



Benefitting the environment and ecologies by reducing plastic pollution

Plastic packaging hammer policies are not the answer

VCMI's commentary in response to [ECCC's August 1, 2023 consultation paper](#)

September 7, 2023

Authors:

Martin Gooch, PhD (Lead)
Delia Bucknell
Peter Whitehead, PhD

Key Contact:

Martin Gooch, PhD
CEO, Value Chain Management International
martin@vcm-international.com
+1 416.977.7779

Editor:

S. Caroline Glasbey

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

Acknowledgements

We would like to thank the packaging and industry experts who reviewed the draft report.

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. 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 copyright: ©Value Chain Management International Inc., September 2023.

Suggested Citation

Gooch, M., Bucknell, D., Whitehead P. 2023. Benefitting the environment and ecologies by reducing plastic pollution; Value Chain Management International; Ontario, Canada. Accessible from: <https://vcm-international.com/wp-content/uploads/2023/09/VCMI-commentary-on-ECCCs-August-consultation-paper-090723.pdf>

***For every complex human problem there is a solution that is simple,
easily communicated, and wrong.***

(Paraphrase of Henry L. Mencken, 1920)

Executive Summary

One of the greatest risks facing industry today is well-intended though poorly conceived policies. **Poorly conceived policies and the mechanisms required for their execution have the potential to worsen the issue(s) that they seek to address.** Policies and regulatory mechanisms must be based on empirical evidence. We agree with the overall aims and direction of policies and regulatory mechanisms published by Environment and Climate Change Canada (ECCC) regarding addressing plastic pollution; however, in our opinion, the detailed objectives published by ECCC in April and August 2023, particularly the latter, are unachievable and will lead to widespread unintended consequences.

Plastic has become a significant pollution issue in our society and must be addressed, though not in isolation of other environmental and economic considerations. How we arrived at the current situation, with literally thousands of plastic packaging solutions — each differing in their recyclability (or compostability), with only a small percentage of total plastic actually being recycled — is not by accident. Nor is it by accident that most municipalities' curbside and ICI (industrial, commercial and institutional) collection, recycling and composting programs differ. **The root causes of the current situation include a lack of common products, processes and infrastructure;** and all levels of government having implemented a mishmash of misaligned policies and regulations.

Governments' lack of effort and investment in the creation of an enabling environment distinctly limits what environmentally conscious businesses are able to achieve. This is particularly the case in fresh produce, where optimized packaging and merchandizing practices are crucial to enabling the transportation of perishable food over long distances, and meeting financially pressed consumers' demands for affordable convenience, freshness and value-added meal solutions.

Policy and regulatory actions need to be assessed in terms of their actual goal. The primary goal of the plastic packaging related policies and regulations proposed by ECCC is to benefit the environment and ecologies by reducing plastic pollution. The policies and mechanisms being proposed by ECCC strongly suggest that ECCC fails to recognize the scale of the conflated relationships that exist between pollution and GHG emissions. This includes the fact that **food loss and waste represents considerably higher pollution and GHG emissions concerns than packaging.**

To be effective, policies and the legislative mechanisms that enable their implementation must reflect systems thinking. Systems thinking ensures that stakeholders consider the whole picture, not individual silos, when developing solutions. It ensures against unintended consequences arising from policy decisions. Only by looking at the challenges of packaging, food system emissions and food system related pollution from a systems perspective can we address the root causes of today's situation to achieve long-lasting change that will produce significant sustainable economic and environmental benefits.

VCMI's commentary concludes with suggestions for how ECCC could forge constructive relationships with industry. This would result in considerably greater and more impactful outcomes than achievable by the execution of hammer policies that alienate industry, hurt consumers and the environment, and may lead to ECCC losing its credibility as an authoritative government body.

Table of Contents

Executive Summary	1
1 Introduction	3
2 Need for Constructive Dialogue	4
3 Pollution vs. Emissions.....	5
4 Systems Thinking	6
5 Putting Environmental Consequences in Perspective.....	7
6 Recommended Next Steps	9
7 Conclusions/Key Takeaways.....	11
8 Bibliography	13
9 Appendix: Canadian FLW & Plastic Packaging Scenarios.....	20
10 End Notes.....	21

1 Introduction

One of the greatest risks facing industry today is well-intended though poorly conceived policies. Poorly conceived policies and the regulatory mechanisms¹ required for their execution have the

Poorly conceived policies and the regulatory mechanisms required for their execution have the potential to worsen the issue(s) that they seek to address.

potential to worsen the issue(s) that they seek to address.ⁱ Our view is that policies and regulatory mechanisms must be based on empirical evidence. This requires that government draws on the work of quantitative empirical studies and collaborative discussions with subject matter experts to develop policy principles in private prior to the release of

public consultation documents. The policies and regulatory mechanisms that have been put out for consultation do not meet this test.

We agree with the overall aims and direction of policies and regulatory mechanisms published by Environment and Climate Change Canada (ECCC) regarding addressing plastic pollution; however, we take issue with the detailed objectives published by ECCC in [April](#)² and [August](#)³ 2023, particularly the latter. In our view, the objectives are unachievable and will lead to widespread unintended consequences that impact all concerned.ⁱⁱ

One size fits all hammer policies cannot achieve the same outcomes as carefully crafted approaches that see government engage industry in purposeful strategic collaboration.

As described in Value Chain Management International and Packaging Technology Research's (VCMI/PTR) 2021 whitepaper entitled "[Unwrapping the Arguments](#)," one size fits all hammer policies⁴ of the type proposed by ECCC cannot achieve the same outcomes as carefully crafted approaches that see government engage with industry in purposeful strategic collaboration.ⁱⁱⁱ When questionable data and

assumptions rather than the results of empirical scientific and economic studies are used to justify hammer policies and regulatory decisions, the potential for poorly conceived policies and regulations leading to unintended consequences rise exponentially.

