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Impact Analysis of Environment and Climate Change Canada's (ECCC) Pollution Prevention (P2) planning notice and PLU legislation on the Canadian Fresh Fruit and Vegetable Industry

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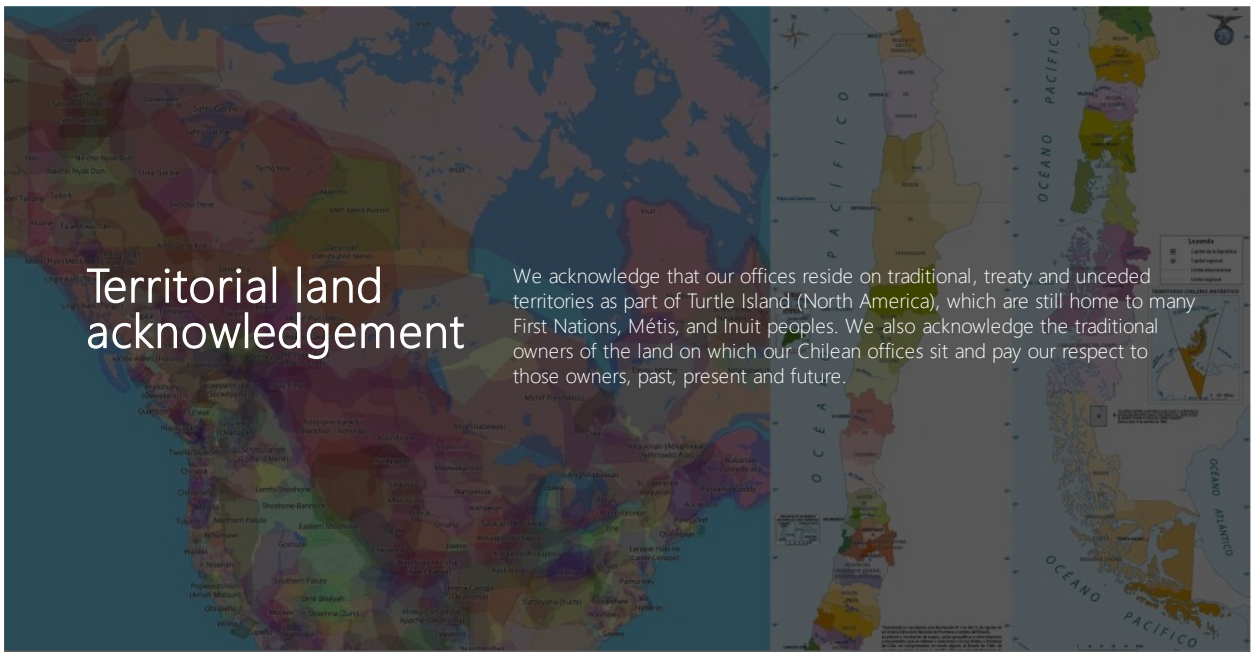


1. INTRODUCTION

1.1. Background

On April 18, 2023, ECCC published a Regulatory Framework Paper on Recycled content and labelling rules for plastics, which outlines targets for reducing plastic pollution. The proposed regulations would set requirements for Canadian businesses within the supply chain to prepare and implement a pollution prevention (P2) plan with an aim for zero plastic waste from primary food plastic packaging. [24]

The Canadian Produce and Marketing Association (CPMA) has a long history of representing companies that are active in the marketing of fresh produce in Canada from the farm gate to the dinner plate. As CPMA assesses the feasibility of the regulations, evaluates its impacts, and determines a course of action, effective communication with its members regarding the new ECCC regulations will be crucial to clarify how it will affect their business operations.

As the proposed implementation of the P2 Notice for 2026 and 2028 draws near and with the PLU regulations in consideration, CPMA is undertaking a comprehensive evaluation of the economic and sustainable impact that these constraints will have on the Canadian consumer ecosystem.

1.2. Objectives

For more than two decades, Deloitte has been at the forefront of guiding organizations toward sustainable value creation for their stakeholders. Committed to leading by example, Deloitte recognizes its responsibility in spearheading sustainability efforts and takes proactive strides to curtail its environmental footprint. Anchored by a set of core values—leading by example, fostering collaboration, acting with integrity, pursuing responsible growth, and empowering people—sustainability remains a linchpin in Deloitte's ethos.

