



Unwrapping the Arguments ...

Solving packaging and food waste through government/industry collaboration



May 18, 2021

Authors:

Martin Gooch, PhD (Lead)
Claire Sand, PhD
Benjamin Dent, PhD
Peter Whitehead, PhD
Hon. Lyle Vanclief, P.C., P. Ag
Abdel Felfel, PhD

Editor:

S. Caroline Glasbey

Research:

Delia Bucknell

Key Contacts:

Martin Gooch, PhD
CEO, Value Chain Management International
martin@vcm-international.com
+1 416.97.7779

Claire Sand, PhD
Owner & CEO, Packaging Technology and Research
claire@packagingtechnologyandresearch.com
+1 612.807.5341

About Value Chain Management International

VCMI has been conducting analysis and designing then implementing solutions for reducing food system inefficiencies and implementing best practice resource management approaches since 1999. Projects completed by the VCMI team to reduce food and associated waste include 1) supply chain reconfiguration to extend shelf life; 2) packaging optimization – including sizing, functionality, recyclability, and reuse; 3) date labelling to influence changes in supply chain and consumer behavior; 4) working with industry organizations, NGOs, and government agencies to improve communication with industry and consumers; and 5) consulting to private and publicly owned businesses. www.vcm-international.com

About Packaging Technology & Research

Packaging Technology & Research (PTR) leads efforts to reduce climate change by reducing food waste with more sustainable packaging. PTR provides [technical strategy, consulting, implementation](#) to new and existing food manufacturers, packaging solutions providers, and trade organizations. PTR Owner & CEO, Dr. Claire Sand, has 35+ years of broad experience within the food science and packaging industry. Today, Sand and her team derive deep solutions that address industry challenges via a Systems Thinking approach that blends Value Chain opportunities with food packaging, science, and processing. www.packagingtechnologyandresearch.com

Copyright

All opinions expressed in this paper belong to those of the authors. This material is subject to copyright, owned by Value Chain Management International Inc. and Packaging Technology and Research. Readers may quote excerpts from the paper, provided they are not being used in a misleading context. The source of the material must be identified and acknowledgement made of the joint copyright:

©Value Chain Management International Inc. and Packaging and Technology Research, May 2021.

Suggested Citation

Gooch, M., Sand, C., Dent, B., Whitehead, P., Vanclief, L., Felfel, A. (2021). Unwrapping the Arguments ... Solving packaging and food waste through government/industry collaboration; Value Chain Management International and Packaging Technology and Research; Ontario, Canada. Accessible from: www.vcm-international.com and www.packagingtechnologyandresearch.com

Table of Contents

1	Executive Summary	2
2	Introduction	4
3	The Problem.....	5
4	The Opportunity	6
5	The Proposed Solution.....	9
6	Systems Thinking	12
7	Packaging Specific to the Food Industry.....	13
8	The Future — Driving Long-Term Environmental Impact	14
8.1	Key Takeaways	15
9	Appendix A: Why Hammer Policies Are an Ineffective Solution	16
10	Appendix B: GHG Scenarios in Canada and the US	17
11	Bibliography	19

1 Executive Summary

One of the greatest risks facing industry today is well-intended though poorly conceived policies. Poorly conceived policies have the potential to worsen the issue(s) that they seek to address. This is due to the unintended consequences that these policies can create for industry, consumers, and the environment. Importantly, policy action needs to be assessed in terms of its actual goal; in this case, the goal is GHG reduction.

While the primary focus of this paper is plastic food packaging, it pertains to all types of packaging materials. **The complexity of packaging and food value chains means that implementing “one-size-fits-all” hammer policies (such as the Canadian Environmental Protection Act) to increase the use of recyclable plastics will not reduce GHG emissions.** Further, it will result in more challenges, more wasted resources, more negative environmental impacts, and higher costs than carefully designed systems-based approaches.

Hammer policies cannot achieve the same outcomes as carefully crafted systems-based approaches, because the economic, environmental, and ecological issues associated with the manufacture, use, and post-use management of packaging are complex. The economic factors that manifest in wasted resources and negative externalities can be categorized as 1) market dysfunctionalities, and 2) value chain dysfunctionalities. The creation of sustainable circular economies relies on addressing both.

Economic factors determine why the recycling rates of metal, glass, and paper packaging are far higher than plastic packaging. Thus, the high recycling rates are fueled by economics, not hammer policies.

Creating a harmonious regulatory environment suited to motivating and enabling the creation of the economic factors that determine the creation of circular economies should be the primary focus of all levels of government.

In both Canada and the US, the carbon emissions that result from the food loss and waste (FLW) that is landfilled are greater than plastic food packaging’s environmental footprint. Given this, and that **packaging typically equates to just approximately five percent of a food’s total carbon footprint,** sustainably addressing economic and environmental packaging-related externalities rests on establishing and maintaining an equilibrium between packaging and minimizing FLW. Packaging and FLW must be viewed in tandem.

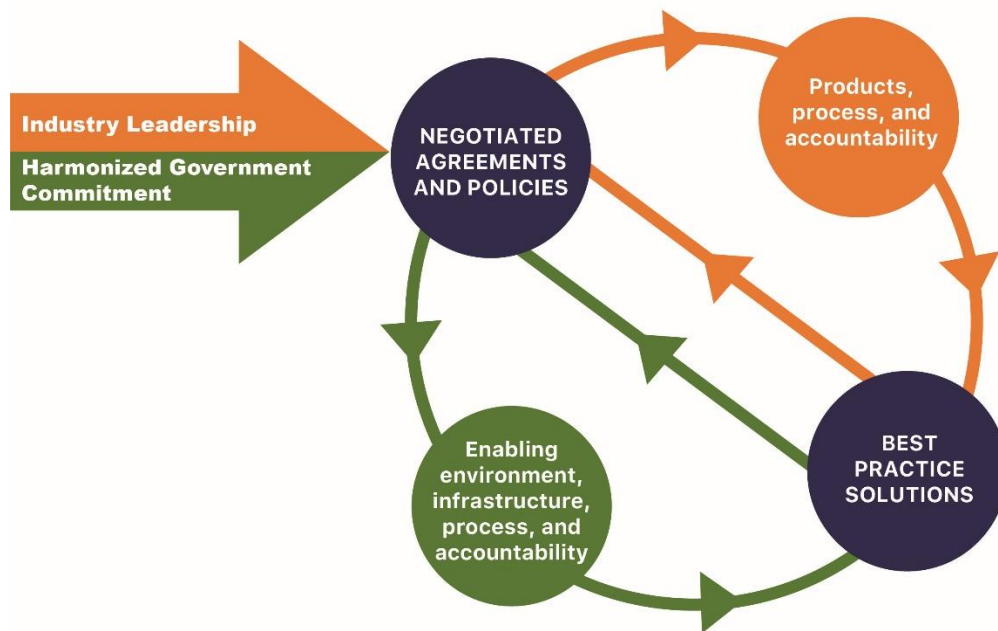
Addressing plastics without addressing food waste will result in increased GHG.