The challenge facing industry and consumers is that activists find hammer policies and regulations appealing, because they create a false sense of effective action, for which they claim credit. Due to the true cost of implementation and enforcement, and the expected benefits of implementing hammer policies and legislation rarely materializing, hammer policies and their regulatory mechanisms become a deadweight loss on the national economy. Hammer policies and regulations also do not allow for optimal decision making and outcomes. They are therefore an ineffective and inefficient avenue to address complex issues.

¹ Since the listing of plastic as a toxic substance under schedule 1 of the Canadian Environmental Protection Act (CEPA), these policies and regulatory mechanisms include the unprecedented use of [Pollution Prevention \(P2\) notices](#) to forcibly change business practices occurring between retailers and their suppliers, and the nature of commercial relationships existing between the food industry and wider stakeholders, including packaging manufacturers and the waste management sector.

² [Recycled content and labelling rules for plastics: Regulatory Framework Paper](#) (ECCC, 2023a)

³ [Consultation document: Pollution prevention planning notice for primary food plastic packaging: Targets for reduction, reuse, redesign, and recycled content](#) (ECCC, 2023b)

⁴ Otherwise known as "single outcome policies," hammer policies are defined by [Soete \(2020\)](#) as a "(policy) tool to crush down quickly and radically through extreme measures."

2 Need for Constructive Dialogue

How we arrived at the current situation, with literally thousands of plastic packaging solutions — each differing in their recyclability (or compostability), with only a small percentage of total plastic actually being recycled — is not by accident. Nor is it by accident that most municipalities’ curbside and ICI (industrial, commercial and institutional) collection, recycling and composting programs

The root causes of the current situation include a lack of common products, processes and infrastructure.

differ. The root causes of the current situation include a lack of common products, processes and infrastructure; and all levels of government having implemented a mishmash of misaligned policies and regulations.

Governments’ lack of effort and investment in the creation of an enabling environment — the products, processes and infrastructure conducive to ensuring packaging circularity — distinctly limits what environmentally conscious businesses are able to achieve. Even though businesses have invested many millions of dollars on improved packaging practices, those same businesses are criticized by government and activist groups for not doing enough. That is not to say that the overall food industry (and other industries) could not and needs not to do more to address plastic pollution.

Seeking to address plastic pollution by introducing hammer policies is nonsensical.

Seeking to address plastic pollution by introducing hammer policies, such as outlawing plastic packaging within individual sectors or the entire food industry per se, is nonsensical and will undoubtedly create widespread unintended consequences for

industry and consumers. In the food sector, optimized⁵ packaging is critical to providing consumers with year-round access to safe, affordable, nutritious food, while minimizing the overall environmental and ecological impacts of food production and distribution.

This is particularly the case in fresh produce, where optimized packaging plays a crucial role in enabling the transportation of perishable food over long distances, and meeting financially pressed

Optimized packaging plays a crucial role in enabling the transportation of perishable food over long distances.

consumers’ increasing demands for convenience, freshness and value-added meal solutions.^{iv} Opportunities to increase the sale of fresh produce (and other food) in bulk or packaging in materials other than plastic exist, though they are finite and product/market specific.^v Expecting the entire fresh produce

industry to transition away from plastic packaging within five years, without negatively impacting consumer choice, food affordability, food availability, food safety, and subsequently food security, is fanciful. Hence the need for pragmatic approaches to address environmental and ecological issues.

The need for constructive dialogue extends to viewing the present situation in context.

The need for constructive dialogue extends to viewing the present situation in context. For example, the protagonists Environmental Defence^{vi} (referenced in ECCC’s document) portray an inaccurate perspective of plastic packaging in the Canadian food industry. They report individual SKUs⁶ versus the

⁵ The term “optimized packaging” describes achieving a balance between minimizing food waste and minimizing the environmental impacts of food and packaging waste: [WRAP](#), [AMERIPEN](#), [DEFRA](#), and [NZWC](#).

⁶ Stock-keeping unit — a unique number combination used by retailers to identify and track discrete products.

total volume of plastic in relation to total food sales. The total volume of fresh produce sold prepacked in plastic in Canada is approximately 40 percent. That is considerably less than that sold prepackaged in the UK, with WRAP (2023:24) having stated that, although many UK fresh produce

The percentage of fresh food products sold prepackaged is generally much higher in other numerous countries than in North America.

items are available in loose format, “most items are currently packaged (in plastic).”^{vii} Across all fresh foods, the percentage of products sold prepackaged is generally much higher in other numerous countries than in North America.^{viii} These comparisons illustrate the extent to which accusations that the Canadian food industry has run amuck in its use of plastic, and packaging in general, are unfounded.

3 Pollution vs. Emissions

Policy and regulatory actions need to be assessed in terms of their actual goal. The primary goal of the plastic packaging related policies and regulations proposed in April and August of this year by ECCC is to benefit the environment by reducing plastic pollution.

The waste management hierarchy is in its simplest form: “Reduce, Reuse, Recycle.” The current ECCC policies are narrowly focused on the “Reduce” level of this hierarchy in relation to plastic packaging without considering the wider implications. ECCC’s polarized perspectives fail to take into account that 1) the food industry has heavily invested in ways to reduce the volume of plastic packaging used per item/kg of food, and utilize readily recyclable⁷ plastic or alternative materials wherever possible; 2) all reusable packaging has a finite life cycle and will enter waste management streams at some point; and 3) numerous alternative packaging materials have a higher environmental footprint, and are more difficult to reuse or recycle than the types of plastic⁸ most commonly used by the food industry. This includes compostable packaging.