The Canadian government, CPMA and Deloitte share the common goal of promoting sustainable practices and technologies that prevent pollution and waste generation, conserve resources, and reduce the environmental impact of industrial and commercial activities.

The continuous well-planned efforts currently being implemented to achieve these goals by stakeholders in the produce industry must also be acknowledged. There is commonality on achieving a cleaner and healthier environment for Canadians along with promoting economic growth and competitiveness of the Canadian market through the adoption of more efficient and sustainable practices.

Consequently, a systematic approach that benefits both the environment and the country's economy must be taken. Therefore, what follows is a thorough analysis of the current market conditions and a projection of the economic, supply chain and sustainability ramifications of implementing these regulations within the timeline specified by the Government of Canada.

This report will focus on the impacts of the following two proposed regulatory actions:

1) Ban of non-compostable plastic PLU stickers under the Labeling & Recycled Content Framework.
2) By way of a Pollution Prevention Plan Notice for Primary Food Packaging, that 75% of fresh fruits and vegetables are to be sold in bulk and/or plastic-free packaging by 2026, and 95% by 2028.

2. EXECUTIVE SUMMARY

The proposed non-compostable PLU ban, Pollution Prevention (P2) plan and its Risk Management Objective for fresh produce will result in considerable impacts to the economy, supply chain, and environment as currently formulated. This report examines the implications of the proposed ban of non-compostable plastic PLU stickers as well as the proposed Pollution Prevention Notice on the fresh produce supply chain, the environment, and the consumer. The report compares the impacts across three scenarios: the current baseline; the proposed regulations; and a scenario focused on the industry's development in recyclable plastic packaging. Proceeding with the ECCC regulations represents the most significant and adverse impact of all three scenarios on the produce industry and the cost and availability of fresh produce to Canadians.

2.1. Proposed ban of non-compostable plastic PLU stickers

A PLU is considered compostable only when the face, ink and adhesive are made of compostable material and the PLU must be acknowledged by a recognized certification body to be certified. Elimination of the non-compostable PLU stickers will adversely impact the Canadian produce market in several ways:

Removal of the PLU would lead to a shift from bulk to packaged produce which would result in:

- Consumers buying quantities beyond their immediate needs, directly contributing to an escalation of food waste.
- Limiting consumer options for purchasing produce leading to a decline in sales. It's estimated that a 10% reduction in produce sales could result in an annual revenue loss of $1B.

Although the present PLU stickers incur only a fraction of a cent per unit, transitioning to compostable PLU stickers could elevate sticker costs **by as much as 60%.** This cost disparity, despite the seemingly minimal expense per unit, could significantly impact growers when scaled against their sales volume, accumulating notable incremental costs over time.

The PLU stickers certified as compostable presently face adherence issues on certain produce surfaces and struggle with performance when exposed to varying humidity and temperature conditions.

The challenges of identifying bulk produce without a suitable compostable alternative can lead to decreased traceability, which in turn increases the risk of food waste due to the need to expand the breadth of a produce recall. In addition, there is a risk of contamination due to mold and microbial growth induced by water contact.

Challenges in differentiating organic produce, forcing a shift to packaging bulk organic produce at a higher cost and consequently a higher selling price to Canadians.

2.2. Proposed Pollution Prevention Notice (P2 Notice)

2.2.1. Supply Chain Impact

The proposed shift to bulk or plastic free packaging has implications on the produce market in Canada, namely:

Growers discontinuing shipments of produce into Canada because of the **increase in operational costs of up to 55%,** as estimated by those interviewed.

Growers might opt to shut down Canadian offices, leading to a cessation of services in Canada. Concurrently, Canadian packaging companies are considering boosting exports to the United States and establishing manufacturing facilities there, resulting in a detrimental effect on Canadian jobs and the economy.

Alternatives to plastic packaging fail to meet modified atmosphere requirements, potentially causing **a 50% increase in food waste**, as indicated by Grower responses.

A shift away from plastic packaged produce, preferred by some consumers for its ease of use and sanitary advantages. Clear plastic also enables food inspection by consumers, unlike opaque or non-transparent packaging.

With **lead times up to 15 days** from grower to retail store in rural areas, the availability and shelf life of non-plastic packaged produce would be adversely impacted.

2.2.2. Sustainability Impact

Considering the already high levels of produce waste in Canada, which contribute to 44.2 million MTCO2e GHG emissions, a potential 50% increase in food waste resulting from the transition to plastic-free packaging could add a staggering 22.1 million MTCO2e GHG emissions, significantly amplifying the negative environmental impact.