Achieving a significant long-term environmental impact that aligns with Canada’s and the US’s SDG and carbon reduction commitments relies on visionary stakeholders adopting economically viable and sustainable systems approaches. **Negotiated agreements have proven an effective means to tackle complex system issues, including those which result in negative economic and environmental externalities.**

The need for negotiated agreements is particularly critical in federated countries such as Canada and the US, where provinces/states and municipal governments can impede efforts by implementing conflicting regulations and misaligned systems. Negotiated agreements can ensure the creation and successful implementation of coherent, stable policies that extend far beyond an election cycle and political divisions between tiers of government; as has occurred, for example, in the UK and Australia.

This paper proposes establishing a negotiated agreement between industry and government that sets out explicit packaging and FLW targets. Industry is accountable for meeting legally binding targets. Government is accountable for enabling and assisting industry to meet those targets. Achieving these outcomes will require industry and all levels of government to collaborate in innovative ways to achieve win-win solutions for all.

As explained in Section 4, the diagram below shows how this collaborative agreement and reiterative process ensures continued best practice solutions.



2 Introduction

Negotiated agreements are a proven and effective means to tackle complex system issues, including those which result in negative economic and environmental externalities. Negotiated agreements have proven effective in circumstances where technological uncertainties exist that impact the prevention and management of waste. Examples of collaborative packaging agreements that have led to measurable reductions in problematic and undesirable packaging include Australia's Commonwealth Government's National Plastics Plan¹ and the UK Plastic Pact.²

"One-size-fits-all" hammer policies cannot address undesirable issues associated with packaging.

"One-size-fits-all" hammer policies³ cannot address undesirable issues associated with packaging, including the use and waste of plastic packaging. This is because the economic and environmental⁴ complexity associated with the manufacture, use, and post-use management of packaging is not taken into account.

The fundamental root causes of the current packaging situation comes down to the following two dysfunctionalities:

1) Market dysfunctionalities

- Many of packaging's costs are externalized; in particular, disposal costs are paid by taxpayers and environmental costs are passed onto society.

2) Value chain dysfunctionalities

- There is a widespread lack of awareness about the root causes of packaging's negative impacts. Combined with a myriad of misaligned strategies, operations, behaviors, and incentives within individual value chains, this further reduces the ability to tackle long-term packaging issues effectively.

The need for negotiated agreements is particularly critical in federated countries.

The need for negotiated agreements is particularly critical in federated countries, where provinces/states and municipal governments can impede efforts by having implemented conflicting regulations and misaligned systems. Specific factors predicate successful collaborative change programs that have at their core a negotiated agreement.

¹ <https://apco.org.au/news/20Y4a0000000YiEAI>

² <https://wrap.org.uk/taking-action/plastic-packaging/the-uk-plastics-pact>

³ The use of formal regulations or legislation to change well-established and uncomplicated ways of doing business without addressing the root causes and enabling efficient solutions. In this case, formal regulations or legislation is considered a hammer-style policy instrument, used for claiming to solve a problem without fully identifying and defining the problem in terms of issues, risks, and causal factors, and without setting clear and measurable objectives.

⁴ The term "environment" encompasses environmental and ecological issues. Environmental issues include the impact of packaging and food industry practices, and consumer behaviours on GHG emissions, etc. Ecological issues include the impact of packaging and food industry practices, and consumer behaviours on wildlife and marine creatures.

These factors include the existence of a **constructive policy and legislative environment, visionary leadership** by industry and government, and the **commitment to invest in innovative solutions** that benefit consumers, industry, and the environment.

Appendix A discusses why hammer policies are an ineffective mechanism to address packaging externalities.

3 The Problem

More sustainable packaging and less food loss and waste (FLW)⁵ are two areas on which proactive governments focus their GHG reduction efforts. The environmentally responsible use of packaging and the reduction of FLW are interlinked. This is because the environmental and economic impacts of FLW and associated wastes cannot be fully addressed without the responsible use of packaging.

The current situation, where the volume of landfilled packaging materials and their potential to harm the environment has grown exponentially, is the result of numerous factors. They include:



An overabundance of low-cost heterogeneous packaging



Lack of common enforceable standards – resulting in a heterogeneous array of plastic, paperboard, metal, glass, multilayer packaging options, and greenwashing



The recyclability of a material being adulterated at any stage in the packaging chain by the application of materials, adhesives, inks, labels, etc., that are incompatible with recycling



Efforts focused on individual elements of the packaging and food value chains being in isolation



Strategically aligned products, process, and infrastructure not being in place



Consumer confusion: conflicting and ill-understood packaging disposal rules (for plastic, paperboard, metal, glass, mixed)

⁵ The term “food loss” is typically used to describe the discarding of food that occurs from production through to processing, while the term “food waste” describes the discarding of food during its distribution and marketing to consumers through retail or foodservice and subsequently in the home.

Well-meaning actions taken by different levels of government, and ministries operating at the same level of government, are often incompatible.

Well-meaning actions taken by different levels of government, and ministries operating at the same level of government, are often incompatible. **The result is a mishmash of inconsistent and disjointed initiatives.** This has allowed an immense array of packaging solutions to exist, each differing in their environmental impact and the economic viability of their reuse, recycling, and disposal.

These disjointed efforts hinder progress towards establishing circular food and packaging systems, and inhibit industry from making a positive impact that will allow Canada and the US to fulfill its United Nations Sustainable Development Goals (SDGs) commitments.

The current mishmash of municipal, provincial, and territorial solid waste management practices further complicates the problem.

The current mishmash of municipal, provincial, and territorial solid waste management practices and evolving extended producer responsibility (EPR) programs further complicates the problem. No single body has control over the factors that determine the effectiveness and efficiency of recycling systems. **Whether a material can be recycled has little bearing on whether it is recycled.**

The potential unintended consequences of using hammer policies to restrict the use and availability of plastics or packaging are well-known and numerous. They include, though are not limited to:

- Increased FLW and GHG emissions;
- Segments of the food industry may cease to exist;
- Food will not have the shelf life that it currently has;
- The industry will not be able to distribute food effectively and efficiently;
- Increased food prices;
- Increased food insecurity; and
- Consumers will have less choice and less access to convenient meal solutions.

Simultaneously, there will be less availability and year-round supply of affordable food. The most significant impacts will occur among fresh highly nutritious foods.

4 The Opportunity

Aligning packaging and FLW reduction efforts more effectively will lead to more economically and environmentally sustainable outcomes.

Aligning packaging and FLW reduction efforts more effectively than is presently the case will lead to more economically and environmentally sustainable outcomes than could otherwise be achieved. The good news is that international organizations, governments, and businesses of all sizes seek to reduce the environmental impact of feeding people nutritious food. Investing in the research and development required to

create the business case for environmentally friendly packaging suited to the formation of circular economies is an important objective for governments and other stakeholders.

