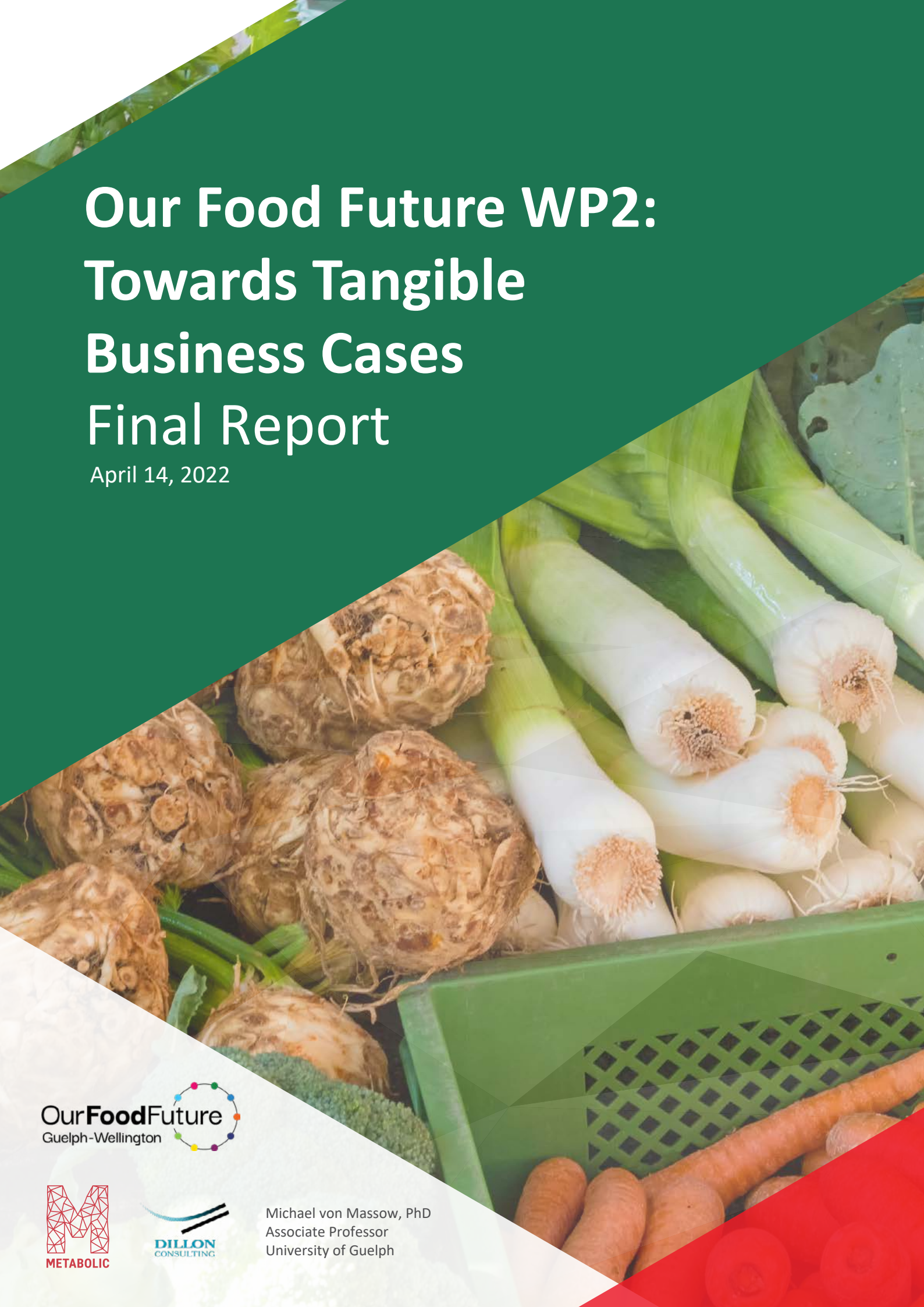
Our Food Future WP2: Towards Tangible Business Cases

Final Report

April 14, 2022



OurFoodFuture Guelph-Wellington

METABOLIC

DILLON CONSULTING

Michael von Massow, PhD
Associate Professor
University of Guelph

A Journey Towards Canada's First Circular Food Economy

The City of Guelph and the County of Wellington (Guelph-Wellington, study area) have embarked on an ambitious journey to create a local circular food economy through their successful application to Canada's Smart Cities Challenge. With funding received through Infrastructure Canada, Guelph-Wellington is implementing their vision of creating Canada's first tech-enabled circular food economy (Our Food Future). The vision involves reaching the following goals by 2025:

- 50% increase in access to affordable, nutritious food;
- 50% new circular businesses and collaborations opportunities; and
- 50% increase in circular economic benefits by unlocking the value of waste.

Dillon Consulting Limited (Dillon), in collaboration with Metabolic B.V. (Metabolic), and Dr. Michael von Massow from the University of Guelph (Consulting Team) supports Our Food Future in their journey towards achieving a local circular food system. The proposed full scope includes three Work Packages (WP):

☑ Work Package #1 (2021)

Delivering a snapshot of the food system in Guelph-Wellington by acquiring, analyzing, and interpreting over 70 data sources to map the flow of food and food waste. The final product of Work Package #1 includes a Material Flow Analysis (MFA), in the form of a Sankey diagram, which is a visual representation of the flow of resources through the food system, including both production and consumption flows.

☑ Work Package #2 (2022)

Building on the hotspots identified in the MFA, engaging with key stakeholders to develop a roadmap and identify tangible business cases to find higher value uses for avoidable and unavoidable food waste within Guelph-Wellington.

☐ Work Package #3 (2022-beyond)

Implement the following proposed business cases identified in Work Package #2 through pilot programs:

- Two pilots testing the feasibility of intervening in specific hotspot areas related to finding higher value uses for avoidable and unavoidable food waste.
- A third pilot to explore how the process laid out in these three work packages related to food waste can contribute to the adoption of circular practices in other sectors starting with construction and demolition waste. Sharing learnings and enabling other jurisdictions to replicate the pilots across Canada is a key objective of this work.

Reading guide

The next pages lay out key insights and hotspots, the approach used to select interventions, the methodology applied to build business cases and the three resulting business cases, including an explanation and assessment for each.

WP #2: From Impacts To Circular Opportunities And Business Cases

Whereas the first part of our study focused on mapping the Guelph-Wellington area's food system to identify which resource flows are most impactful, Work Package #2 aims to move from knowledge to action; its objective is to refine the learnings from a high-level data analysis, consult with local and applicable stakeholders to identify feasible business cases to pilot. Work Package #2 involved the following:

1. Identifying hotspots - areas where waste is causing disproportionate (or irreversible) social or environmental harm, or where value is lost in the production, processing, distribution, and consumption patterns. An analysis of possible interventions and their relative impact on identified hotspots;
2. Engagement with local stakeholders to identify which interventions are most suitable or feasible;
3. Ranking of interventions to identify a short-list of potential business cases for implementation through pilot projects;
4. Developing a systematic business case framework built on locally relevant variables to evaluate whether a potential intervention merits advancing;
5. Applying the business case framework to forecast the integrated economic, environmental and social/wellbeing outcomes of an intervention; and
6. Identify the unique key performance indicators for each business case that are expected to drive 'best in class' outcomes and that would be tested through a pilot phase to determine viability of scaling an intervention.

Recap: A Baseline Assessment Of The Local Food System

To know what the circular food economy will look like in the future, we must first determine where we are now. In Work Package 1, we developed a baseline understanding of the Guelph-Wellington food system by assessing the current status of organic (waste) flows in the area. To do so we have mapped the Guelph-Wellington food system from both a consumption perspective (what is consumed in the study area and where do we get these resources) and a production lens (local production and export).