Both virgin and recycled plastic packaging provides substantial food safety advantages, protecting produce from bacterial contamination thus decreasing food recalls which helps reduce food waste throughout the supply chain.

2.2.3. Economic Impact

The economics for three scenarios were evaluated: the current state without the P2 Notice; a shift to recyclable plastics; and a shift to the proposed P2 Notice.

In the current state, for every dollar of produce purchased by the consumer, $0.33 goes to the grower, $0.19 goes to the distributor and the remaining $0.48 goes to the retailer.

Compared to the current dollar spent by the consumer on produce**, pricing increases by 5%** or $0.05 when shifting to recyclable plastics and **by 34%** or $0.34 when shifting in accordance with the proposed P2 Regulation.

A sensitivity analysis where only 60% of the estimated operational cost increases with the proposed P2 Notice are achieved still yields a considerable **consumer price increase of 20%**, or $0.20, based on a current dollar spent by the consumer.

Considering the heightened financial strain among Canadian consumers when purchasing groceries, further increments in produce costs may prompt shifts in buying behaviors. This shift might particularly affect the accessibility of produce for lower-income earners, potentially jeopardizing their ability to afford essential items.

2.2.4. Comparative Assessment of Scenarios

An assessment of the three scenarios presented in section 2.2.3 was conducted using five key criteria: Cost, Food Waste, Food Safety, Food Availability and Environmental Impact.

The P2 Notice scenario ranked poorly across all the criteria, highlighted by the lowest scores in the cost and food waste categories.

The Baseline and Recyclable Plastic scenarios scored similarly with a notable distinction being the improved environmental impact by further increasing the use and adoption of recyclable plastics.

The scenario with a shift to recyclable plastic packaging had the highest overall score while the scenario implementing the P2 Notice ranked last when assessed against the criteria.

3. IMPACT ANALYSIS OF THE PROPOSED REGULATIONS

In this section, a deep-dive analysis is conducted on the impact of the proposed regulations. Desktop research and interviews with key stakeholders were conducted to understand current pain points & challenges with respect to the regulations.

3.1. Proposed ban of non-compostable plastic PLU stickers

3.1.1. CPMA's strategy on PLU stickers

CPMA has deliberately taken a leadership role in the produce industry's effort to reduce and mitigate the use of non-compostable plastic packaging. In Spring 2023, CPMA worked with Canada's composting industry to provide guidance to support the voluntary transition to the use of industrial compostable PLUs with a specified non-restrictive timeline, to ensure Canada's PLU strategy is harmonized with international composting standards. A prescriptive non-compostable plastic PLU ban would lead to the following impacts:

3.1.2. Packaging volume impact

As PLU stickers are used by all major outlets across Canada to ensure price accuracy at check-out and inventory control of fresh produce. Should these stickers become unavailable, there would likely be a **shift toward increased packaging of produce** in various material types such as plastic, fiber, or paper, to fulfill these vital functions.

Moreover, stickers play an **extensive role in the organic produce industry** as a means of labeling, **allowing differentiation in the market**. Should cost-efficient stickers face a ban, the organic industry may feel compelled to resort to increased packaging to ensure proper labeling—a measure aimed at preserving their distinct market presence.

3.1.3. Food waste

The opportunity to provide bulk and packaged produce supports the complex nature of merchandising, purchasing and consumption. Therefore, it is important that consumers have the ability to purchase both bulk and packaged produce.

Traditionally, bulk produce is priced higher than packaged to account for shrink/loss due to handling at the store level. However, allowing the consumer to buy produce in bulk gives them the capacity to control the quantities they can consume before their next visit to the grocery store and offers Canadians an alternative to pre-packaged produce. While the unit price for bulk purchase does tend to be higher than pre-packaged units, the option is part of the entire merchandising model for supporting consumption in Canada.

Moreover, beyond the environmental implications of increased produce packaging in the Canadian market, eliminating the option to purchase in desired quantities could **compel consumers to buy more than needed**, **leading to food waste**. This consequence would further amplify the environmental impact associated with produce waste.