Plastic has become a significant pollution issue in our society and must be addressed. However, addressing the plastic pollution issue without considering GHG emissions of the food system and other forms of food and packaging related pollution is negligent.^{ix} When plastic packaging is manufactured from recycled materials and designed for recyclability, and then recycled, there are multiple instances where plastic provides considerably greater pollution and GHG benefits than

Allowing industry to utilize the most appropriate packaging available plays a key role in ensuring economic and environmental optimization.

those that are achievable by any other currently available packaging material. It is therefore essential that the food-system is optimized to minimize its environmental and ecological impact. Allowing industry to utilize the most appropriate packaging available plays a key role in ensuring economic and environmental optimization.^x

The policies and mechanisms being proposed by ECCC strongly suggest that ECCC fails to recognize the scale of the conflated relationships that exist between pollution and GHG emissions.

⁷ Or other environmentally conscious forms of plastic, such as compostable.

⁸ Plastics used in the greatest volume by the food industry and readily recyclable include PET, HDPT, LDPT, and PP.

Successfully addressing both issues is vital to society’s wellbeing. However, addressing each issue requires the creation and execution of complementary solutions.

Environmental pollution comes in many forms. As described in VCMI/PTR’s “[Unwrapping the Arguments](#)” and VCMI’s “[Aligning Government and Industry Within Value Chain Solutions](#),” the creation of economically and environmentally sustainable packaging and food circular economies rely on addressing both market dysfunctionalities and value chain dysfunctionalities. Different arms of government have distinct roles to play in enabling and ensuring that the required changes occur.

ECCC’s latest proposal of forcing changes to food packaging practices by issuing retailers with P2 notices under CEPA directly conflicts with other ministry’s jurisdictions and mandates. This includes 1) the Competition Bureau’s [mandate](#) of ensuring healthy competition and equitable market opportunities amongst any sized businesses within the Canadian grocery industry; and 2) Agriculture

The unintended consequences of policies proposed by ECCC will negatively impact Canada’s ability to meet its SDG commitments.

and Agri-Food Canada’s [mandate](#) of assisting Canada’s agricultural and agri-food industry to build climate resiliency, reduce food loss and waste (FLW), strengthen food security, and reduce its environmental emissions. The unintended consequences of policies proposed by ECCC will also negatively impact Canada’s ability to meet its SDG⁹ commitments.^{xi}

ECCC should focus on assisting industry and motivating provinces/municipalities to collaborate on the creation of an enabling environment suited to establishing circular economies for packaging — by standardizing plastic packaging products and processes, and creating the infrastructure required to establish common waste management practices across the country. The extended producer

More federal coordination is required to ensure the creation of common standardized and workable regulations and practices across the country.

responsibility (EPR) programs being established by provinces will form part of this process, though much more federal coordination is required to ensure the creation of common standardized and workable regulations and practices across the country. This should include carefully designed economic mechanisms for driving purposeful change across entire packaging and food value chains.

4 Systems Thinking

Sections four and seven of the federal [Cabinet Directive of Regulation](#) state that ministers, along with the federal departments and agencies that they represent, must consider all ramifications

Policy makers need to be acutely conscious of the dangers that are inherently associated with hammer-style policies and approaches.

while policies and associated mechanisms are in development, then monitor their effect once implemented. Policy makers therefore need to be acutely conscious of the dangers that are inherently associated with hammer-style policies and approaches. The only exemptions to this directive apply in “exceptional circumstances, when approved by Cabinet.”¹⁰

⁹ [United Nations Sustainable Development Goals](#)

¹⁰ [Appendix: roles and responsibilities](#)

To be effective, policies and the legislative mechanisms that enable their implementation must reflect systems thinking.¹¹ Systems thinking ensures that stakeholders consider the whole picture, not individual silos, when developing solutions. It also ensures against unintended consequences arising from policy decisions. Only by looking at the challenges of packaging, food system related emissions and food system related pollution from a systems perspective can we identify and address the root causes of today's situation in order to achieve substantial long-lasting change that will produce significant sustainable economic and environmental benefits.

To achieve sustainable systemic change stakeholders must:

- Fully understand the system
- Determine the correct management principles from the get-go
- Standardize materials and migrate to a situation of fewer resins and packaging materials

Understanding the system includes understanding the food system and the life-cycle of plastic packaging. In their 2019 study, Zheng & Suh “demonstrates the need for integrating energy, materials, recycling and demand-management strategies to curb the growing life-cycle GHG emissions from plastics.”

Canada needs legally enforceable standards and specifications that encompass the complete packaging solution, not individual components.

Certain plastics, additives, adhesives, inks, and material combinations should not be allowed for any type of packaging, not just food packaging. Canada needs legally enforceable standards and specifications that encompass the complete packaging solution, not individual components — and certainly not carte blanche approaches that essentially view all plastic packaging as bad, and all alternatives as good.

Governments need to work with industry to establish negotiated agreements; then drive change by using industry's expertise to determine how the system (the combination of products, processes and infrastructure mentioned earlier) should operate to ensure that the packaging systems exhibits the desired outcomes — in this case, minimum pollution and significantly lower GHG emissions.

5 Putting Environmental Consequences in Perspective

VCMI has conducted a number of empirical studies to provide evidence-based results and pragmatic context from which sound policies and mechanisms can be developed.

The following scenarios (illustrated in Figure 5-1) exemplify the relationship between FLW and plastic packaging, and were published by VCMI/PTR in “[Unwrapping the Arguments](#).” Because food waste management options, such as composting and upcycling, represent minimal reductions in avoidable GHG emissions when compared to the prevention of FLW occurring, they are not considered in the scenarios presented below. Scenarios that do include the composting of food

¹¹ Definitions of systems thinking and its importance for successfully addressing complex issues from government, public policy and business practice perspectives include [OECD](#), [WEF](#) and [VCMI 2021 / 2016](#).