Canada and the US are committed to Target 12 of the United Nations SDGs, including reducing the negative effects of food packaging and FLW. Food and packaging businesses have established CSV (Creating Shared Value) and CSR (Corporate Social Responsibility) goals derived from these SDGs.

Comprehensive data and facts clearly show the comparative environmental effects of packaging and FLW from a whole of chain perspective. **The greatest GHG footprint, and therefore environmental improvements, can be achieved by reducing FLW.** Packaging typically accounts for five percent or less

Packaging typically accounts for five percent or less of a packaged food products' total environment footprint.

of a packaged food products' total environment footprint. Therefore, a small change in the effectiveness of packaging (as a result of, for example, legislation potentially forcing industry to use suboptimal materials⁶) would more than offset any gains achieved by recycling more and/or optimizing the use of packaging.

As shown by the Canadian and US scenarios presented below, **an industry-defined equilibrium must be maintained between optimizing the use of packaging and minimizing FLW.** One cannot be viewed without consideration of the other. As the WARM model⁷ can be applied to all food types in the US and Canada to estimate GHG emissions, this was used for the scenarios, which are directional only.

Current Situation

In each case, the orange bars represent the current situation. In Canada, the environmental emissions of FLW and packaging, plus the additional emissions created by their landfilling, total 146.9 million metric tonnes of CO₂E. In the US, the estimated total emissions are 251.6 million metric tonnes of CO₂E.

Scenario #1

The blue bars represent Scenario #1. The GHG of packaging has been halved by optimizing⁸ the volume of packaging used and increasing recycling rates. However, less effective packaging would result in a 10 percent increase in FLW and landfilled FLW. In Canada and the US, total CO₂E emissions would subsequently increase by 14.7 and 25.1 million metric tonnes, respectively.

Scenario #2

The green bars represent Scenario #2. Packaging material management remains unchanged from Scenario #1. However, the utilization of effective⁹ packaging and more effective management of FLW would lead to a 10 percent reduction in FLW and a 50 percent reduction in landfilled FLW below current levels. In Canada, total CO₂E emissions would subsequently decrease by 16.3 million metric tonnes compared to the status quo. In the US, total CO₂E emissions would decrease by 34.4 million metric tonnes compared to the status quo. The assumptions that lie behind the scenarios form Appendix A.

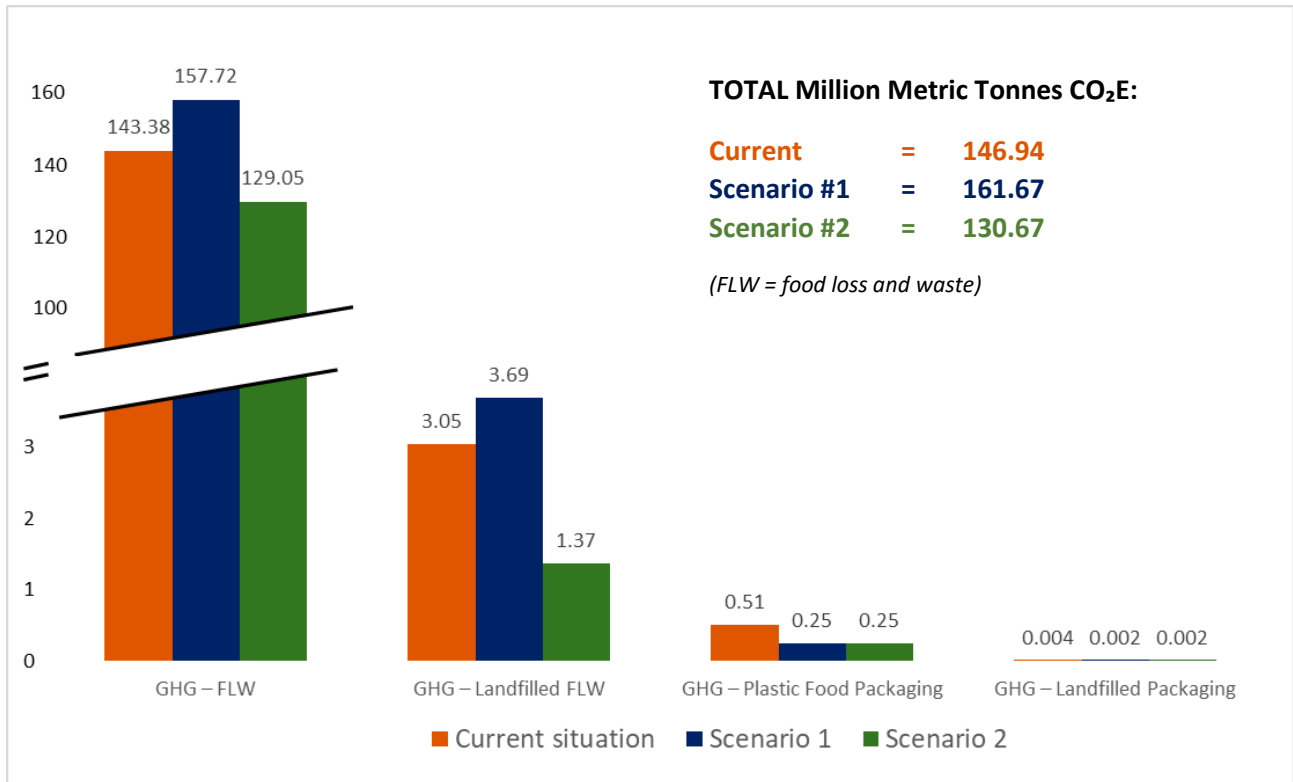
⁶ Such as materials that cannot create the modified atmosphere required to maximize shelf life, or are not re-sealable.