3.1.4. Cost impacts

Although certified compostable PLUs are becoming increasingly available, **the additional cost to growers remains a key barrier to adoption**. A certified industrially compostable PLU sticker is one which complies with defined industrial compost quality standards, is tested by an accredited laboratory, and is certified by a recognized certification body [(6)]. In Canada, PLU stickers should follow the BNQ (Bureau de normalization du Québec) standard to ensure the desired control of constituents and rate of degradation for product disintegration [(6)]. Furthermore, a PLU sticker is only considered compostable when all 3 of its components are compostable: Face, ink, and adhesive. With these factors, certified compostable PLUs cost more than paper or plastic PLUs. An interviewed major PLU sticker manufacturer stated that their compostable PLU sticker solutions cost on average **50% to 60% more** than the non-compostable plastic alternative. As the current market conditions limit the grower's ability to pass this cost onto consumers, this would lead to **undue financial impacts on the growers**. Faced with this cost barrier, growers will turn towards the following three scenarios:

- *A shift to less costly non-compostable plastic-free alternatives:* Although more accessible, growers avoid adopting plastic-free PLUs as they are less durable through the entirety of the supply chain, are less flexible and more prone to disintegration and damage during handling and due to humidity and temperature fluctuations *(See details in section 3.1.7).*

- *A shift away from bulk handling towards increased packaging:* This shift away from bulk handling could lead to higher packaging volumes and increased food waste. Consumers, deprived of the option to purchase in bulk via the PLU system, might switch to packaged produce, resulting in uncontrolled quantities and subsequent waste.

- *A shift to more labour-intensive retail solutions:* Weighing, counting, signage, and barcoding are methods currently used in retail in the UK where PLUs are not used. These additional operations constitute additional labour costs to retailers.

For imported produce, an alternative to introducing packaging would be for product to be shipped to Canada without labelling. Canadian companies would need to rehandle the product to apply compostable PLU stickers or repack the produce. CPMA members have estimated an additional 20% to 30% in repacking costs to distribution companies with this scenario. For every dollar spent by distribution companies, 16% is spent on operational costs, with labour constituting 25% of operational costs. This means that a **1.2% increase in repacking costs will inevitably be passed along to Canadian consumers**. Needless to say, the repacking process induces more handling of the produce leading to more physical damage and food waste, especially for delicate produce types.

Given that composability certification standards are not harmonized across jurisdictions, this complexity adds **cost to transition to compostable PLUs solely in the Canadian market.**

3.1.5. Decrease in fresh produce availability

Several types of produce, including melons, watermelons, apples, and citrus, heavily rely on PLU stickers for shipment and sale. **Imposing non-plastic PLU alternatives on these commodities might prompt companies to reconsider shipping to Canada**. The increased packaging costs and potential durability issues associated with non-plastic PLU stickers could dissuade these companies from engaging in the Canadian market. This situation poses a risk to the diversity of produce available to Canadians. Companies choosing not to ship to Canada in turn leads to inflation and puts at peril Canadians' access to a variety of healthy fruits and vegetables.

3.1.6. Food safety

According to a major PLU manufacturer, some growers don't wash certain types of fruit like Kiwi, they proceed by a dry-rub and do not treat the fruit with bactericides and fungicides to avoid adding chemicals**. This poses the risk of mold and other microbes living on the surface of the fruit.** When paper & compostable PLUs are attached to this surface and becomes wet, they can serve as a host for these microbes and mold, posing a safety risk. Thus, chances of food safety risks arising from the use of paper or compostable PLUs can be higher than those associated with plastic PLUs.

Traceability support is enabled by PLU stickers by typically identifying the brand/source of the item. **Omitting PLU stickers from bulk produce completely erases any traceability** linking the produce to its grower and source. This would also pose a challenge to retailers in terms of price differentiation and would potentially prompt average pricing applied to produce of the same type and put produce assortment at retail points at risk. Additionally, PLUs are extensively used by the Canadian Food Inspection Agency (CFIA) in their investigations. In the case of quality or safety risks, the CFIA, and by extension, distributors, retailers and ultimately consumers, would be unable to link the compromised bulk produce to its source without a PLU sticker.

3.1.7. Compatibility with environment & produce

The journey of fruits and vegetables through the supply chain exposes them to fluctuating temperatures, ranging from below 0 degrees Celsius to warmer conditions. When refrigerated produce transitions into warmer environments, condensation forms on the fruit surface and PLU stickers. Additionally, some retailers regularly mist produce to maintain freshness. **In these scenarios, plastic PLUs offer significant advantages over paper alternatives**, as they perform exceptionally well in moisture-rich environments. Conversely, paper PLUs under-perform in such conditions, rendering them unsuitable for the diverse situations encountered in the distribution and sale of fresh produce.