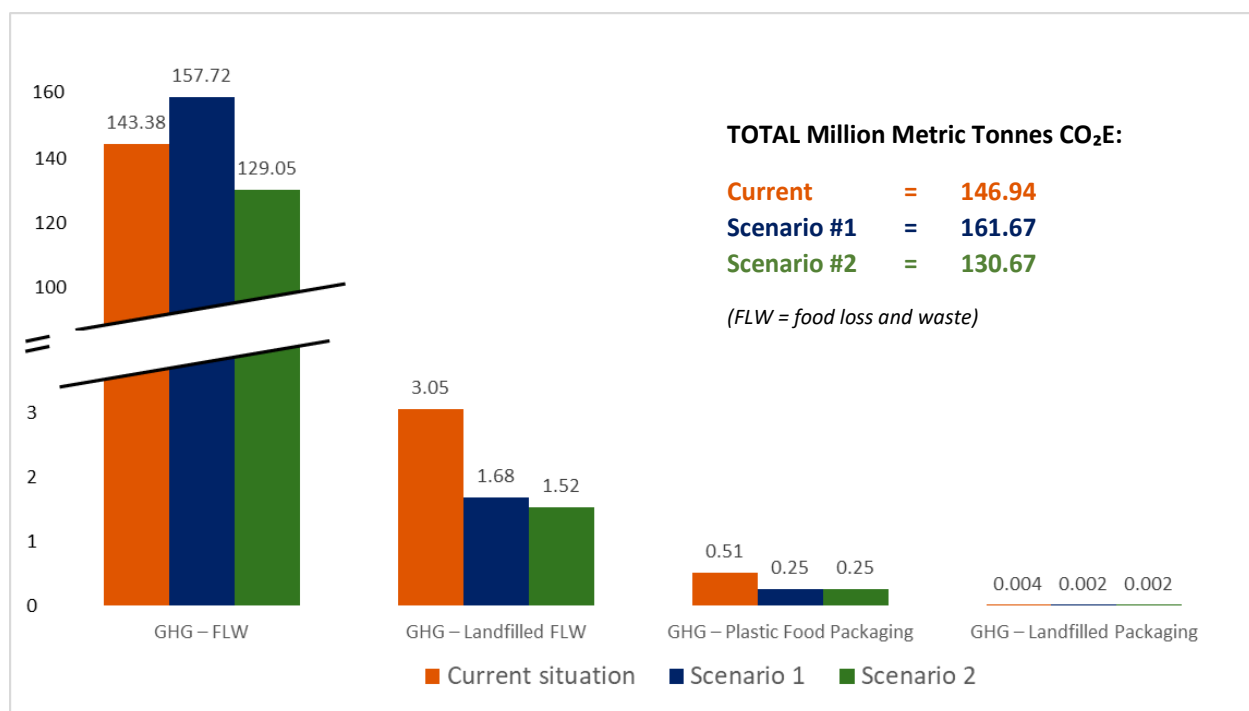
were produced by VCMi for the [National Zero Waste Council, RECYC-QUEBEC, Eco Enterprises Quebec and PAC North America](#).^{xii}

The orange bars represent the **current situation** of emissions from FLW and packaging, plus the additional emissions created by their landfilling. It is currently estimated to total 146.9 million metric tonnes of CO₂E.

The blue bars represent **Scenario #1**, in which the GHG of packaging has been halved by optimizing the volume¹² of packaging used and increasing recycling rates. However, if achieving this outcome requires industry to utilize less effective (fit for use) packaging than previously, it would result in a 10 percent increase in FLW and landfilled FLW. The total CO₂E emissions would subsequently increase by 14.7 million metric tonnes.

The green bars represent **Scenario #2**, in which packaging material management remains unchanged from Scenario #1. However, the utilization of effective¹³ packaging, combined with more effective management of food systems¹⁴ to reduce FLW, would result in a 10 percent reduction in FLW and a 50 percent reduction in landfilled FLW below current levels. The resulting total CO₂E emissions would subsequently decrease by 16.3 million metric tonnes compared to the status quo. The assumptions that lie behind the scenarios form the Appendix.

Figure 5-1: Canada Green House Gases (CO₂E)



¹²Packaging solutions are redesigned to prevent any excess use of materials.

¹³ The packaging is best fit-for-purpose in respect to its ability to protect, preserve and promote the products contained within, and be designed for recycling, while simultaneously ensuring the minimum use of materials.

¹⁴ This would include 1) inter- and intra-business supply chain optimization to increase operational efficiencies and reduce transaction costs, 2) merchandizing practices tailored to specific markets and products, and 3) enhanced consumer communication leading to less household food waste.

Fluctuations in FLW represent considerably greater changes in GHG emissions than those related to fluctuations in packaging.

As can be seen from the above scenarios, fluctuations in FLW represent considerably greater changes in GHG emissions than those related to fluctuations in packaging. This is because packaging manufactured from virgin materials typically equates to five percent or less of food products' total environmental footprint.^{xiii} Of all packaging materials, plastic typically exhibits

the lowest GHG emissions. A further 30 to 90+ percent reduction in plastic packaging related GHG emissions is achievable if manufactured from recycled materials. It is from this type of objective empirical evidence that ECCC policies and regulations should draw.

While the above scenarios are focused on GHG emissions, the impact that changes in FLW have on multiple forms of pollution is more difficult to quantify, though should not be ignored. This is because food waste represents the unnecessary production, processing and distribution of food. It also represents the unnecessary use and potential pollution of water. Forms of pollution associated with FLW include chemicals and fertilizers applied during crop and animal production; energy used by machinery, equipment, and transportation at all levels of the food chain; and the energy and natural resources used to produce agricultural inputs (fertilizers, pesticides, herbicides).

6 Recommended Next Steps

There is an urgent need for ECCC to establish constructive dialogue with industry and wider expert stakeholders.

Instead of continuing down the road of issuing hammer policies and regulations that demonstrate ECCC's lack of knowledge and understanding of the complexities surrounding food packaging decisions, there is an urgent need for ECCC to establish constructive dialogue with industry and wider expert

stakeholders. Failure to do so will further alienate ECCC from the food and packaging industry, and may well lead to ECCC losing its credibility as an authoritative government body. This would be unfortunate for all concerned.