⁷ <https://www.epa.gov/warm>

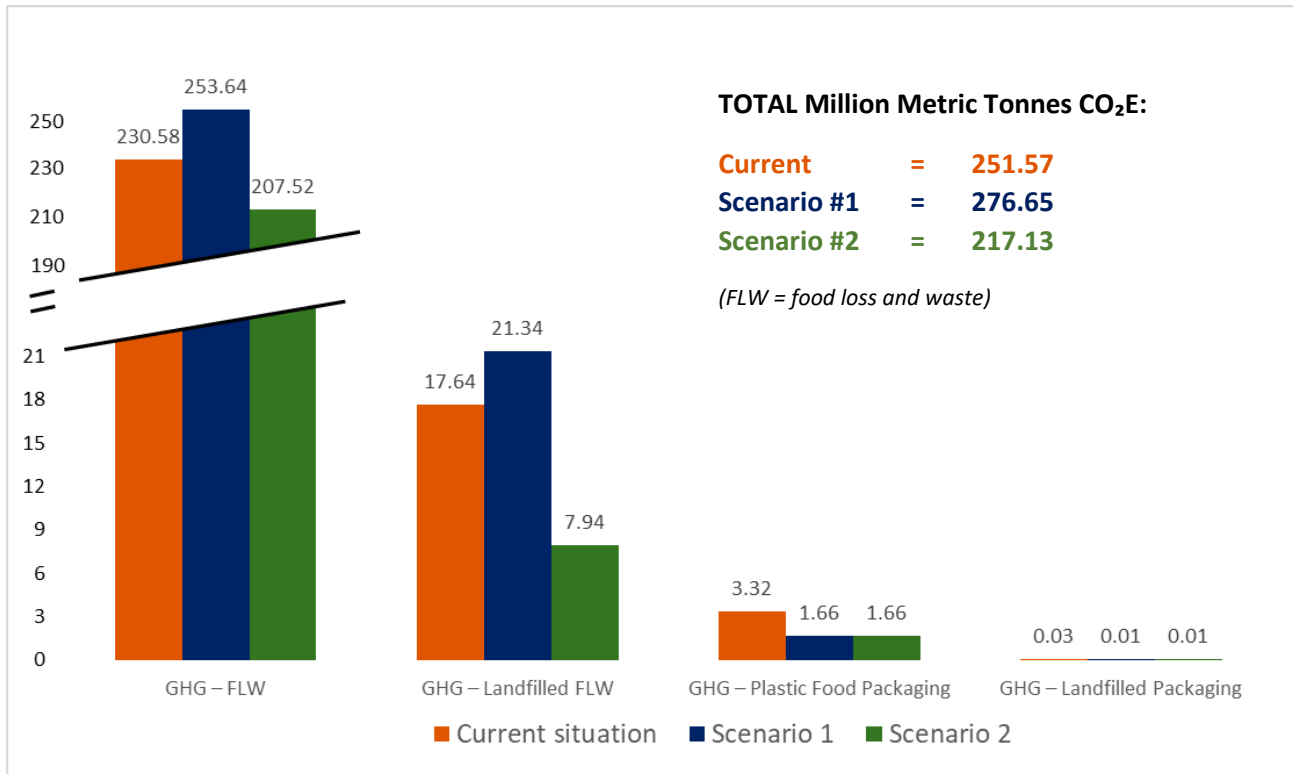
⁸ Packaging solutions are redesigned to prevent any excess use of materials.

⁹ The packaging is best fit-for-purpose in respect to its ability to protect, preserve, and promote the products contained within, and is designed for recycling, while simultaneously ensuring the minimum use of materials.

Canada – Green House Gases (CO₂E)



US – Green House Gases (CO₂E)



The economics of recycling need to be addressed for all materials. The recycling rates of paperboard, glass, and metal packaging are far higher than the recycling rate of plastic packaging, because there is a market for recycled paperboard, glass, and metal.¹⁰ **Thus, the high recycling rates are fueled by economics, not hammer policies.** The same economic tools that have led to high recycling rates in paperboard, glass, and metal can be applied to plastics.

Governments supporting innovation and commercialization in partnership with industry will produce more purposeful and longer-term innovation than hammer policies.

Governments supporting innovation and commercialization in consultation and in partnership with industry will produce more purposeful and longer-term innovation than hammer policies. An example of constructive partnerships is negotiated agreements. Performance targets are set by industry and different tiers of government in consultation. The implementation of negotiated agreements is ensured by government-enacted legislation placing accountability on industry to meet these targets. Similarly, municipalities

should be legally accountable for their performance and implementing the systems required to enable industry to meet targets set out in the negotiated agreements.

The creation of negotiated agreements for plastic packaging, and plastic in general, can lead to and provide a solid foundation for addressing environmental and economic issues surrounding other types of packaging materials — including those not yet invented.

5 The Proposed Solution

Sections four and seven of the federal Cabinet Directive of Regulation¹¹ state that the ministers must consider all ramifications while regulations are in development, and then monitor the effect of regulations once implemented. Policy makers should be conscious of the dangers that are inherently associated with hammer-style approaches to regulatory reform.

Our approach focuses on a negotiated systems-based effort.

Our proposed solution for addressing negative economic and environmental impacts associated with packaging material policies and regulations differs from the hammer approach proposed by the Canadian federal government.¹² Our approach focuses on a negotiated systems-

based effort toward achieving a more sustainable food system with less food and packaging waste, resulting in a significant reduction in GHG emissions.

¹⁰ The comparative uniformity of these materials in relation to plastic packaging enables their efficient recycling, trading, and reuse as food packaging or other value-generating uses beyond food, over and over again.

¹¹ [Cabinet Directive of Regulation](#)

¹² See Section 6 for an explanation of why we believe the currently proposed approach of legislating plastic as a toxic substance under the EPA will not achieve the intended outcomes and will have unintended ramifications that extend beyond plastic packaging.

In our approach, the objectives and risks of the proposed solution will be easier to define, and its effects more readily monitored and measured, than is possible with hammer policies. The proposed solution will also assist in addressing the present mishmash of federal, provincial, and municipal policies and regulations.

The starting point for achieving the changes required to create circular packaging economies without negatively impacting FLW is predicated by visionary innovative leaders from the food industry, packaging industry, and government partnering on round table initiatives.

Food and packaging industry leaders must make bold targets that address crucial challenges.

Food and packaging industry leaders must make bold targets that address crucial challenges affecting the establishment of a circular packaging economy, and commit to investing in the creation of harmonious precompetitive solutions. In Canada, this has begun with the establishment of the Canadian Plastics Pact,¹³ initiatives undertaken by individual businesses (such as Unilever), and the enhancement of EPR programs (such as those occurring in Quebec¹⁴).

Government-implemented policies, regulations, and programs need to incentivize and assist industry in addressing barriers that inhibit the establishment of circular packaging economies without negatively impacting the FLW reduction efforts of the food industry, NGOs, and consumers. Since investments required to make this change represent a commitment to long-term versus short-term goals and are substantial, government policies, legislation, and regulations must look far beyond an election cycle and political divisions between tiers of government.