The resulting Material Flow Analysis (MFA) captures the Guelph-Wellington food system and helps identify which resource flows are most impactful. **Figure 2** shows the production-based Sankey. The MFA findings can serve as a starting point for selecting circular strategies and building a roadmap with actionable business cases to close these loops. Please refer to the Work Package #1 report for all Sankey diagrams and details regarding the methodology.

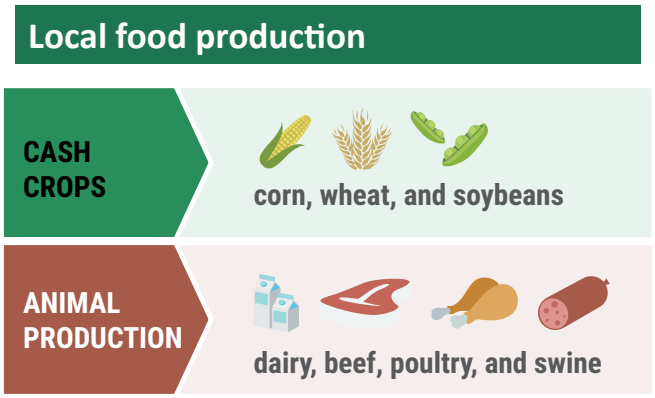


Figure 1 Conceptual Overview of the Food Supply Chain in Guelph-Wellington.

Guelph-Wellington's Production-Based Food Flows

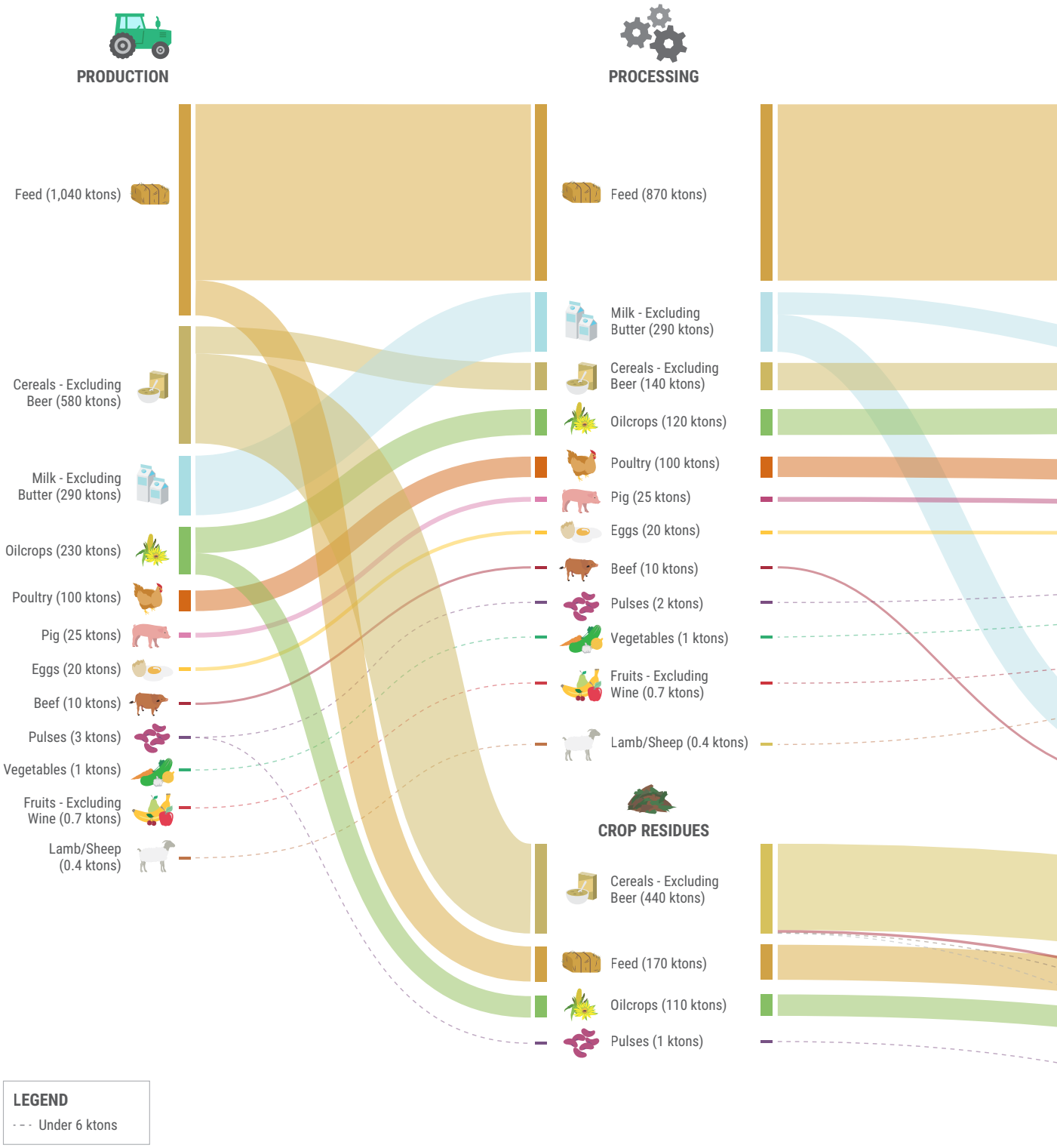
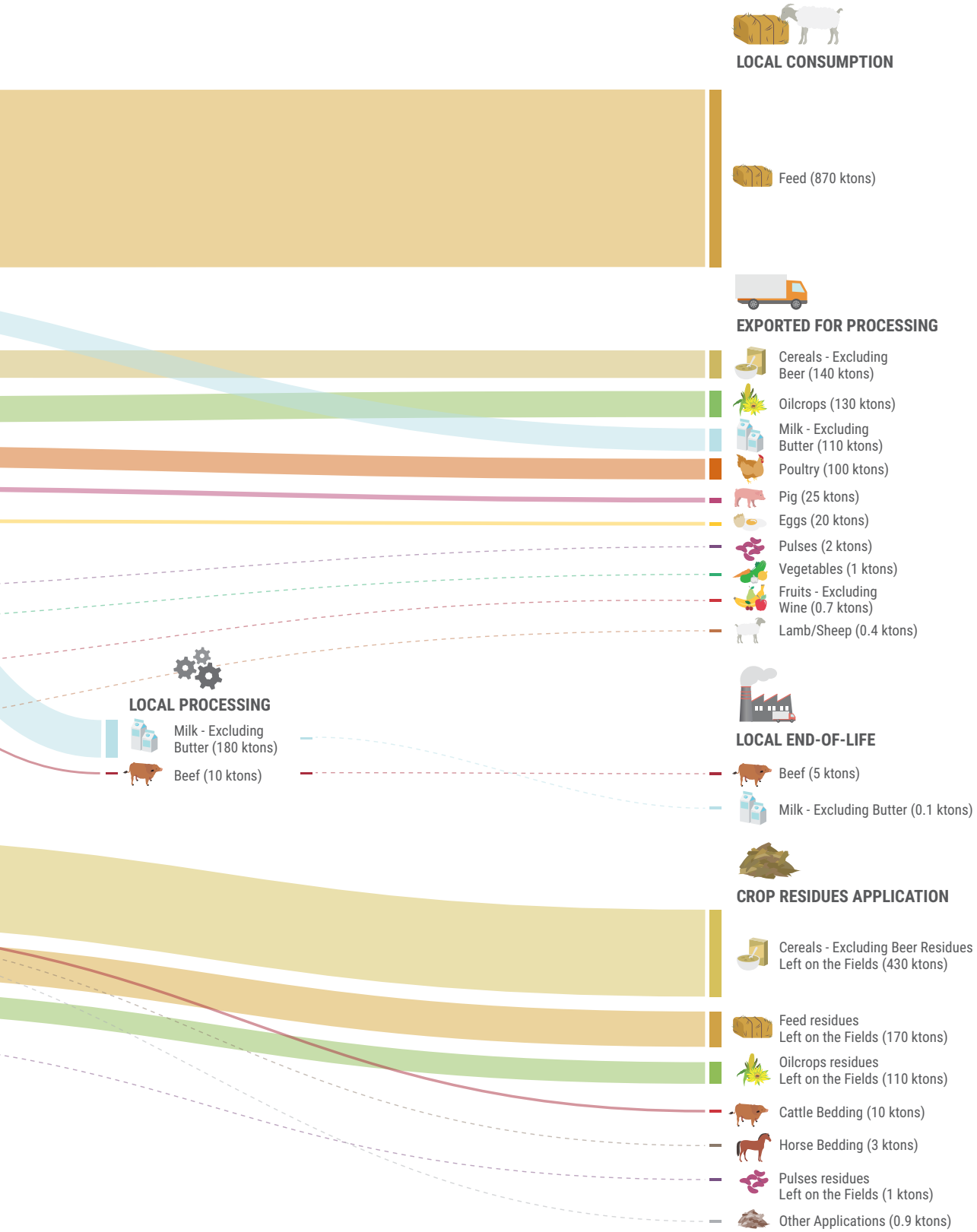