Particularly in federated countries, "where provinces/territories and municipal governments can impede efforts by having implemented conflicting (packaging related) regulations and misaligned systems,"¹⁵ negotiated agreements have proven an effective means to align government and industry in the design and execution of systems-based solutions.

Negotiated agreements would see ambitious though achievable performance targets developed between visionary leaders from government and industry.

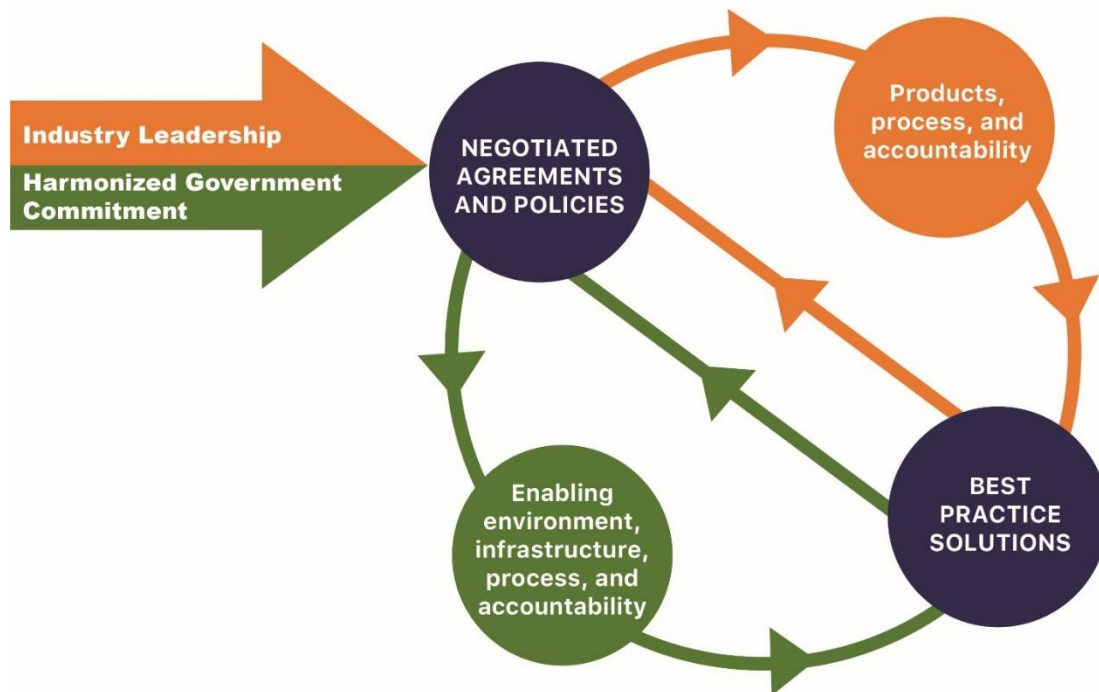
- Government would be responsible for assisting the creation of an enabling environment suited to motivating and assisting the food and plastic packaging industry to significantly reduce the environmental pollution and GHG emissions associated with plastic packaging and food. This would include enacting legislation that places accountability of industry to achieve agreed targets.
- Industry would be responsible for investing in the design and execution of purposeful precompetitive solutions, and accountable to government for meeting agreed targets.

¹⁵ [Unwrapping the Arguments](#) (2021:4)

- Continual discourse between government and industry would drive continual improvement from a systems perspective, and prevent decisions by government or industry that are later regretted due to them having led to unintended consequences.

A schematic of a workable outcome driven approach to achieve purposeful change through the creation of negotiated agreements between industry and government is shown below in Figure 6-1. For a fuller explanation of how negotiated agreements operate, and their value for successfully addressing complex issues facing government and industry, see VCMI/PTR's [2021](#) and VCMI's [2016](#) whitepapers.

Figure 6-1: Reiterative Industry/Government Alignment



NEGOTIATED AGREEMENTS AND POLICIES

Industry:

- Adopts targets

Government:

- Ensures consistent policies between departments and jurisdictions

Products, process and accountability

Industry:

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

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

BEST PRACTICE SOLUTIONS

Canada and US deliver best practice:

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

7 Conclusions/Key Takeaways

Key to establishing economically and environmentally sustainable circularity of plastic packaging (and food systems generally) is the execution of carefully devised economic mechanisms. Without doubt, plastic pollution must be addressed. Vilifying one form of packaging over another in isolation of other considerations and driving arbitrary increases in the comparative volume of items sold in bulk versus packaged, and the materials in which foods are packed, will have significant unintended consequences for industry and consumers.

VCMI's three critical government/industry recommended actions to successfully address plastic pollution without risking the arising of unintended consequences:

1. Government and industry (both food and packaging industries) must devise then execute collaborate solutions to minimize pollution and life-cycle GHGs associated with packaging and the food system, including FLW.
2. Government must incentivize and assist industry to address barriers that inhibit the establishment of circular packaging economies. This includes the creation of an effective and economically sustainable recycling sector and market system for recycled materials.
3. Industry must be the driving force for change, setting bold targets and determining the optimum value proposition^{xiv} for discrete items purchased by consumers in pre-packed format versus bulk, and the correct format in relation to distinct markets.

Key Takeaways

1	Hammer policies are an unnecessarily high risk approach to address complex problems, particularly when the proposed mechanisms for change are out of context and untested in relation to the problem(s) seeking to be addressed.
2	Policies must recognize the scale of the conflated relationships that exist between plastic pollution and GHG emissions. Addressing both issues is vital, though addressing each issue requires the execution of complementary solutions.
3	ECCC urgently needs to establish constructive dialogue with industry on addressing plastic pollution. Failure to do so could well result in ECCC losing its credibility as an authoritative government body.