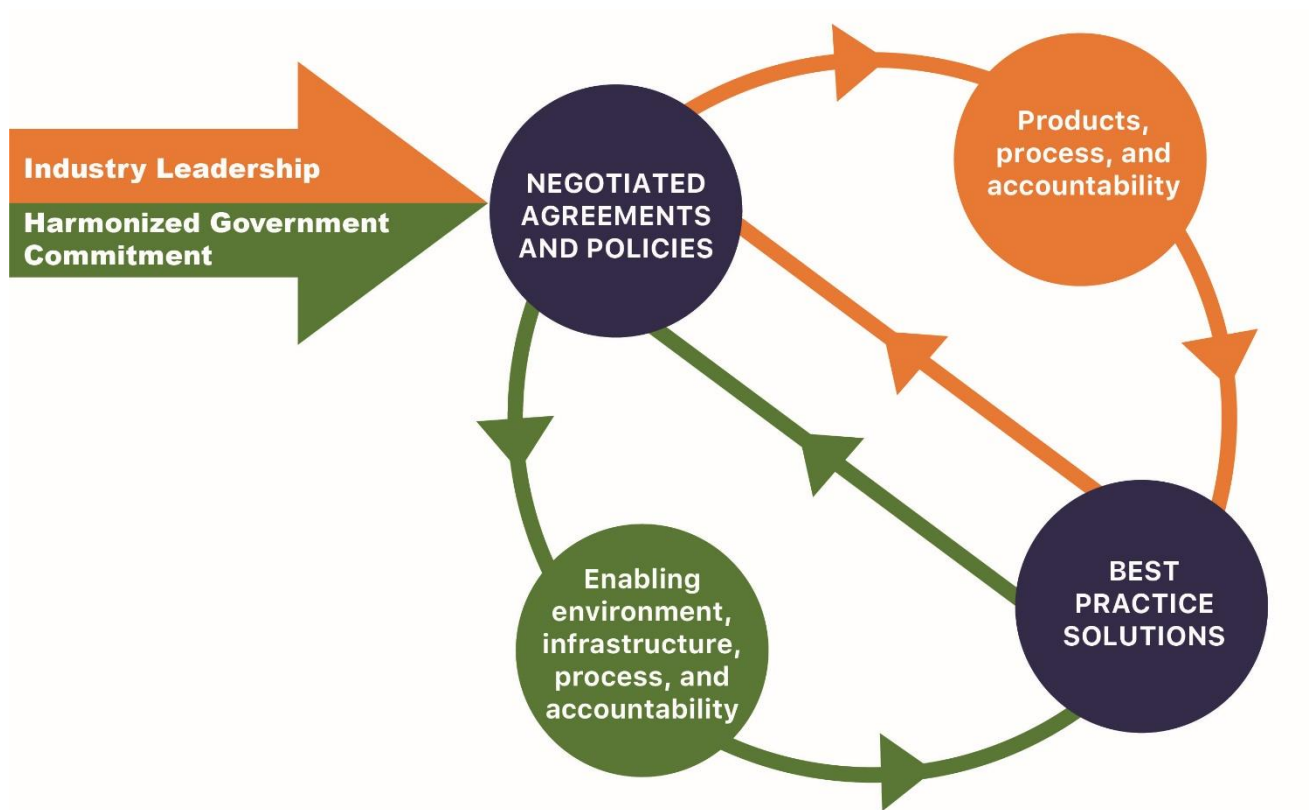
The solution addresses the current defensive attitudes that have perpetuated adversarial behaviours.

The solution addresses the current defensive attitudes that have perpetuated adversarial behaviours by seizing the opportunity to build a more functional culture within and between industry and government. How this industry and government collaboration looks in practice – resulting in continuous improvements that can extend beyond plastic to include all packaging – is shown below.

¹³ [Canadian Plastics Pact](#)

¹⁴ [Éco Entreprises Québec](#)

Reiterative Industry/Government Alignment



NEGOTIATED AGREEMENTS AND POLICIES

Industry:

- Adopts targets

Government:

- Ensures consistent policies between departments and jurisdictions

Enabling environment, infrastructure, process, and accountability

Government:

- Creates and enforces common national standards and specifications
- Invests in common collection, recycling, and disposal infrastructure
- Engages public in behavioural change

Products, process and accountability

Industry:

- Invests and adopts innovative products and continually improving processes
- Reports on performance in relation to targets

BEST PRACTICE SOLUTIONS

Canada and US deliver best practice:

- Efficient systemic solutions
- Less environmental impact
- Greater food security
- Competitive packaging and food value chains

Canada and the US are not alone in seeking to reduce FLW and addressing packaging externalities simultaneously. The negotiated agreement should establish both explicit packaging and food waste

The negotiated agreement should establish both explicit packaging and food waste economic impact targets.

economic impact targets, and make industry accountable for meeting those targets. The actions implemented to achieve this will include adapting successful mechanisms that have been introduced in other countries and regions. **It is not reinventing the wheel and implementing unproven approaches.**

These mechanisms include the use of successful national EPR systems that are objective, economics-driven, and share common standardized processes, protocols, and standards. Features of effective EPRs include:

1) Fees

- EPR fees and associated mechanisms factor in the externalized carbon costs of virgin versus recycled materials (polluter pays).
- Externalized carbon costs are factored into landfill fees (polluter and user pays).

2) Investment in the circular economy

- Levy fees should be invested into strategically aligned recycling infrastructure, technical innovation, and consumer messaging.
- Ultimately, the landfilling of all packaging should be banned. EPR levies significantly favour packaging solutions that are recycled.
- EPR levies will also favour packaging that contains a high percentage of recycled content.

3) Reporting and incentives

- Standardized public reporting of volume and types of package material used, along with municipalities' performance in recycling versus landfilling packaging, should be mandatory.
- Municipalities that do not meet legally enforceable performance targets should be penalized.
- Engaging consumers in the responsible post-life management of packaging, through complementary incentive programs and effective communication, is also critical to establishing a circular economy.

6 Systems Thinking

The above solution reflects the concept of systems thinking. Systems thinking is a disciplined approach that has been used for decades to examine then address complex problems completely and effectively.

Systems thinking ensures stakeholders look at the whole picture, not single silos, when developing solutions.

It ensures stakeholders look at the whole picture, not single silos, when developing solutions. Viewing networks' interactions ensures that the solutions developed are effective, while avoiding unintended consequences.

Negotiated agreements are an effective means for assisting the creation of circular economies, because systems thinking is incorporated into their design and implementation.

To ensure that a system's performance organically adapts to changing situations, three distinct elements (often called sub-systems) need to interact coherently. The elements, which together determine the sustainability of circular packaging systems, can be grouped into:

- Products (e.g., readily recyclable materials)
- Process (e.g., standardized materials, adherence to pre-determined specifications)
- Infrastructure (e.g., collection and recycling infrastructure)

Whether packaging is both **recyclable and recycled** is determined by the alignment that exists between these sub-systems. Misaligned products, processes, and infrastructure lead to even the most recyclable packaging not being recycled. Reasons for this include:

- The packaging materials used cannot be efficiently recycled;
- Consumers handling packaging do not know how (or are not sufficiently incentivized) to recycle their packaging waste;
- Recycling infrastructure and/or processes are lacking or have not kept pace with material developments; and
- There is insufficient demand for recycled material.

7 Packaging Specific to the Food Industry

Decisions relating to materials' suitability for packaging food are complex. Food packaging needs to satisfy specific requirements not faced by other industries. These requirements include mitigating food safety risks, maximizing shelf life, the international distribution of highly perishable food, and enabling portion control.

Compared to other packaged products, food is a commodity and is priced accordingly. This inherently leads to per unit packaging costs being minimized and adequate consideration not being given to optimizing packaging from circular economy perspectives. This, in turn, leads to the full environmental costs of packaging being externalized and not factored into industry's or consumers' decisions. Packaging externalities include municipal household taxes covering the cost of collecting, sorting, and recycling or landfilling, along with the environmental cost of fossil fuel extraction and ill-disposed packaging waste.

