donations to food banks – Food banks rely on their relationship with retail as a significant contributor to food stocks. There were several factors which play a role in donations to food banks and a number of questions were raised by participants.

- Building awareness – Ontario, where are we relative to the rest of the world/Europe?
- There are still questions around risk management and legal ramifications for donations to food banks.
- The 1994 Ontario Donation Food Act needs to be updated, a process which is currently underway. In some areas, like legal responsibility for food safety, it may be missing some protection for suppliers.
- In the US, donations are tax exempt. This is being initiated with farmers, but investigation is required to determine if more can be done throughout the rest of the value chain.
- How can partnerships with retail organizations be expanded and deepened?
- Issues with lack of access and coordination between retail stores continue to persist, especially in rural areas.
- Lack of training in retail organizations in handling food that could go to food banks means that some food is discarded rather than diverted to food banks.

The role of retail in food waste – Policies at retail and consumer preferences both play significant roles in the food waste issue.

- **Metrics and measurements**
 - Metrics are geared primarily at volume or sales per square foot.
 - What about unavoidable food waste? How should it be measured? How should it be included in the problem map?
 - Systems do not provide accurate measurement of waste into different streams. In many cases food simply is written off without keeping track of where it went. Organizations like Second Harvest actually give metrics to Loblaws to encourage diversion.
- **Due dates which are unnecessarily short increase waste – retailers and processors are risk averse relative to the threat of litigation arising from food safety issues.**
- **De-packaging issues** – Stores cannot de-package on site (for composting or anaerobic digester use). How this is managed affects the retail waste stream. Food safety regulations are devised to avoid cross-contamination from goods suspected to be a risk to food safety.
- **Sub-optimal category management**
 - Improving forecasting as part of category management
- **Lack of training** in managing food to reduce waste and to manage the waste stream.

Retail – High potential opportunities for improvement

Discussion	Detail	Potential opportunities
Focus on volume	The promotions, performance measures and incentives at retail all focus on volume and moving product. Participants were not sure whether changing this focus was possible or desirable.	Promotions like “buy 1 get one later” may help reduce consumer waste, while not discouraging sales
Assortment optimization	Reduce the number of choices – decreases inventory and food waste	Less waste at retail
Addressing inappropriate shelf life	“Sell by” versus “consume before” – in some cases consumers buy products with insufficient shelf life remaining.	Lower consumer level losses as consumers receive products with longer shelf life
Collaborating on consumer education – pre-competitive issue	As the main point of contact with consumers, retail operators can play a major role in educating consumers to reduce food waste in the home. There may be an opportunity to learn from UK retail chains. Education should deal with food safety and food waste together.	Reduce consumer waste
Improve cold chain discipline	How long is the product stored in cold rooms/cold trucks before making it to store/table? What role do handling practices play?	Improved cold chain capabilities will increase shelf life
Optimizing inflexible package size & portion control packaging	Identifying optimal packaging sizes to reduce overall waste levels – for example, sustainable seafood has made headway in this area.	Reduce consumer waste by providing more appropriate size options. This can conflict with assortment optimization.
Category management and order quantities	Better forecasting and ordering. What’s the role of economic order quantity policies in waste? Optimizing product waves – Example: what to do when overload of Californian strawberries arises when Canadian strawberries are local in June/July? Too many choices? Relate back to assortment optimization <i>Solution Example: Tesco’s Buy 1, Get 1 Later</i>	More accurate ordering could minimize waste at retail. Better planning may allow a smoother switch to domestic product in season, supporting the local economy.

Future challenges

Grocery home delivery – How will this change the food waste situation? Will Canadians shop more frequently? How will distribution overcome the geographic barriers and city planning differences? What will happen with legacy stores?

Technology – What role will new technologies play in reducing food waste such as using mobile devices/QR codes/near-field technology? More current and complete information should reduce food waste.

Foodservice sector discussion

The discussion around foodservice focused on several areas:

Opportunities are enormous. Foodservice is a \$60 billion industry, with approximately \$20 billion food purchased. Margins are slim – i.e., 4 percent on average, with only 2.9 percent in Ontario, making waste reduction extremely important.

Huge distributor influence. When approaching this sector, it is critically important to understand the context – i.e., high concentration at distributor level (90% of the market owned by two North American companies in 2012) versus low concentration in foodservice (60% of the sector is represented by independent foodservice operators). Consequently, there is substantial distributor influence on packaging, etc. and therefore a role for the distributor to help the foodservice operator track waste and look for ways to reduce it.

Stakeholders. It was believed that apart from foodservice operators (full serve represent 35% of the market, limited serve 34%, catering 6%, pubs 4%, accommodation 4%, and other 12%), distributors/ manufacturers, industry associations, waste experts/ scientists and government (e.g., Growing Forward 2 similar to WRAP) also need to be involved in addressing the food waste issue in the foodservice sector.

Lack of benchmarks. One critical issue is that baselines and industry benchmarks do not exist for wastewater, packaging, or organic waste.

Foodservice – high potential opportunities for improvement

Discussion	Detail	Potential opportunities
Track refrigeration and storage practices	There may be an opportunity to integrate food waste with utility use and food safety.	The data required to make informed decisions exists, resulting in less waste
Push packaging back to distributor	Make distributors take packaging with them, as is the case with the Fairmont Royal York Hotel does.	Aggregation of handling, resulting in reduced costs and more recycling
Better management practices, tools for independent operators	Distributors can coordinate education of independent operators on better management practices and effective tools.	Improved processes and operations, resulting in less waste and higher margins
Efficient preparation	Improve trimming and fresh portion control.	Less waste resulting in higher margins
Use of unavoidable waste	Identify ways to use the unavoidable waste.	Economic benefits to public and private stakeholders

Household sector discussion

The discussion around households focused on several areas:

- There was a discussion of whether too much blame was being placed on consumers and whether we understand the factors that drive consumer behavior (e.g., dated products, food safety concerns, consumer expectation to be able to buy everything all year long, consumer disconnect from food).
- The value of obtaining better data was acknowledged.
- It was believed that there was a role for retailers to get involved in educating consumers, along with schools and high schools (impact on both children and teachers), and organizations such as My Sustainable Canada and the Catholic Women’s League. Social media could also be used to inform consumers.

Households – high potential opportunities for improvement

Discussion	Detail	Potential opportunities
Increase clarity about date codes	Increase clarity about “use by” and “best before” dates.	All of the proposed items believed to play a role in facilitating reductions in food waste and food expenditure.
Connect consumers with farmers	Increase consumers’ perceived value of food through showing the costs and resources involved in its production	
Education regarding consumption	Educate consumers about what is normal (e.g., why toss broccoli stems?), about how to preserve local food at home, and about methane emissions from food waste.	
Buy What You Need, Use What You Buy.	Educate consumers about the value of planning and food management – purchase only what is needed and transform leftovers into “planned-overs.”	
Re-introduce Home Economics training in schools	Teach the young how to purchase wisely. Emphasize the economics part of Home Economics – how households can save money.	
Provide better consumer information at purchase	E.g., use colour codes for dating, provide clear storage instructions.	
Move to smaller, more frequent food shopping	Shopping more frequently reduces overall waste but it may be difficult to convince consumers to change.	