4	The topic of plastic pollution cannot be viewed in isolation. Doing so will undoubtedly lead to widespread unintended consequences.
5	The need for negotiated agreements is particularly critical in Canada's federated system, where provinces/states and municipal governments can impede change initiatives by having implemented conflicting regulations and misaligned systems.
6	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 to address plastic pollution.
7	Government-implemented policies, regulations and programs need to incentivize and assist industry to address barriers that have historically inhibited the formation of circular packaging economies.
8	Successive governments' failure to adequately influence the three factors conducive to ensuring packaging circularity (products, processes and infrastructure) distinctly limits what environmentally conscious businesses are able to achieve.

8 Bibliography

AMERIPEN. 2018. Quantifying the Value of Packaging: As a Strategy to Prevent Food Waste in America; From Research Completed by Gooch, M., Bucknell, D., Whitehead, P.; AMERIPEN.

Accessible from:

<https://c.ymcdn.com/sites/www.ameripen.org/resource/resmgr/files/AMERIPENWhitePaper-FoodWast.pdf>

ANON. 2022a. 2022-2023 Departmental Plan; Agriculture and Agri-Food Canada; Government of Canada; Date Last Modified: February 10, 2022. Accessible from:

<https://agriculture.canada.ca/en/departement/transparency/departemental-plan/2022-2023>

ANON. 2022b. Our Mandate; Competition Bureau Canada; Government of Canada; Last Modified January 20, 2020. Accessible from:

<https://ised-isde.canada.ca/site/competition-bureau-canada/en/how-we-foster-competition/our-organization/our-mandate>

ANON. 2020c. Cabinet Directive on Regulation; Treasury Board of Canada Secretariat; Government of Canada; Last Modified November 19, 2020. 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>

APCO. 2021. Legislative review: Used packaging NEPM and the Australian Packaging Covenant; Australian Packaging Covenant Organization. Accessible from:

<https://apco.org.au/news/20Y4a00000000YiEAI>

Bachmann, M., Zibunas, C., Hartmann, J., Tulus, V., Suh, S., Guillén-Gosálbez, G., Bardo, A. 2023. Towards circular plastics within planetary boundaries; Nature Sustainability; 6, 599–610.

<https://doi.org/10.1038/s41893-022-01054-9>

Arpe, J., Dumon, Q. (eds.). 2016. “To the Man with a Hammer...” Augmenting the Policymaker’s Toolbox for a Complex World; Bertelsmann Stiftung. Accessible from: https://www.bertelsmann-stiftung.de/fileadmin/files/BSt/Publikationen/imported/leseprobe/1_679_Leseprobe.pdf

Boisacq P, De Keuster M, Prinsen E, Jeong Y, Bervoets L, Eens M, Covaci A, Willems T, Groffen T. 2023. Assessment of poly- and perfluoroalkyl substances (PFAS) in commercially available drinking straws using targeted and suspect screening approaches. Food Addit Contam Part A Chem Anal Control Expo Risk Assess. 2023 Aug 24:1-12. Accessible from:

<https://pubmed.ncbi.nlm.nih.gov/37619405/>

Börkey, P., Glachant, M., Lévêque, F. 1999. Voluntary Approaches for Environmental Policy in OECD 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>

Brennan, L., Parker, L., Schivinski, B., Jackson, M., Pochun, T., Florence, E., Langley, S., Hill, A., Ryder, M., Lockrey, S., Verghese, K., Francis, C., Sherman, A., Alessi, N., Phan-Le, N. T., and Chorazy, E. 2023. Consumer perceptions of the role of packaging in reducing food waste: Final Project Report. Fight Food Waste Cooperative Research Centre, Adelaide, Australia. Accessible from:

https://fightfoodwastecrc.com.au/wp-content/uploads/2023/02/Consumer_Perceptions_final_report.pdf

Brennan, L., Langley, S., Verghese, K., Lockrey, S., Ryder, M., Francis, B., Phan-Le, N.T., Hill, A. 2021. The Role of Packaging in Fighting Food Waste: A Systematised Review of Consumer Perceptions of Packaging; Journal of Cleaner Production; Vol 281, 25 January 2021, 125276; Science Direct.

Accessible from: <https://doi.org/10.1016/j.jclepro.2020.125276>

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>

Carney Almroth, B., Carle, A., Blanchard, M., Molinari, F., Agathe Bour, A. 2023. Single-use Take-Away Cups of Paper Are as Toxic to Aquatic Midge Larvae as Plastic Cups; Environmental Pollution, Volume 330, 1 August 2023, 121836. Accessible from:

<https://doi.org/10.1016/j.envpol.2023.121836>

Chung, E. 2023. Is plastic-free plastic even possible?; What on Earth; CBC; August 17, 2023.

Accessible from: <https://www.cbc.ca/news/science/what-on-earth-plastic-free-plastic-certification-1.6939398>

Clement, D. 2023. Banning plastic food packaging would be a second big plastics mistake; Opinion, Financial Post; August 23, 2023. Accessible from: <https://financialpost.com/opinion/banning-plastic-food-packaging-second-big-plastics-mistake>

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

Conway, C. 2023. Unpacking the Opportunity: Pathway to Selling More Uncut Fresh Fruit and Vegetables Loose; March 2023; WRAP. Accessible from:

https://wrap.org.uk/sites/default/files/2023-03/UK_PlasticsPact_PathwaytoLoose_0.pdf

Corbin, T. 2023. Major Waste and Packaging Reforms Must Not Be Rushed, says ACS; Talking Retail: News; August 30, 2023. Accessible from: <https://www.talkingretail.com/news/industry-news/major-waste-and-packaging-reforms-must-not-be-rushed-says-ac-30-08-2023/>

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. 2009. 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. 2019. Pollution Prevention Planning Provisions of Part 4 of The Canadian Environmental Protection Act, 1999: Guidelines, Third Edition; Environment and Climate Change Canada; Government of Canada. Accessible from: <https://www.canada.ca/en/environment-climate-change/services/pollution-prevention/planning-notices/guidelines.html>