A lack of legally enforceable standards leads to innovations that do not address the systemic challenges that need to be addressed. **Not having to factor economic externalities into packaging decisions leads to "greenwashing."**

Examples of greenwashing include:

- Promoting the use of bio-degradable packaging
 - Increasing plastics' degradation rate increases the concentration of toxins and micro-plastics, both of which are known to have harmful effects on people, the environment, and biology.
- Increasing the use of packaging that claims to be compostable
 - Such packaging is not actually composted and finds its way to landfill, where it does not compost.
- Switching from plastic to paperboard
 - This requires more materials and energy to produce and is typically less effective at reducing food waste.

8 The Future — Driving Long-Term Environmental Impact

Achieving a significant long-term environmental impact that aligns with North America's Sustainable Development Goals and carbon reduction commitments relies on visionary stakeholders adopting

Negotiated agreements are a proven means to achieve significant and sustainable outcomes.

economically viable and sustainable systems approaches that encompass packaging and food. Negotiated agreements can ensure the creation and successful implementation of coherent stable policies that extend far beyond an election cycle and political divisions between tiers of government. Negotiated agreements are a proven means to achieve

significant and sustainable outcomes by addressing complex issues that have an environmental component.

While the primary focus of this paper is plastic food packaging, it pertains to all packaging materials. The complexity of packaging and food value chains means that policies must be able to address nuances regarding why certain types of food packaging are chosen over alternatives and root causes that impact the management of packaging value chains. The economic factors that manifest in the form of wasted resources and negative externalities can be categorized as 1) market dysfunctionalities, and 2) value chain dysfunctionalities. The creation of sustainable circular economies relies on addressing both.

Economic factors determine why far higher levels of metal, glass, and paper packaging are recycled than plastic packaging. Recycling is therefore driven by economics, not hammer policies. **The creation of a harmonious regulatory environment suited to motivating and enabling the creation of the economic factors that determine the creation of circular economies should therefore be the primary focus of all levels of government.**

Given that packaging typically equates to just approximately five percent of a food product's total carbon footprint, sustainably addressing economic and environmental packaging related externalities rests on establishing then maintaining an equilibrium between packaging and minimizing food loss and waste (FLW).

8.1 Key Takeaways

1	A tandem focus on food and packaging waste is needed to meet GHG emission targets.
2	GHG emissions that result from food sent to landfill are greater than the GHG emissions of plastic food packaging.
3	The need for negotiated agreements is particularly critical in federated countries such as Canada and the US, where provinces/states and municipal governments can impede efforts by having implemented conflicting regulations and misaligned systems.
4	Industry must be the driving force for change, with visionary leaders committing to achieve and be accountable for bold targets, and investing in the creation of harmonious precompetitive solutions.
5	Government-implemented policies, regulations, and programs need to incentivize and assist industry in addressing barriers that inhibit the establishment of circular packaging economies, without negatively impacting the FLW reduction efforts of the food industry, NGOs, and consumers.
6	Whether packaging is both recyclable and recycled is determined by the level of alignment that exists between three sub-systems: 1) products, 2) process, and 3) infrastructure.
7	The three key features of effective extended producer responsibility (EPR) programs are 1) fees, 2) investment in the circular economy, and 3) reporting and incentives.
8	EPR fees must reflect legally enforceable standards and specifications for entire packaging solutions, not just an individual component of the packaging.
9	An important element of effective EPR programs is ensuring municipal governments are legally accountable for implementing the required systems and processes, and that they publicly report their performance in relation to targets contained in negotiated agreements.

9 Appendix A: Why Hammer Policies Are an Ineffective Solution

Hammer policies, such as the Canadian federal government Canadian Environmental Protection Act (CEPA), are not effective mechanisms to ensure the responsible use of plastic and ensure more plastic packaging is recycled.

Social activist groups like hammer policies. When advocating for hammer-style policies, the assumption made is that reducing the carbon footprint of packaging using other policy tools will not achieve the required outcomes. The belief that lies behind this approach is that the business case for using alternative approaches does not exist. We are, however, not aware of any empirical studies that examined the reduction of packaging's carbon footprint using hammer policies and that identified a successful business case for doing so. Thus, the use of hammer policies for achieving packaging-related carbon emissions is not proven. Collaborating with the actual business environment as part of a negotiated process to achieve purposeful packaging and carbon-related outcomes is a proven solution.

Hammer-style policies invariably result in unintended consequences. Multiple studies have revealed that policies focused on an isolated issue within a complex system can make the situation worse. In the case of plastic packaging, the unintended consequences of using hammer policies could lead to increased food loss and waste, more (not less) packaging, higher environmental emissions, measurable increases in the price of food, and worsen food insecurity. Hammer policies are also ineffective. For example, the shopping bag ban has measurably increased the purchasing of bin liners. Bin liners can have a larger and more variable environmental footprint compared to shopping bags. In addition, many reusable shopping bags (material or heavier-duty plastic) cannot be recycled, and their GHG footprint is higher than recyclable "single-use" shopping bags.

Hammer policies are expensive to enforce. When using the legislation as a policy tool, usually the true total costs of the implementation are not calculated/estimated. The true cost of hammer policies can be much higher than other effective policy tools, and way above the expected benefits of implementing a certain policy; thereby increasing their deadweight loss (excess burden) on the national economy.

In addition, hammer-style policies focus on mitigating symptoms, not addressing root causes. Hammer-style policies cannot take into account nuances. These nuances include that food packaging must exhibit specific characteristics, and that required characteristics differ greatly by food type.

The CEPA cannot be successfully applied broadly. A case in point — the CEPA is a successful mechanism for ensuring asbestos is only used in certain forms. These 'form factors' preclude asbestos from being used in ways that present a human toxin, such as construction materials, but it is allowed in heat shields in the engine bay of vehicles. Asbestos is a mineral that is not further processed in ways that fundamentally alter its chemical characteristics. **This is contrary to plastics.** What asbestos is and what it is not can be clearly defined, unlike plastics. As well, asbestos does not have a critical upside. Food packaging does have a critical upside; it significantly reduces FLW and enables the operation of a safe, efficient global food system.