Figure 2 Guelph-Wellington's Production-Based Food Flows.

Michael von Massow, PhD
Associate Professor
University of Guelph


LOCAL CONSUMPTION
Feed (870 ktons)
EXPORTED FOR PROCESSING
Cereals - Excluding Beer (140 ktons)
Oilcrops (130 ktons)
Milk - Excluding Butter (110 ktons)
Poultry (100 ktons)
Pig (25 ktons)
Eggs (20 ktons)
Pulses (2 ktons)
Vegetables (1 ktons)
Fruits - Excluding Wine (0.7 ktons)
Lamb/Sheep (0.4 ktons)
LOCAL PROCESSING
Milk - Excluding Butter (180 ktons)
Beef (10 ktons)
LOCAL END-OF-LIFE
Beef (5 ktons)
Milk - Excluding Butter (0.1 ktons)
CROP RESIDUES APPLICATION
Cereals - Excluding Beer Residues Left on the Fields (430 ktons)
Feed residues Left on the Fields (170 ktons)
Oilcrops residues Left on the Fields (110 ktons)
Cattle Bedding (10 ktons)
Horse Bedding (3 ktons)
Pulses residues Left on the Fields (1 ktons)
Other Applications (0.9 ktons)

Identifying Key Insights and Hotspots

This step lays out key insights and critical impact hotspots from the Guelph-Wellington regional food system analysis. We define critical impact "hotspots" as areas where avoidable (e.g., rotten fruits, stale bread) and unavoidable (e.g., egg shells, vegetable peels) food waste in Guelph-Wellington is causing disproportionate (or irreversible) social or environmental harm or where economic value is lost in the regional food system. By taking these leverage points and translating them into strategic directions, we set out to find the most meaningful opportunities.

It is important to note that the highest mass of food flows does not always determine a 'hotspot'. Although this is true in some cases, it is important to take their embedded impacts into account.

The transition to a sustainable food system involves analysis of consumption and production patterns. Even though Guelph-Wellington has a thriving agri-food industry itself, if we take all food consumed into account, we enter the world of complex supply chains from farming practices to end of life covering multiple geographies. To adhere to the overarching objectives of the Our Food Future program, identified hotspots emphasize insights and impacts related to reducing avoidable and unavoidable food waste flows relevant to uncover business case opportunities within the study area. Before we dive into critical insights and impacts specific to the Guelph-Wellington food system, we invite you to look at the textbox as it provides some broader framing of hotspots in the global food system.

We have identified five hotspots relevant to reducing avoidable food waste flows and their impacts and finding opportunities to reduce or repurpose unavoidable food waste flows that would have been disposed otherwise within Guelph-Wellington.

Michael von Massow, PhD
Associate Professor
University of Guelph

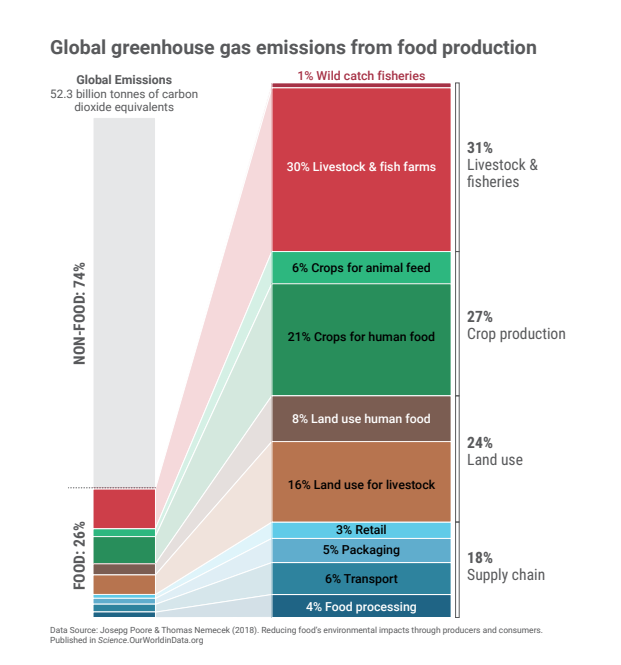
The Global Food System

The food system is fundamental to human survival, it employs over a billion people worldwide, and with a growing population will need to feed over 9 billion people by 2050. At the same time, the food sector is the main contributor to environmental problems. The ”Environment Impact of Food Production” report, published by Ritchie and Roser (2020)[1] builds on the largest meta-analysis of food system impact to date (Poore & Nemecek’s (2018)[2]. The data includes almost 39,000 commercial farms across 119 countries covering ~90% of global protein and calorie consumption. The figure on the right demonstrates the distribution of environmental impact across the supply chain:

- Global food production is responsible for **26% of global greenhouse gas emissions.**
- **6%** of global greenhouse gas emissions come from **food losses and waste.**
- **Total food impacts** due to **production** are **58%, and up to 82% when also accounting for land-use (change)** due to crop production, livestock and fisheries.

Globally, 82% of environmental impacts occur during food production. This is caused by land-use change, crop production, livestock and fisheries associated with it. A large portion of these impacts are ‘imported’ for consumption since production occurs in other countries.

Addressing unnecessary food waste is a significant opportunity to bring our food system within planetary boundaries. Inadequately designed transportation chains, over specific product standards (e.g. requirements to aesthetics/looks), as well as losses on the consumer end, contribute to approximately 1/3 of all food being wasted. This amounts to a value loss of approximately $2.6 trillion USD per year, of which $1.6 trillion are environmental and social costs (FAO, 2014)[3]



1. Hannah Ritchie and Max Roser (2020) - “Environmental impacts of food production”. Published online at OurWorldInData.org. Retrieved from: ‘https://ourworldindata.org/environmental-impacts-of-food’
2. Poore, J., & Nemecek, T. (2018). Reducing food’s environmental impacts through producers and consumers. Science, 360(6392), 987-992.
3. Food and Agriculture Organization of the United Nations (FAO) (2014). Food Wastage Footprint. https:// www.fao.org/nr/sustainability/food-loss-and-waste/en/

Production

The majority of environmental impacts occur during food production. However, from a consumption perspective, we can state that a large part of these impacts are 'imported' since production occurs in other countries/regions.

1.Local production is dominated by cereals, milk and meat

Approximately 68% of total land cover in Guelph-Wellington is agricultural and 7% is urban. Figure 3 shows that in terms of mass, Guelph-Wellington's local production is dominated by cereals and milk production. Additionally, the study area produces meat (poultry, pig, beef, and some sheep).

Figure 4 takes local production in relation to total local consumption into account. We see that Guelph-Wellington produces enough wheat and flour to fulfill its consumption needs twice.