ECCC. 2020a. National Waste Characterization Report: The Composition of Canadian Residual Municipal Solid Waste; Environment and Climate Change Canada; Government of Canada. Accessible from: https://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf

ECCC. 2020b. 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: <https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/plastics-proposed-integrated-management-approach.html>

ECCC. 2023a. Recycled Content and Labelling Rules For Plastics: Regulatory Framework Paper; Environment and Climate Change Canada; Government of Canada; May 5, 2023. Accessible from: <https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/recycled-content-labelling-rules-plastics.html>

ECCC. 2023b. Consultation document: Pollution Prevention Planning Notice for Primary Food Plastic Packaging: Targets for Reduction, Reuse, Redesign, And Recycled Content; Environment and Climate Change Canada; Government of Canada; May 5, 2023. Accessible from: <https://www.canada.ca/en/environment-climate-change/corporate/transparency/consultations/consultation-pollution-prevention-planning-notice-primary-food-plastic-packaging.html>

ESDC (Employment and Social Development Canada). 2022. Taking Action Together: Canada's 2021 Annual Report on the 2030 Agenda and the Sustainable Development Goals; Employment and Social Development Canada; Government of Canada. Accessible from: https://www.canada.ca/content/dam/esdc-edsc/documents/programs/agenda-2030/sdg_taking-action-together-aoda.pdf

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

Europatat. 2023. Sustainable Packaging Should Be Based On Realistic, Fair and Feasible Targets for Environmental Impact Reduction; Fresh Plaza; March 23, 2023. Accessible from: <https://www.freshplaza.com/north-america/article/9513992/sustainable-packaging-should-be-based-on-realistic-fair-and-feasible-targets-for-environmental-impact-reduction/>

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., 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., 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., 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., Whitehead, P. 2017. Quantifying Packaging's Potential to Prevent Food Waste, Produced for AMERIPEN by Value Chain Management International". Accessible from: <https://vcm-international.com/wp-content/uploads/2023/08/Quantifying-Packagings-Potential-to-Prevent-Food-Waste-May-2017.pdf>

Gooch, M., Dent, B., Felfel, A.S., Vanclief, L., Whitehead, P. 2016. Food Waste: Aligning Government and Industry Within Value Chain Solutions; Value Chain Management International. Accessible from: <https://vcm-international.com/wp-content/uploads/2016/10/Food-Waste-Aligning-Government-and-Industry-VCMI-Oct-4-2016.pdf>

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. Accessible from: <https://vcm-international.com/wp-content/uploads/2021/05/Packaging-and-Food-Waste-Unwrapping-the-Arguments-FULL-PAPER-051821.pdf>

Government of Canada. 2023. Canada and the Sustainable Development Goals; Employment and Social Development Canada; Government of Canada. Accessible from: <https://www.canada.ca/en/employment-social-development/programs/agenda-2030.html>

Greenfield, S., Boot, P. 2023. Will paper packaging be capable of replacing plastic?; Fresh Plaza; March 23, 2023. Accessible from: <https://www.freshplaza.com/north-america/article/9515653/will-paper-packaging-be-capable-of-replacing-plastic/>

Hammer, M., Peet, J. Vincken, M. 2009. Coping with uncertainty: Accountability Challenges in Global Climate Governance; Briefing Paper Number 123, December 2009; One World Trust. Accessible from: <https://globalclimategovernance.org/sites/default/files/publications/testmanager/Coping%20with%20uncertainty%20OWT%20Briefing%20123%202009.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

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>

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>

Koundouri, P., Hammer, B., Kuhl, U., Velias, A. 2023. Behavioral Economics and Neuroeconomics of Environmental Values; Annual Review of Resource Economics; V.15, Review in Advance first posted online on July 7, 2023. Accessible from: <https://doi.org/10.1146/annurev-resource-101722-082743>

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/Aruna_Kumarankandath.pdf

Lockrey, S., Verghese, K., Danaher, J., Newman, L., Barichello, V. 2019; The Role Of Packaging For Australian Fresh Produce; Australian Fresh Produce Alliance. Accessible from:

<http://freshproduce.org.au/resources/>

Mencken, H.L. 1920. Prejudices: Second Series; Chapter IV; The Divine Afflatus; Jonathon Cape Publishing; Project Gutenberg. Accessible from: <https://www.gutenberg.org/ebooks/53467>

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

Parkinson, L. 2023. Measuring trade-offs between packaging waste and food waste; Food Packaging Forum; April 21, 2023. Accessible from: <https://www.foodpackagingforum.org/news/measuring-trade-offs-between-packaging-waste-and-food-waste>

Parry, A., White, H. WRAP. 2019. Evidence and Insights Informing Updated Guidance Aimed At Reducing Fresh Produce Waste and Plastic Packaging; WRAP. Accessible from: <https://wrap.org.uk/sites/default/files/2022-01/WRAP-Evidence-informing-guidance-on-fresh-produce-2019.pdf>

Parry, A., James, K. LeRoux, S. 2015. Strategies to achieve economic and environmental gains by reducing food waste; WRAP. Accessible from: <https://wrap.org.uk/sites/default/files/2020-12/Strategies-to-achieve-economic-and-environmental-gains-by-reducing-food-waste.pdf>

Quested, T., Devine, R., Herszenhorn, E., White, E., Palmer, G., Jasper, J. 2023. Helping People to Reduce Fresh-Produce Waste: Modelling the Impact Of Selling Products Loose Or In Packaging; WRAP. Accessible from: <https://wrap.org.uk/sites/default/files/2022-02/Modelling-the-impact-of-selling-products-loose-or-in-packaging.pdf>

Russell, M. 2019. Packaging fresh produce helps reduce food waste, according to new report; Fresh Plaza; September 24, 2019. Accessible from: <https://www.freshplaza.com/north-america/article/9146700/packaging-fresh-produce-helps-reduce-food-waste-according-to-new-report/>