10 Appendix B: GHG Scenarios in Canada and the US

Canadian National Scenario

	Item	Million Metric Tonnes	Million Short Tons	GHG Emissions Metric Tonnes CO ₂ E per Short Ton of Material ¹⁵	GHG (MT CO ₂ E)
Current Situation¹⁶	Current FLW	35.54	39.18	3.66	143.38
	Landfilled FLW	5.53	6.10	0.5	3.05
	Food packaging	0.24	0.26	1.94	0.51
	Landfilled packaging	0.19	0.21	0.02	0.004
	Total				146.94
Scenario 1	10% increase in FLW	39.09	43.09	3.66	157.72
	10% increase in landfilled FLW	3.04	3.35	0.5	3.69
	50% decrease in food packaging	0.12	0.13	1.94	0.25
	50% decrease in food packaging landfilled	0.09	0.10	0.02	0.002
	Total				161.67
Scenario 2	10% decrease in FLW	31.99	35.26	3.66	129.05
	50% decrease in landfilled FLW	2.49	3.05	0.5	1.37
	50% decrease in food packaging	0.12	0.13	1.94	0.25
	50% decrease in food packaging landfilled	0.09	0.10	0.02	0.002
Total					130.67

¹⁵ [EPA WARM Model](#), [WRAP](#)

¹⁶ Sources: [VCMi & Second Harvest](#); [ECCC 1](#); [ECCC 2](#), [NZWC](#), Confidential [Industry Data](#)

US National Scenario

	Item	Million Short Tons	GHG Emissions Metric Tonnes CO ₂ E per Short Ton of Material ¹⁷	GHG (MT CO ₂ E)
Current Situation ¹⁸	Current FLW	63	3.66	230.58
	Landfilled FLW	35.28	0.5	17.64
	Food packaging	1.71	1.94	3.32
	Landfilled packaging	1.37	0.02	0.03
	TOTAL			251.57
p				
Scenario 1	10% increase in FLW	69.3	3.66	253.64
	10% increase in landfilled FLW	42.69	0.5	21.34
	50% decrease in food packaging	0.86	1.94	1.66
	50% decrease in food packaging landfilled	0.68	0.02	0.01
	TOTAL			276.65
Scenario 2	10% decrease in FLW	56.7	3.66	207.52
	50% decrease in landfilled FLW	15.88	0.5	7.94
	50% decrease in food packaging	0.86	1.94	1.66
	50% decrease in food packaging landfilled	0.68	0.02	0.01
	TOTAL			217.13

¹⁷ [EPA WARM Model](#), [WRAP](#)

¹⁸ Sources: [EPA 1](#), [EPA 2](#), [ReFED](#), Confidential [Industry Data](#)

11 Bibliography

- APCO. 2021. Legislative review: Used packaging NEPM and the Australian Packaging Covenant; Australian Packaging Covenant Organization. Accessible from: <https://apco.org.au/news/20Y4a0000000YiEAI>
- Börkey, P., Glachant, M., Lévêque, F. 1999. Voluntary Approaches for Environmental Policy in OEDC Countries: An Assessment; CERNA, Centre d'économie industrielle; Ecole Nationale Supérieure des Mines de Paris. Accessible from: <https://www.peacepalacelibrary.nl/ebooks/files/C08-0099-B%F6rkey-Voluntary.pdf>
- Bryden, A., Petticrew, M., Mays, N., Eastmure, E., Knai, C. 2013. Voluntary agreements between government and business: A scoping review of the literature with specific reference to the Public Health Responsibility Deal; Health Policy; Volume 110, Issues 2–3, May 2013, Pages 186-197. Accessible from: <https://www.sciencedirect.com/science/article/abs/pii/S0168851013000614>
- Coglianesi, G. 2012. Measuring Regulatory Performance: Evaluating the Impact of Regulation and Regulatory Policy; Expert Paper No. 1, August 2012; OECD Publishing. Accessible from: https://www.oecd.org/gov/regulatory-policy/1_coglianesi%20web.pdf
- DAWE. 2021. National Plastics Plan 2021; Department of Agriculture, Water and the Environment; Australian Government. Accessible from: <https://www.environment.gov.au/system/files/resources/a327406c-79f5-47f1-b71b-7388407c35a0/files/national-plastics-plan-2021.pdf>
- DEFRA. Making the Most Of Packaging: A Strategy For A Low-Carbon Economy; Department for Environment, Food and Rural Affairs; Gov.UK. Accessible from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69289/pb13189-full-packaging-strategy-090624.pdf
- ECCC. 2020. National Waste Characterization Report: The Composition of Canadian Residual Municipal Solid Waste; Environment and Climate Change Canada; Government of Canada. Accessible from: http://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf
- ECCC. 2019. A Proposed Integrated Management Approach to Plastic Products to Prevent Waste and Pollution: Discussion Paper; Environment and Climate Change Canada; Government of Canada. Accessible from: [A proposed integrated management approach to plastic products: discussion paper - Canada.ca](https://www.ec.gc.ca/eecc/eng/14/405/2020-eng.pdf)
- Edwards, C., Meyhoff Fry, J. 2011. Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006; Environment Agency, Bristol, UK. Accessible from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291023/scho0711buan-e-e.pdf
- EEQ. 2020. Behind The Scenes: The modernization of curbside recycling; Annual Report; Éco Entreprises Quebec. Accessible from: https://www.eeq.ca/wp-content/uploads/EEQ_RA_2020_VFA.pdf
- EPA. 2020. Food: Material-Specific Data: Facts and Figures about Materials, Waste and Recycling; United States Environment Protection Authority. Accessible from: <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/food-material-specific-data>

EPA. 2020. Plastics: Material-Specific Data: Facts and Figures about Materials, Waste and Recycling; United States Environment Protection Authority. Accessible from: <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/plastics-material-specific-data#:~:text=The%20total%20amount%20of%20plastics,percent%20of%20all%20MSW%20landfilled.>

EPA. 2020. Waste Reduction Model: Version 15; United States Environment Protection Authority. Accessible from: <https://www.epa.gov/warm/versions-waste-reduction-model-warm#15>

Feber, D., Nordigården, D., Granskog, A., Ponkshe, S., Berg, P. 2021. The Drive Toward Sustainability in Packaging – Beyond The Quick Wins; McKinsey & Company. <https://www.mckinsey.com/~media/McKinsey/Industries/Paper%20and%20Forest%20Products/Our%20Insights/The%20drive%20toward%20sustainability%20in%20packaging%20beyond%20the%20quick%20wins/The-drive-toward-sustainability-in-packaging-beyond-the-quick-wins.ashx>

Gooch, M., Bucknell, D., LaPlain, D., Dent, B., Whitehead, Marenick, N. 2020. Less Food Loss and Waste, Less Packaging Waste; National Zero Waste Council. Accessible from: <http://www.nzwc.ca/Documents/FLWpackagingReport.PDF>

Gooch, M., Bucknell, D., Laplain, D., Whitehead, P. 2019. A landscape review of plastic packaging in the Canadian fresh produce industry; Canadian Produce Marketing Association. Accessible from: <https://cpma.ca/docs/default-source/corporate/2019/cpma-executive-summary-of-technical-report.pdf>

Gooch, M., Bucknell, D., LaPlain, D., Dent, B., Whitehead, P., Felfel, A., Nikkel, L., Maguire, M. 2019. The Avoidable Crisis of Food Waste: Technical Report; Value Chain Management International and Second Harvest; Ontario, Canada. Accessible from: <https://secondharvest.ca/research/the-avoidable-crisis-of-food-waste/>