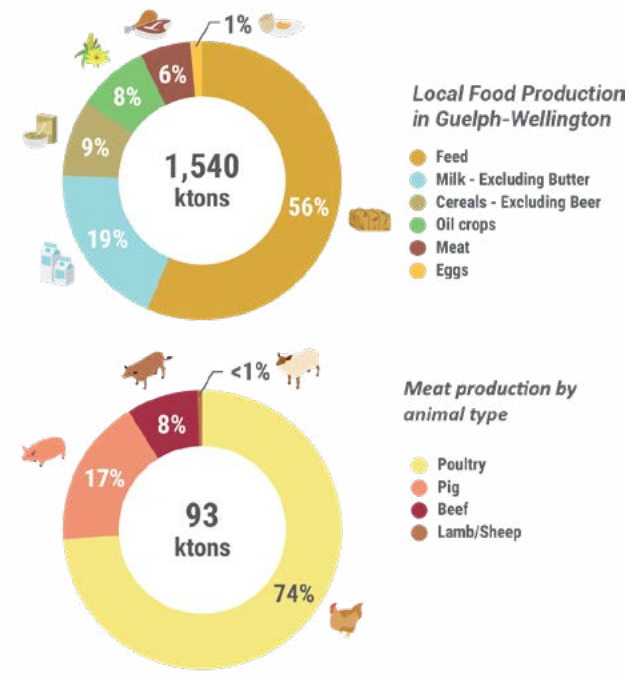


Figure 3 Overview of local production

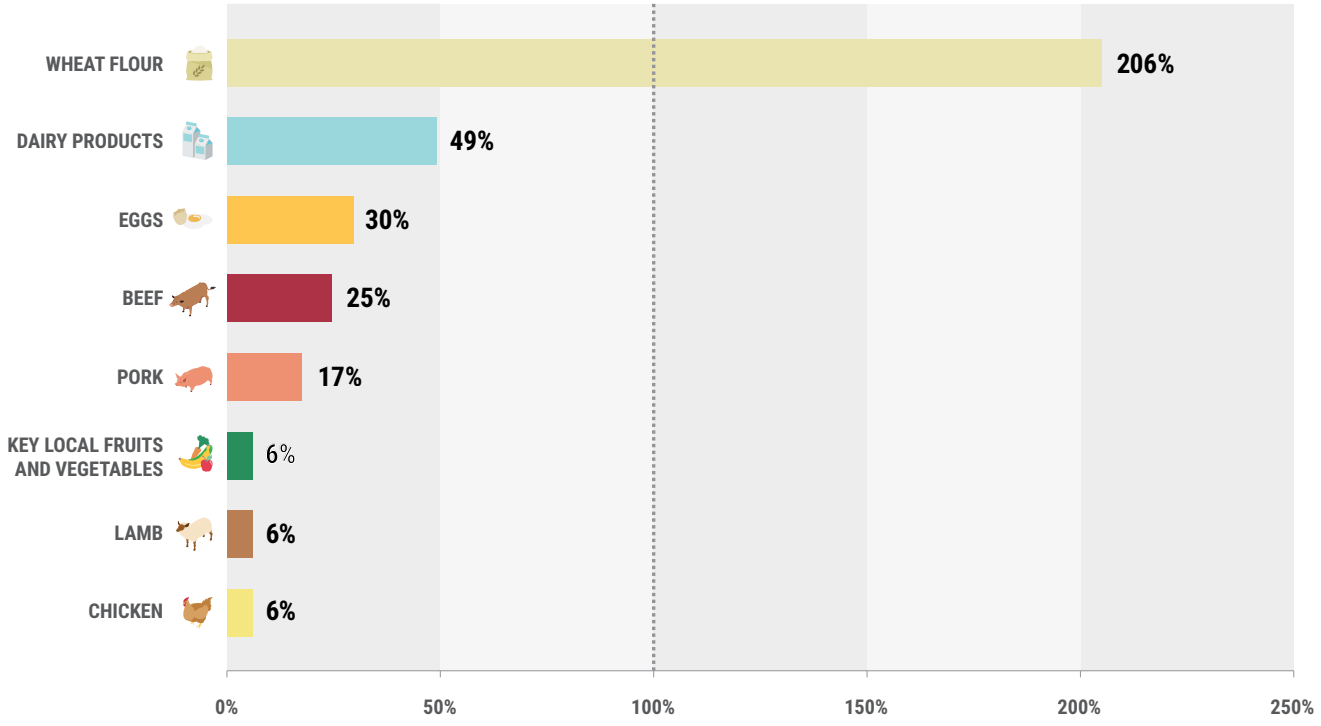


Figure 4 Level of Production & Self-Sufficiency by product in Guelph-Wellington.

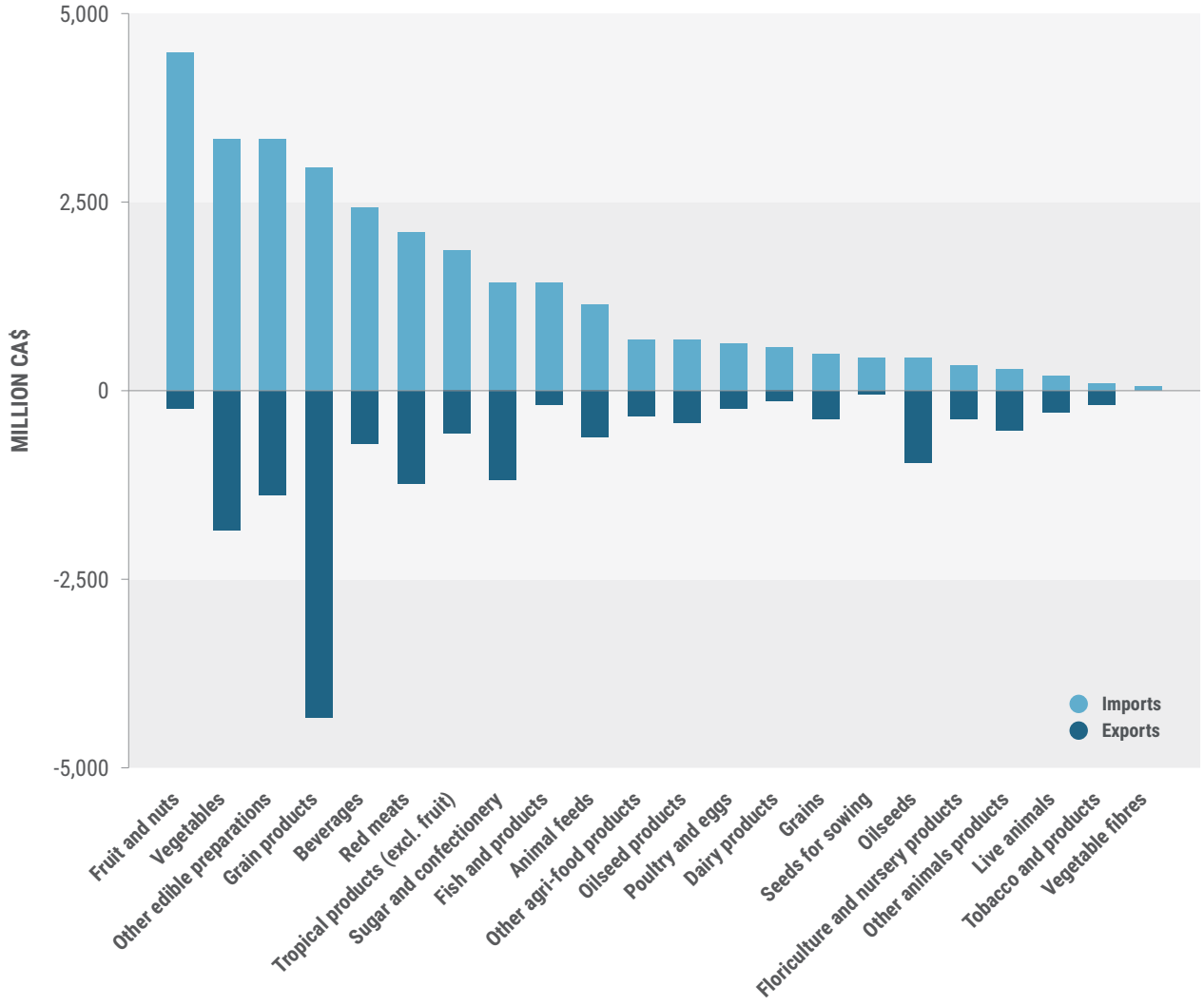
METABOLIC
OurFoodFuture Guelph Wellington
DILLON CONSULTING
Michael von Massow, PhD
Associate Professor
University of Guelph

2. Although most production is transported out of the region, some local processing occurs.

The majority of the products produced in Guelph-Wellington is transported out of the region for additional processing. Some local processing happens, mainly of milk and beef (see quantities in **Figure 2**).