PLU stickers also need to adhere to the surface shape of the produce. **Plastic PLUs are more flexible than other material alternatives and are thus easily applied to a variety of surfaces**. The surface texture of the produce also challenges the performance of the PLU stickers. As it is well-known, surface texture varies from one produce type to the other (Examples: Rough & net-like (Cantaloupe), Hairy (Kiwi)), thus a good solution is required for these variations. The adhesives currently certified as compostable are inadequate for certain produce items. This results in PLUs having a

much higher than average rate of detachment and failing to perform their intended task.

Summary

To summarize, a non-compostable plastic PLU ban would lead to the following outcomes, further supporting CPMA's strategy to a voluntary transition to the use of industrial compostable PLUs with a specified non-restrictive timeline:

- An **increase in produce packaging** due to growers shifting back to packaging due to unacceptable performance or cost for non-plastic stickers, **which contrasts the P2 Notice goal of reducing packaging.**
- An **increase in food waste** by removing the option to purchase specific amounts of produce in bulk to consumers.
- A **cost increase of 60% for PLU stickers for growers/packers to shift to compostable PLUs**, at high volumes, would be an additional expense for growers.
- A **1.2% increase for repacking costs** to distribution companies which will be inevitably passed along to consumers.
- Depending on the produce item, **food safety risks** related to water and humidity effects on plastic-free PLUs.
- **Traceability challenges** hindering product differentiation and food inspection requirements.
- **Performance challenges** of plastic-free and compostable PLUs under fluctuations in **humidity and temperature.**

3.2. Proposed Pollution Prevention Notice (P2 Notice)

As initially outlined in the objectives, the P2 Notice proposes that 75% of fresh produce is to be sold in bulk and/or plastic-free packaging by 2026, and 95% by 2028. The implementation of this notice significantly influences the industry's supply chain on a global scale, impacts the sustainability of our environment, and bears implications for the Canadian consumer market's economy. This section of the report provides a detailed breakdown of these impacts and evaluates their potential effects on the global produce supply chain.

3.2.1 Supply Chain Impact

3.2.1.1. Understanding the Supply Chain of the Produce industry

As shown in figure 1 below, this report examines the environmental burden of the "cradle-to-consumer" segments of the produce supply chain – beginning with growers and continuing through distribution and retail, ending with the consumption (or waste).

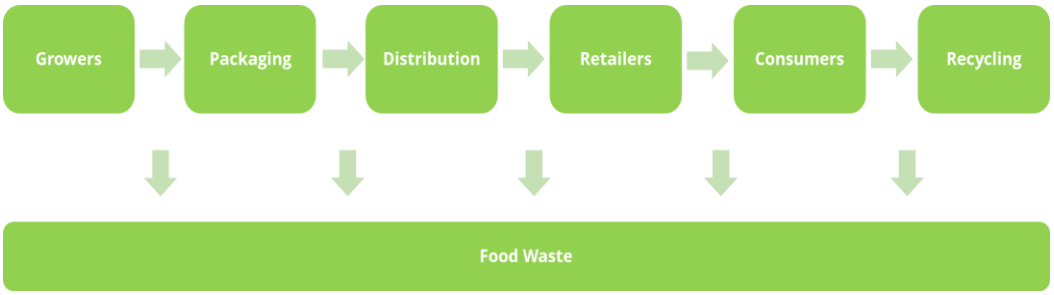


Figure 1: Process Flow

3.2.1.2. Disruption to Growers

Due to an increase in costs & food waste levels and the required changes to their business models, the proposed P2 Notice would represent an additional burden to produce growers. The proposed regulation would result in disruption for growers and produce imports and exports. Some produce is less likely to be available during key periods of the year due to challenges in maintaining produce safety & quality during transportation, such as cold weather during the winter, elevated heat during the summer and high humidity index. Concerns raised by both foreign and domestic vendors, expressed to CPMA, indicate a **potential withdrawal from the Canadian market if the policy is implemented as outlined** due to concerns with increased operating costs, impacts to produce safety, and increased food waste Approximately 50% of interviewed growers from CPMA member companies have echoed similar sentiments.