Gooch, M., Bucknell, D., Whitehead, P. 2018. “Quantifying the Value of Packaging: As a Strategy to Prevent Food Waste in America, AMERIPEN”. Accessible from: <https://c.ymcdn.com/sites/www.ameripen.org/resource/resmgr/files/AMERIPENWhitePaper-FoodWast.pdf>

Hirschnitz-Garbers, M., Hinzmann, M., Watkins, E., ten Brink, P., Leonidas, M., Soleille. 2015. A Framework for Member States to Support Business in Improving Its Resource Efficiency: An Analysis of Support Measures Applied In the EU-28 Measure Synthesis; Supporting Voluntary Agreements and Initiatives; European Commission. Accessible from: https://ec.europa.eu/environment/enveco/resource_efficiency/pdf/studies/RE_in_Business_M4_Voluntary_Agreements.pdf

Koehler, D. A., 2019. The Effectiveness of Voluntary Environmental Programs—A Policy at a Crossroads? Policy Studies Journal; Volume 35, Issue 4, November 2007, Pages 689-722. Accessible from: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1541-0072.2007.00244.x>

Kumarankandath, K. 2010. Voluntary Agreements versus Regulation: An Emissions Trading Case Study; Master’s Thesis; School of Geography, University of Exeter. Accessible from: <https://geography.exeter.ac.uk/media/universityofexeter/schoolofgeography/pdfs/epsdissertations/ArunaKumarankandath.pdf>

Kitching, J., Hart, M., Wilson, J. 2015. Burden or benefit? Regulation as a dynamic influence on small business performance; International Small Business Journal; Vol. 33(2) 130–147; Sage Publications. Accessible from: <https://journals.sagepub.com/doi/10.1177/0266242613493454>

Conference Board. 2017. Regulation & the Economy: The Relationship & How to Improve It; A Policy Statement by the Committee for Economic Development of The Conference Board. Accessible from: https://www.ced.org/pdf/CED_Report-Regulation_and_the_Economy2.pdf

Gilmour, B., Ridge, S., Whiteside, G., Olsen, S. 2020. Canada Announces Intention to Add "Plastic Manufactured Items" to List of Toxic Substances; October 13, 2020. Bennett Jones. Accessible from: <https://www.bennettjones.com/Blogs-Section/Canada-Announces-Intention-to-Add-Plastic-Manufactured-Items-to-List-of-Toxic-Substances>

Government of Canada. 2020. Cabinet Directive on Regulation; Treasury Board of Canada Secretariat; Government of Canada. Accessible from: <https://www.canada.ca/en/government/system/laws/developing-improving-federal-regulations/requirements-developing-managing-reviewing-regulations/guidelines-tools/cabinet-directive-regulation.html>

OECD. 2014. OECD Framework for Regulatory Policy Evaluation; OECD Publishing. Accessible from: <https://doi.org/10.1787/9789264214453-en>.

Parker, D., Kirkpatrick, C. 2012. The Economic Impact of Regulatory Policy: A Literature Review of Quantitative Evidence; Measuring Regulatory Performance; Expert Paper No. 3, August 2012; OECD Publishing. Accessible from: https://www.oecd.org/gov/regulatory-policy/3_Kirkpatrick%20Parker%20web.pdf

RECYC-QUEBEC. 2019. Circular Economy; RECYC-QUEBEC. Accessible from: <https://www.recyc-quebec.gouv.qc.ca/sites/default/files/documents/feuille-economie-lineaire-circulaire-english-version.pdf>

ReFED. 2020. 27 Solutions to Food Waste: The benefits of each of these solutions outweigh the costs. Accessible from: <https://www.refed.com/?sort=emissions-reduced>

ReFED. 2016. A Roadmap to Reduce U.S. Food Waste by 20 Percent. Accessible from: http://www.refed.com/downloads/ReFED_Report_2016.pdf

Salo, E. 2016. Voluntary Agreements for the Achievement of Sustainable Development Goals: Dutch Green Deals and Wrap Agreements; Master's Thesis; Corporate Environmental Management; Jyväskylä University School of Business and Economics. Accessible from: <https://jyx.jyu.fi/bitstream/handle/123456789/52151/URN%3aNB%3afi%3ajyu-201612024906.pdf?sequence=1&isAllowed=y>

Sealed Air 2015. Taking Stock: Retail Shrink Solutions; Sealed Air Corporation, Charlotte, NC.

Summers, C. 2012. What Should Be Done About Plastic Shopping Bags? Magazine; BBC News; British Broadcasting Corporation; March 19, 2012. Accessible from: <https://www.bbc.com/news/magazine-17027990>

Taylor, R, L, C. 2019. Bag leakage: The effect of disposable carryout bag regulations on unregulated bags; Journal of Environmental Economics and Management; Elsevier; Vol 93, PP. 254-271. Accessible from: <https://doi.org/10.1016/j.jeem.2019.01.001>

Tenhunen, A., Pöhler, H. (Eds.). 2020. A Circular Economy of Plastics: A Vision for Redesigning Plastics Value Chains; VTT Technical Research Centre of Finland Ltd. Accessible from: <https://cris.vtt.fi/en/publications/a-circular-economy-of-plastics-a-vision-of-redesigning-plastics-v>

Tu, J. The Impact of Regulatory Compliance Costs on Business Performance; Research and Analysis Directorate; Small Business Branch; Innovation, Science and Economic Development Canada; Government of Canada. Accessible from: [https://www.ic.gc.ca/eic/site/pbri-iafp.nsf/vwapj/Impact-regulatory-compliance-costs-business-perf-5.pdf/\\$file/Impact-regulatory-compliance-costs-business-perf-5.pdf](https://www.ic.gc.ca/eic/site/pbri-iafp.nsf/vwapj/Impact-regulatory-compliance-costs-business-perf-5.pdf/$file/Impact-regulatory-compliance-costs-business-perf-5.pdf)

UNDP. 2019a. Sustainable Development Goals: Deadline 2030, The SDG Decade of Action; United Nations Development Program. Accessible from: <https://www.undp.org/content/undp/en/home/sustainable-development-goals.html>

UNDP. 2019b. Sustainable Development Goals: Goal 13: Climate action; United Nations Development Program. Accessible from: <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-13-climate-action.html>

UNEP (date unknown). Legal Limits on Single-Use Plastics and Microplastics: A Global Review of National Laws and Regulations; United Nations Environment Programme. Accessible from: <https://www.unep.org/resources/report/legal-limits-single-use-plastics-and-microplastics>

WRAP. 2020. The UK Plastics Pact; Waste & Resources Action Programme. Accessible from: <https://wrap.org.uk/taking-action/plastic-packaging/the-uk-plastics-pact>

WRAP. 2015. Strategies to achieve economic and environmental gains by reducing food waste; Waste & Resources Action Programme. Accessible from: <https://wrap.org.uk/sites/default/files/2020-12/Strategies-to-achieve-economic-and-environmental-gains-by-reducing-food-waste.pdf>