3. Crop residues are often left on the field

Local stakeholders indicate that crop residue from production is often left on the field. Although this is often already repurposed, there might be additional opportunities to use this towards higher value e.g. utilizing as a resource for products. Please refer to the next chapter for additional explanation.



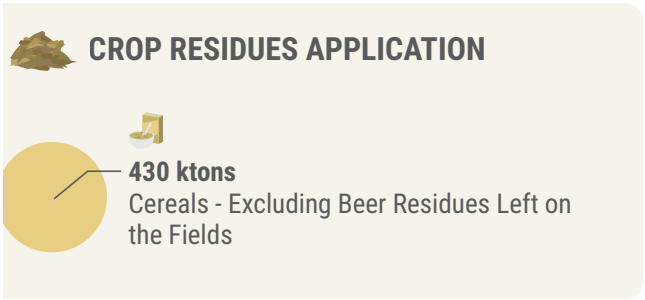


Figure 5 Import and Export Expressed in Monetary Value for Guelph-Wellington.

Consumption

4. Storage and packaging account for a large part of food losses

Storage and Packaging account for **36% of avoidable food waste** and **35% of unavoidable food waste** along the supply chains that are at the source of the food consumed in Guelph-Wellington. This is a significant portion of food losses. Approximately, half of the food losses that occur during storage/packaging and processing are avoidable. **Figure 6** indicates that the majority is related to fruits and vegetables. Since there is also a lot of food import, not all these losses happen within the region. Linking this back to local production we see that **especially cereals can be a major driver for food loss**, but generally represent **unavoidable losses.** These losses, however, could provide interesting business opportunities.

5. Households and hotels waste food that could be avoided

Households waste approximately 25% of all food they purchase, of which 67% of this could be avoided. Although both the City of Guelph and Wellington County have curbside organics collection programs (Green Cart/Bin program) that take source-separated food waste to composting facilities, there are opportunities to create awareness about the value of food to reduce the quantity of avoidable food wasted.

Additionally, **hotels and businesses waste 19% of all food** they purchase. This fraction goes to landfill directly.

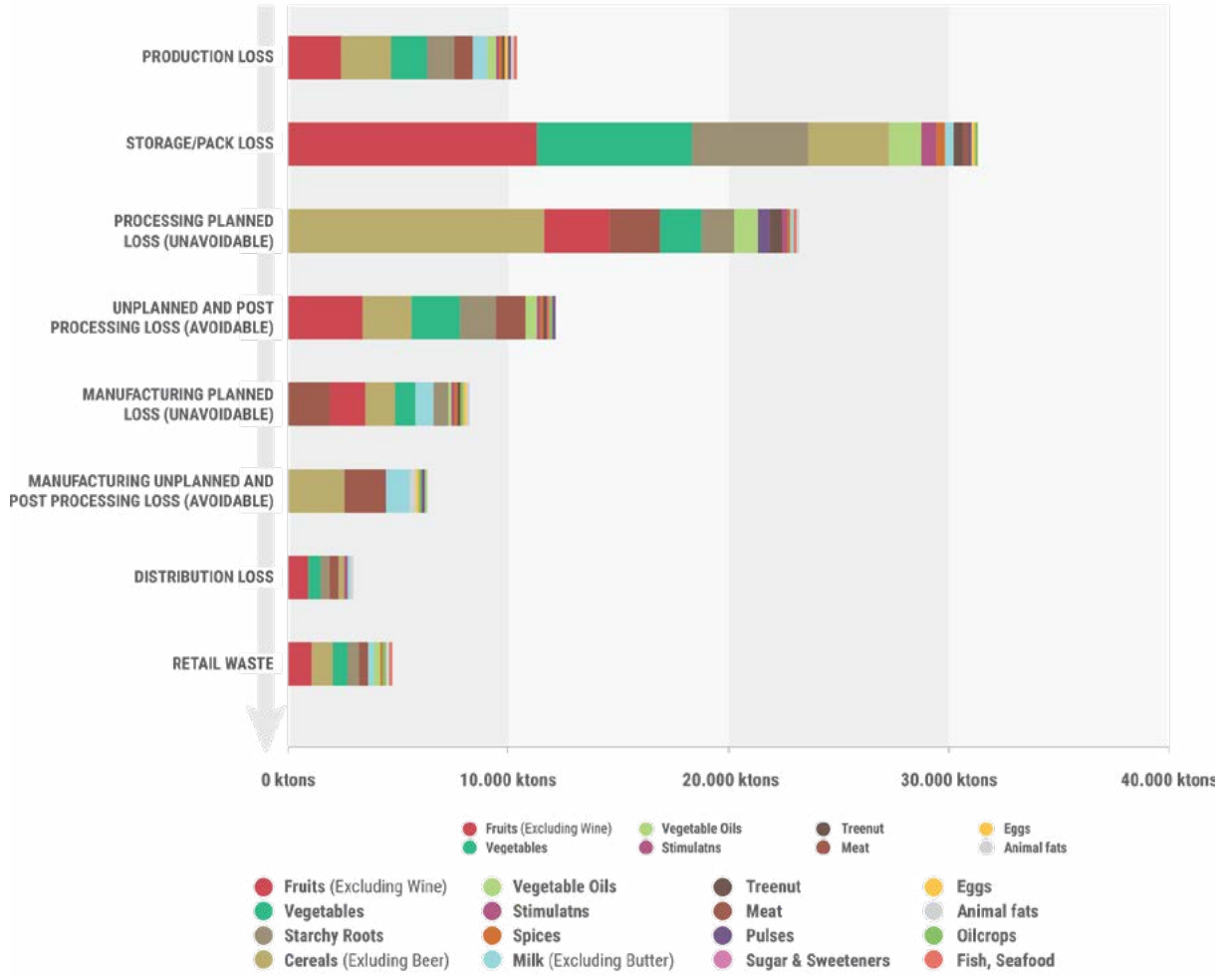


Figure 6 Food Loss & Waste through the Food Supply Chain.

Michael von Massow, PhD
Associate Professor
University of Guelph

From Impact To Opportunity

Taking the identified hotspots as a starting point, we engaged with local stakeholders in a collaborative process to identify interventions and assess them based on their relative impact and feasibility. Our team compiled a list of interventions and evaluated them in relation to the hotspots through a two-stage process:

- **Step 1:** the consulting team, local experts, and the Our Food Future team identified the most promising 13 interventions out of a list of 44 options to bring to the broader community experts for further assessment.
- **Step 2:** a group of local experts from the food community helped our team assess which interventions are most suitable for implementation within Guelph-Wellington.

Identifying Interventions And Pathways Forward

Let's start by laying out a few rules of thumb when thinking about a sustainable food system and moving to less impactful consumption patterns:

1. Consume locally produced food when possible.
2. Mitigate impacts from consumption where possible by sourcing food products from certified/sustainably sourcing producers.
3. Prevent food waste along the whole value chain
4. Use by-products and unavoidable food waste through the most high-value option available. (see **Figure 7**).