Soete, L. 2020; Hammer or Nudge? Science Based Policy Advice in the COVID-19 Pandemic; Research Gate; May 2020. Accessible from:

https://www.researchgate.net/publication/344327892_Hammer_or_nudge_Science_based_policy_advice_in_the_COVID-19_pandemic

Tönurist, P., Rovenskaya, E., Mechler, R., Wagner, F., Linnerooth-Bayer, J. 2023; Introducing Systems Thinking into Public Sector Institutions: Learning by Doing?; Systemic Thinking for Policy Making : The Potential of Systems Analysis for Addressing Global Policy Challenges in the 21st Century; OECD Library. Accessible from: <https://www.oecd-ilibrary.org/sites/3a9acaa6-en/index.html?itemId=/content/component/3a9acaa6-en>

Tooley, C. 2021. What 'Systems Thinking' Actually Means - And Why It Matters For Innovation Today; World Economic Forum: Innovation; January 18, 2021. Accessible from: <https://www.weforum.org/agenda/2021/01/what-systems-thinking-actually-means-and-why-it-matters-today/>

United Nations. 2023. The 17 Goals; Department of Economic and Social Affairs: Sustainable Development; United Nations. Accessible from: <https://sdgs.un.org/goals>

United Nations Environment Programme. 2022. Single-use supermarket food packaging and its alternatives: Recommendations from life cycle Assessments; UNEP Nairobi: Accessible from: https://www.lifecycleinitiative.org/wp-content/uploads/2022/10/UNEP-D010-Food-Packaging-Report_Final-Version-1-1.pdf/UNEP-D010-Food-Packaging-Report-2-1.pdf

UP Scorecard. 2022. The Understanding Packaging (UP) Scorecard. Accessible from: <https://upscorecard.org/#get-started>

Wirsig, K. 2023. Left Holding the Bag: A Survey of Plastic Packaging in Canada's Grocery Stores; Environmental Defense. Accessible from: <https://environmentaldefence.ca/wp-content/uploads/2023/04/Left-Holding-the-Bag-A-Survey-of-Plastic-Packaging-In-Canadas-Grocery-Stores-1.pdf>

Wood, Z., Packham, A., Skopeliti, C. 2023. Change is always difficult': from no lids to vac-packs, the war on plastic packaging divides opinion; The Guardian; April 14, 2023. Accessible from: <https://www.theguardian.com/business/2023/apr/14/change-is-always-difficult-from-no-lids-to-vac-packs-the-war-on-plastic-packaging-divides-opinion>

Zheng, J., Suh, S. 2019. Strategies to reduce the global carbon footprint of plastics. Nature: Climate Change; Vol. 9, 374–378 (2019). <https://doi.org/10.1038/s41558-019-0459-z>

9 Appendix: Canadian FLW & Plastic Packaging Scenarios

		Million Metric Tonnes	Million Short Tons	GHG Emissions Metric Tonnes CO2E per Short Ton of Material ¹⁶	GHG (MTCO2E)
Current Situation¹⁷	Current FLW	35.54	39.18	3.66	143.38
	Landfilled Waste	5.53	6.10	0.50	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
	Landfilled Waste	6.70	7.38	0.50	3.69
	Food Packaging	0.12	0.13	1.94	0.25
	Landfilled Packaging	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
	Landfilled Waste	2.49	2.74	0.50	1.37
	Food Packaging	0.12	0.13	1.94	0.25
	Landfilled Packaging	0.09	0.10	0.02	0.002
				TOTAL	130.67

¹⁶ EPA WARM Model V.15, Parry et al (WRAP), 2015

¹⁷ Sources: ECCC 2020a; ECCC 2020b, Gooch et al, 2019; Gooch et al, 2020; Confidential Industry Data
Value Chain Management International Inc.

10 End Notes

- ⁱ Corbin, 2023; Carney Almroth et al, 2023; Boisacq et al, 2023; VCMi, 2021; Koehler, 2019; Arpe & Dumon, 2016; Kitching et al, 2015; OEC, 2014; Parker and Kirkpatrick, 2012; Kumarankandath, 2010; DEFRA, 2009.
- ⁱⁱ Brennan et al., 2023; Gooch et al, 2021; Gooch et al, 2020; Brennan et al, 2021
- ⁱⁱⁱ Koundouri et al, 2023; Europatat. 2023; Corbin, T. 2023; Kitching et al, 2015; DEFRA. 2009; Gooch et al, 2021; Gooch et al, 2016; Coglianese, G. 2012; OECD, 2014
- ^{iv} Brennan, 2023; Greenfield & Boot, 2023; Brennan et al., 2023; Brennan et al, 2021; Gooch et al, 2020; Lockrey et al, 2019; Gooch et al, 2019; Russell, 2019; AMERIPEN, 2018
- ^v Qusted et al, 2023; Brennan et al, 2023; Brennan et al., 2021; Gooch et al, 2020; Lockrey et al, 2019; Gooch et al, 2019; Parry & White, 2019
- ^{vi} Wirsig, 2023
- ^{vii} Qusted et al, 2023; Brennan et al, 2023
- ^{viii} AMEFRIPE, 2018
- ^{ix} Carney Almroth et al, 2023; Gooch et al, 2020; Europatat, 2023; DEFRA, 2009
- ^x <https://www.sciencedirect.com/science/article/abs/pii/S0959652620353208?via%3Dihub>; Brennan et al. 2023; Clement, 2023; Qusted, 2023; DEFRA, 2009; Gooch et al, 2020; Gooch et al, 2017; APCO. 2021; Parry et al, 2015
- ^{xi} UN, 2023; Government of Canada, 2023; ESDC, 2022
- ^{xii} Gooch et al, 2020
- ^{xiii} Gooch et al, 2020
- ^{xiv} Wood et al, 2023; Qusted et al, 2023; Brennan et al, 2023; Gooch et al, 2020; AMERIPEN, 2018; Parry et al, 2015