The Food Waste Intervention Hierarchy is a useful tool to consider the role that each potential intervention can play in food system transformation. In our process towards a more circular food system, we aim to select the intervention highest in the hierarchy. The top of the hierarchy is to prevent avoidable food waste followed by reusing avoidable food waste. Cascading means to repurpose/reuse/recycle/recover unavoidable food waste flows within Guelph-Wellington that would have otherwise been disposed.

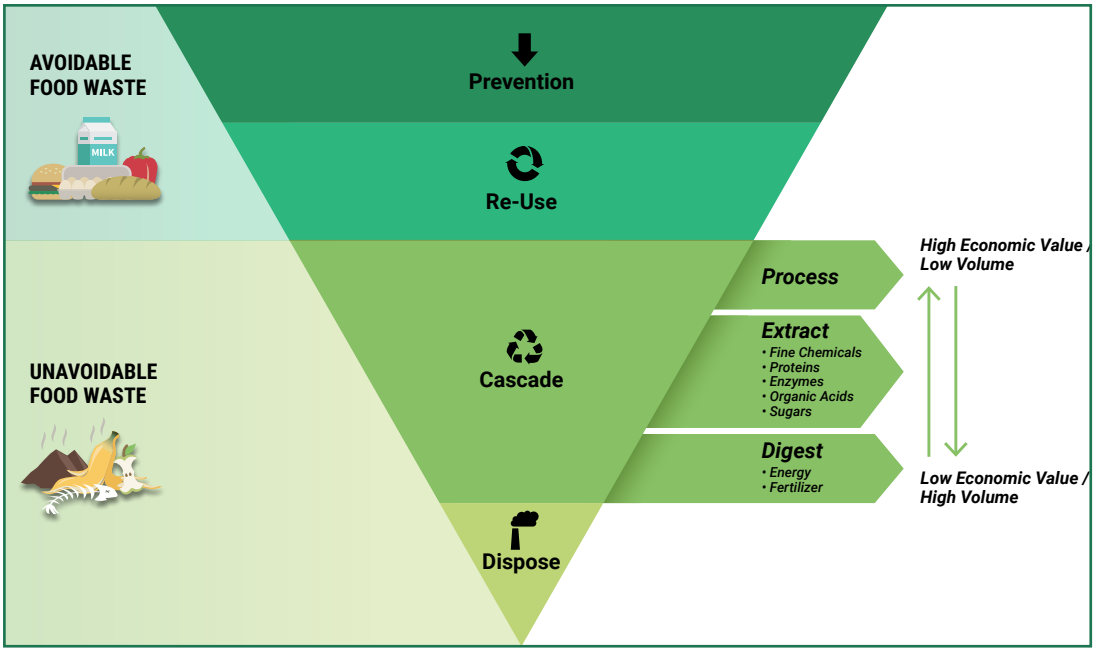


Figure 7 The Food Waste Intervention Hierarchy.

What Have We Heard?

In a workshop on September 29, 2021 a diverse group of relevant stakeholders active in the food sector in Guelph-Wellington came together to:

- Give feedback on our first result of the study in which we mapped the flow of food produced, consumed, and wasted in Guelph-Wellington and selected food waste 'hotspots' across the regions' food system; and,
- Collaboratively select interventions that could be progressed further by developing business cases and potential pilot projects. To do so, we used the Food Waste Intervention Hierarchy and the principles of the circular economy in which we favour interventions to prevent waste, re-use it, and cascade it (see **Figure 7**). In this workshop, we asked participants to indicate which proposed solutions would work in Guelph-Wellington and potential barriers they saw for implementation.

In preparation for the workshop, the project team assessed the selected 13 interventions on their potential impact on achieving a more circular food system. In conversation with the Our Food Future team, we selected a group of knowledgeable and local experts to assess the feasibility and opportunities around the proposed interventions. **Figure 8** provides a listing of the materials selected for potential interventions.

During the workshop, participants were split into two groups to assess the potential interventions. The first group focused on reducing food waste and reusing unavoidable waste streams and the second group started with options for cascading resources flow.

Figure 8 Proposed materials selected for interventions for Guelph- Wellington.

From Longlist to Actionable Interventions

Using the feedback provided by workshop participants and further discussions with the Our Food Future team and local stakeholders, the long-list was condensed into five preferred interventions. These actionable interventions were selected based on their feasibility, level of effectiveness in addressing the hotspots identified in the MFA, and community enthusiasm for implementation in the region (see **Table 1**).

Table 1 An overview of short-listed interventions.

Short-Listed Interventions	Objective
Insect-Based Feed	Use insects, such as Black Soldier Flies, as a protein source for feed for animals.
Food Rescue Logistics Innovation	Divert edible food away from end of life waste streams by pairing points of food loss along the value chain with food processors or consumers.
Crop Residue Reuse Opportunities	Assess the value of repurposing corn residues, such as straw, for the manufacture of bioplastics and other biorenewable materials.
Whey Protein Resource Optimization	Assess process optimization in the dairy industry, and more specifically, identify new outlets for whey protein and whey lactose to prevent current oversupply from being wasted.
Organic Waste Logistics Innovation	Address urban demand for high frequency organic waste collection while producing a high energy feedstock to increase gas production at rural anaerobic digestion facilities. Consider that high energy feedstock could improve return on investment for rural owners of on-farm energy assets while addressing urban waste management needs.

Towards Business Cases

The project team considered five interventions as viable pilot projects and evaluated them based on their value proposition and potential to be piloted as part of Work Package #3.

Moreover, criteria for selection included asking the following questions:

- Does the intervention align with the findings of the MFA (i.e. would the business case have an impact on an identified hotspot)?
- What would be the relative impact of a proposed pilot to greenhouse gas emissions?
- Are stakeholders or community members involved?

The Our Food Future team selected two interventions based on information provided by the consulting team, while also considering alignment with the Guelph Solid Waste Management Master Plan, the Wellington Solid Waste Services Strategy, other municipal strategies, and other Our Food Future initiatives. The resulting business cases represent viable pilot studies, in alignment with requirements to obtain funding through the Federation of Canadian Municipalities (FCM), for Our Food Future to pursue in Work Package #3.

The final three business cases were identified as

- Existing Platforms;
- Source-Separated Organic Waste Logistics Innovation and;
- Repliating Study Methodology for Construction and Demolition Waste.

It is noted that the pilots pursued in Work Package #3 are subject to change.

Building a Business Case Evaluation Framework

Advocacy for action requires more than a relative ranking. Activating a solution requires a discrete justification for a specific action and a clear assertion of how the action will create a measurable benefit in the near future.

Business cases provide a mechanism for a community to not just assess the relative value of an intervention, but also to assess whether a potential intervention or action merits advancing or whether it should be set aside. The business case provides a rationale for action in a broader context of competing objectives and priorities. Building the business cases, consequently, involved a more in depth analysis based on locally relevant factors, as compared to the preceding steps.

Building on the initial phases wherein Our Food Future identified a number of interventions for further exploration and compared the relative extent to which interventions enhanced the circularity of the Guelph-Wellington food system, the business cases evaluated each selected action or intervention's specific economic, environmental, and social costs and benefits on a standalone basis and forecasted the expected outcomes of implementation. By exploring these in more detail, the business case provides additional insight into a go or no-go decision. In developing the business case methodology, the consulting team was mindful of the community's interest in replicability. The business case template can be reapplied to other interventions in the future.

To calculate the impact of interventions we identified the factors presented in **Table 2** as relevant business model inputs.

Table 2 Key business Model Variables.

Factor	Unit of Measure	Description
Incremental Organic Waste Diversion	Tonnes	This factor represents the total additional tonnes of food available and loss that can be prevented.
Ceiling Limit for Diversion	Tonnes	Captures any system-specific restrictions that would limit local capacity to beneficially reuse incremental tonnes diverted. The inclusion of this factor prevents the over-estimation of intervention impact by considering both the need to prevent loss and create an outlet for beneficial reuse.
Waste to Resource Conversion Factors	Intervention Specific	Depending on the nature of the intervention, different factors apply to represent the efficiency of waste to resource conversion. For example, biogas generation rate would be a critical factor for food waste used to generate renewable natural gas, whereas spoilage rate would provide an indication of the efficiency of food redirection platforms to get resources to end users within the time window for rescue and/or beneficial reuse.
Baseline Emission Factors	Tonnes CO_2e / baseline unit production	Local and generally accepted emission factors were used to establish baseline emission profiles to compare intervention to the status quo. For example, Ontario's emission factor was used for electricity generation, 4.0 x 10-5 Tonnes CO_2e. Other relevant factors include emissions per tonne of waste landfilled, emission related to fuel usage and emissions related to refrigeration and food storage.
Incremental Cost and/or Cost Savings	$ / Tonne Waste	The incremental costs or cost savings related to an intervention was assessed on a per tonne basis and evaluated as a cost variance (positive or negative) relative to the current per tonne cost of municipal waste disposal.
Green Energy Value	$ / kWh	Locally applicable rates for green energy generation.
Cost of Carbon (Option to Consider Economic Impact)	$ / Tonne CO_2e	Though carbon emission reduction or increase is primarily an input to measure environmental performance, an option was built into the economic model to consider the economic impact of a reduction or increase should a cost of carbon be applied. This analysis requires a cost per tonne of CO_2e. A range of $0 - $130 was used to reflect federal projections and targets.
Social Wellbeing Objective Addressed	# of Objectives Addressed	Count of social objectives addressed by an intervention.
Program Reach	# of Community Members Reached	In order to scale the social impact, a measure of the number of people reached by an intervention was used.

Towards A Circular Food System: Three Business Cases

The consulting team assessed the five preliminary interventions and narrowed the list down to two for business case development: one on food rescue logistics innovation and another on organic waste logistics innovation. At the same time, Guelph-Wellington became aware of an exciting opportunity to test the replicability of this study's methodology for a different material stream: construction and demolition waste. Since the third pilot is more process focused we have only included quantitative results from our business case modeling for the first two pilots. The intention of the defining business cases at this stage (WP#2) is to determine the potential impacts of implementation and as such, ranges are provided. The purpose of the pilot program (WP#3) will be to narrow in on the results. Please refer to the table in the next chapter for an explanation of the KPIs presented.

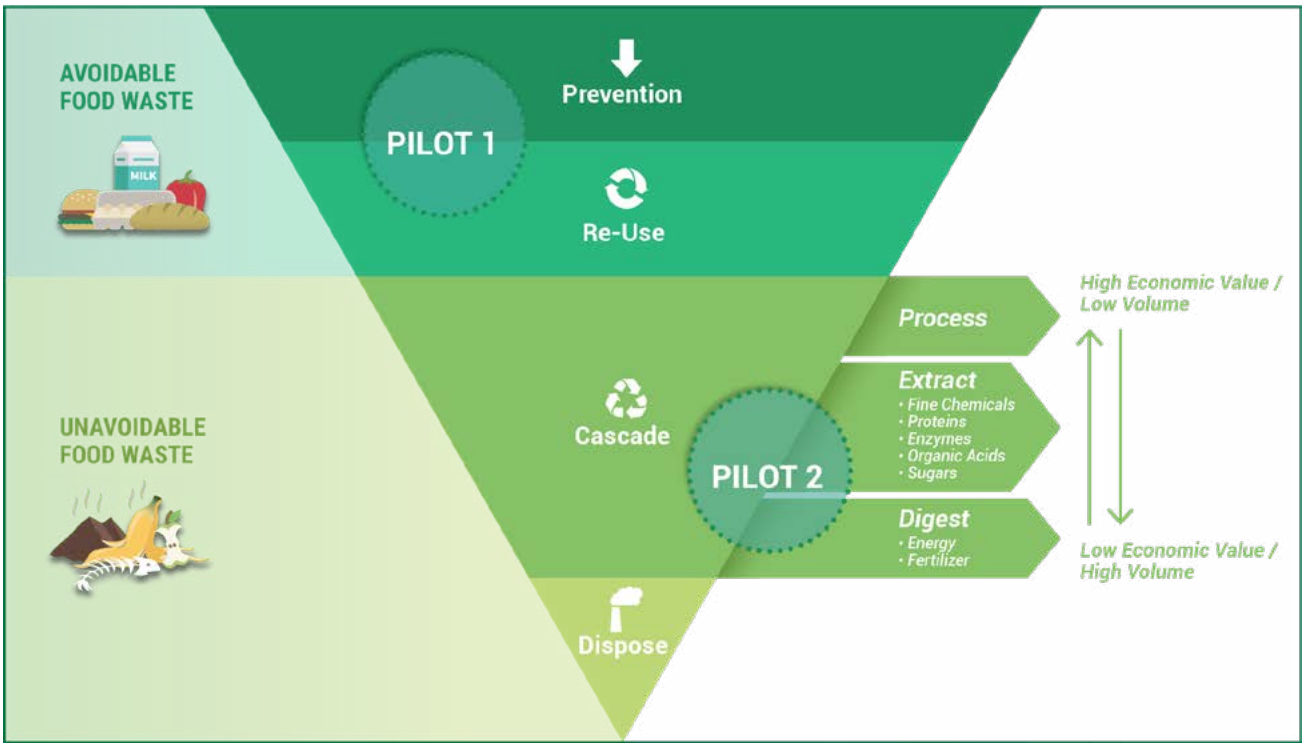
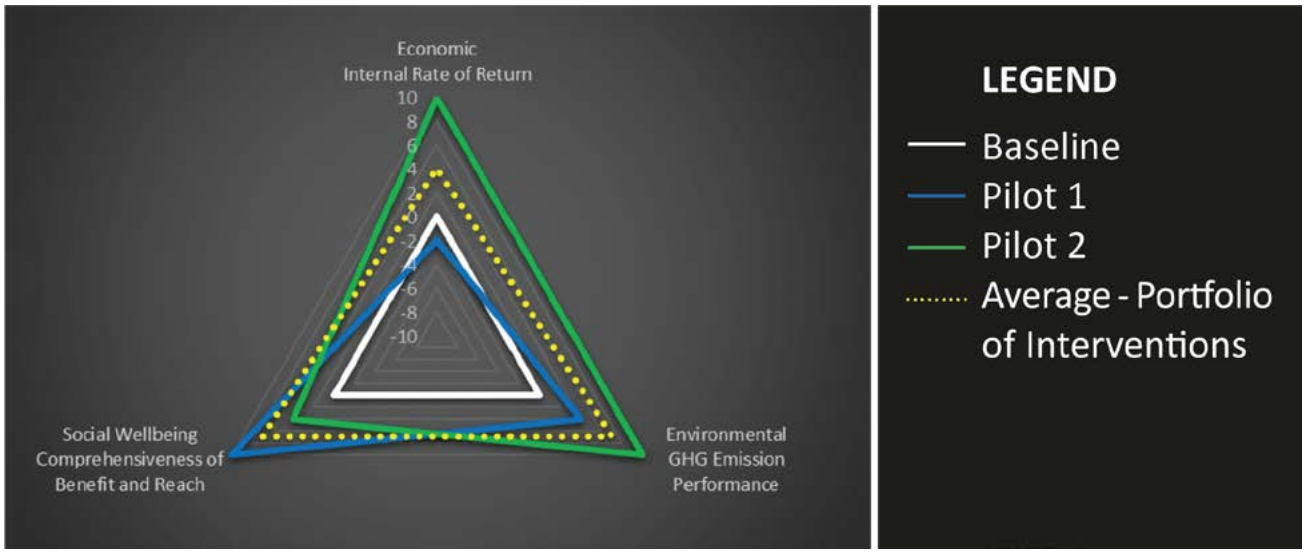


Figure 9 Pilots Mapped on The Food Waste Hierarchy.

Figure 10 Triple Bottom Line Intervention Assessment.



Pilot 1 Enhance Existing Platforms

Our Material Flow Analysis indicated that 25% of all food purchased by households in Guelph-Wellington was wasted. Of this 2/3 could be avoided. This intervention aims to amplify efforts made to this waste stream and make food redirection platforms more accessible to better redirect food waste to end-users that can consume, reuse, upcycle or recycle it. The pilot will estimate baseline conditions of existing platforms using metrics such as number of users, quantities of food diverted from disposal. Employing different tactics can increase awareness and participation with existing platforms (e.g., food rescue, ReSource Exchange) and increase diversion opportunities. This can include platforms that support the capture of food, and the reduction of food waste, from both non-residential and residential sectors. Metrics will be monitored and measured throughout the pilot program, and altering tactics can increase desired results. Workshop participants indicated an interest in finding more ways to rescue nutritious foods and supporting organizations to make procurement decisions based on specific impact objectives (e.g., reducing the carbon footprint of purchased food).

Proforma model results:

- **Internal Rate of Return:** -10% to 10%
- **GHG Impact:** Nominal increase in GHG emissions as incremental transportation emissions > diversion emission reductions.
- **Social Impact:** 90% of Target Wellbeing Reach - Significant increases the accessibility of existing platforms by addressing technological, reporting and logistical constraints and barriers.

* Note that Pilot 2 results are complementary to Pilot 1. Together they provide a comprehensive and balanced economic, environmental and social benefit.

Pilot 2 Source-Separated Organic Waste Logistics Innovation

This intervention aims to improve food waste systems in the City of Guelph and Wellington County. The solution reduces unavoidable food waste, which typically has a low economic value and is available in a high volume. The pilot means to increase the economic value of food waste by harnessing its energy potential through anaerobic digestion processing and electricity generation.

Restaurants in downtown Guelph require high-frequency organic waste collection. At the same time, having sufficient return on investment can incentivize rural anaerobic digestion facilities to invest in on-farm energy production systems. This intervention can accomplish several objectives, including:

- A solution for restaurants to further participate in organic waste collection;
- Increase organic waste processing capacity;
- Improve the return on investment for rural organic waste processors who invest in capital assets to generate electricity; and
- Improve the quality of the final nutrient product generated from organic waste processing.

Proforma model results:

- **Internal Rate of Return:** 30% - 50%
- **Potential GHG Impact:** 1300 - 1800 Tonnes CO2e Emission Reduction annually
- **Social Impact:** 20% of Target Wellbeing Reach - Driven by improved access to waste diversion solutions for small and medium sized businesses in the downtown core and improved utilization of rural energy generating assets through improving the generation and availability of biogas.

Pilot 3 Replicating Study Methodology For Construction And Demolition Waste

The Our Food Future team became aware of an exciting opportunity to validate the processes used to identify, evaluate, select and mature circular economy interventions through the Food Waste Flow Study. Since a main objective of the Study was to create a replicable process to become more circular, this third pilot project aims to test the replicability of the approach to facilitate the sharing of Our Food Future's experience with other jurisdictions that are working toward the adoption of a circular economy approach.

Pilot 3 involves a different material stream: construction and demolition waste. Identifying circular hotspots in Canada's construction and demolition sector is a relatively new area of research, and the team is excited to be pioneering this pilot and expanding on the existing knowledge base. The project will involve sourcing and aggregating data from the sector and identifying areas of intervention, using the same analytical and visual tools used in Work Package #1 to research food systems. Specific data on waste arising from basement flooding will be compared and contrasted with the overall findings of waste flows in the construction and demolition sector.

Proforma model results:

- This pilot looks to standardize tools and mechanisms used to identify best in class interventions through application to a different waste stream such that high value interventions may be applied at a larger scale to identify and implement high value interventions.

Michael von Massow, PhD
Associate Professor
University of Guelph

Measuring Impact: Applying Key Performance Indicators to Business Cases and Pilots

As stated, Guelph-Wellington's overall objectives are:

- 50% increase in access to affordable, nutritious food;
- 50% new circular businesses and collaborations opportunities; and
- 50% increase in circular economic benefits by unlocking the value of waste.

To evaluate outcomes of the short-listed options performance metrics were selected to align with Guelph-Wellington's goals with business case outputs. The use of a triple bottom line approach further enabled the balancing of environmental, economic, and social well-being performance indicators in keeping with Guelph-Wellington's objectives.

Table 3 provides the initial key performance indicators (KPIs) identified to assess the three business cases at a high level. As these three projects are implemented as pilots, the KPIs will be refined and/or revised based on availability of information for each specific pilot. While the KPIs for each pilot will be consistent with the triple bottom line approach (i.e., environmental, social wellbeing, economic), the specific KPIs used for each pilot may vary given the diversity and unique qualities of the three proposed pilot projects. As such, developing a clearer understanding of how each KPI, such as "Regenerative Enterprise" applies in the context of each pilot will be part of the implementation process. Some examples are provided in **Table 3** that elaborate on how KPIs can be refined to apply to the three pilots.

These KPIs will help Guelph-Wellington track its achievement in designing out waste and pollution, improving food production practices and the food value chain, and creating collaborative networks to keep nutrients cycling through a more circular system.

Table 3 Selected Perfomance Indicators for High-Level Business Case Assessment.

Description	Factor	Unit of Measure
Environmental		
Measure of the total and consolidated GHG impact of the intervention compared to a do-nothing or status quo scenario.	**Total GHG emissions reduced or increased by intervention implementation**	Tonnes CO_2e
Social Wellbeing		
Yes/No evaluation of whether social objective addressed by intervention, subsequently scaled based on anticipated program reach within the community: • New Jobs & Job Types • Regenerative Enterprise, Total Businesses Supported (e.g. Business improves soil quality) • Food Security, Hunger Prevention (e.g. Prevention)	**# of social objectives addressed**	Degree of benefit
Yes/No evaluation of whether social objective addressed by intervention, subsequently scaled based on anticipated program reach within the community: • Program Accessibility (e.g. Physical accessibility) • Program Inclusivity (e.g. Geographic proximity) • Community Climate Resilience	**Program Reach, measured by % of community reached**	
Economic		
To provide a measure of economic performance, we use internal rate of return (IRR). IRR consolidates the economic impacts of new revenues, capital costs, fixed and variable operating costs, volumes of material captured and the time-value of money to generate a single standardized and comparable economic metric. IRR was selected in lieu of NPV to accommodate variable costs of capital across different stakeholder groups (e.g., public versus private sector participants).	**Internal Rate of Return (IRR)**	%

Michael von Massow, PhD
Associate Professor
University of Guelph

Next Steps

The final work package has two aims: to implement the three selected pilots and share the lessons learned through this study with other Canadian jurisdictions.

Work Package #3 will involve ensuring that local community partners, technology providers, potential platform users, and/or other stakeholders have the knowledge and materials they need to launch these projects. To set up the pilot projects for success over the long term, the consultant team will gather data as the projects become operational to ensure that the planned KPIs can be tracked over the long term. By the end of this work package, Guelph-Wellington will have had the opportunity to incorporate recommendations from the consulting team and tweak the three projects to maximize the impact of each intervention.

Further, to advance the replicability of Our Food Future, a workbook will be created as part of Work Package #3. This deliverable will allow Guelph-Wellington to share their overall experiences with other jurisdictions, including the processes used from the beginning of Work Package #1.

DILLON CONSULTING

METABOLIC

Michael von Massow, PhD
Associate Professor
University of Guelph

+31 (0) 203690977
info@metabolic.nl
www.metabolic.nl

Klimopweg 150
1032HX Amsterdam
The Netherlands

This project was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.