The impact of U.S.-based growers taking a similar stance holds significant weight. The U.S. is the highest exporter of fruits to Canada, with a volume of **0.94B metric tons in 2022**, representing **32.8%** of total volumes imported into Canada [(9)]. It is also Canada's highest exporter of field vegetables, with a volume of **0.67B metric tons in 2022**, or **92.5%** of total volume imported into

Canada [9], and the second exporter of greenhouse vegetables after Mexico, with a total of **0.023M metric tons in 2022** or **14.5%** of total volume imported to Canada. U.S. growers backing out from the Canadian market would constitute a loss in produce availability in the country coupled with an increase in produce prices, essentially putting Canadians' access to fruits and vegetables at risk.

Moreover, **the proposed regulation introduces trade implications**, potentially placing Canadian growers at a competitive disadvantage. This scenario arises as other countries increasingly adopt recyclable plastic packaging, compelling foreign partners to reduce or halt trade with Canada. This reduction in diversity within the produce market could elevate supply and demand costs for Canada's produce and food industry.

Impact on Value-Added Produce Industry:

Illustration 1: Bagged Value-Added Salad

Value-Added (VA) produce is defined as **produce that is cut, washed, and packaged for consumer purchase**.

An industry leader in market research estimates salad and vegetable sales at $1.3 billion annually as of March 2023, constituting **12.5% of Canada's total produce market.** Value-Add produce requires specific requirements to achieve shelf life, customer quality specifications for commerce and a positive consumer experience: **Modified Atmosphere Packaging (MAP) and a supply chain with temperatures between 34 and 40 degrees Fahrenheit** due to the respiration rate of cut produce. Modified Atmosphere is packaging that maintains a carefully balanced inner-bag atmosphere that allows to control the respiration of the produce inside. Today, MAP can only be achieved through the **combined use of breathable plastics and integrated equipment/technology** that creates the desired atmosphere. MAP packaging achieves an average shelf life of **16 days** (about 2 and a half weeks). Without breathable packaging, fresh-cut produce has **1-2 days** of marketable shelf life. **No other material used in packaging achieves the desired performance** for VA produce.

Today, plastics are a highly effective tool in improving VA produce quality and food safety and reducing food loss, all while at a highly competitive price. There are no viable alternatives or substitutions to plastic today. Growers have tested multiple bio-based resins such as PLA and other fibre-based materials, but they can't meet MAP requirements, or lack machinability such as throughput speed and seal performance. Also, **substitutions that do exist, cost five to nine times more than plastic.** In terms of functionality, most alternatives for plastic film are low strength or react poorly to micro-perforation, **which makes them susceptible to breakage or malfunction**. Furthermore, **most also lack the durability to perform in a constant 34–40-degree cold chain**.

The elimination of plastic packaging would eliminate 100% of VA products currently being provided to the Canadian market. A major VA manufacturer shared their intention to pull-out from the Canadian market and shut down their Ontario facility, providing 350-450 direct jobs and 450-550 indirect jobs, if the proposed regulations were adopted.

To summarize, moving forward with the proposed regulation for fresh produce packaging increases the risk of major fresh produce suppliers opting not to ship to Canada, leading to an elimination of jobs from the Canadian economy as processing in Canada will no longer be required. While for many suppliers this will be the case, for the minority that continue to ship to Canada, this will lead to premiums arising from separate packing and inventory lines to serve the Canadian market, **therefore increasing produce cost in Canada.**

3.2.1.3. Disruption to Packaging

The regulation is a **major risk to the produce packaging industry in Canada**, specifically plastic packaging companies servicing the produce market. With most of their sales based in Canada, local based produce packaging companies deem this regulation as devastating to their presence in the Canadian market and they are **looking to export their sales as well as their manufacturing facilities to the U.S.** in response to the regulation. This would be an important loss to the Canadian packaging economy as well as a **loss of employment opportunities** to other countries. It is crucial to note that the packaging industry that caters to high-value packaging for produce also manufactures packaging for other food categories, including dairy and meat. Therefore, any negative impact on this industry would not only affect the

availability of food-grade packaging for produce but **also hinder other food producers' access to such packaging.**

Conversely, if all foods, including produce, can be packaged in recyclable plastic packaging, there may be an opportunity for Canadian plastic packaging companies to transition operations to recycled plastic packaging.

3.2.1.4. Disruption to Distribution

The P2 Notice would cause disruption to produce distribution companies stemming from their effort to fulfill timely transportation to warehouses in shorter timelines with rapid spoiling conditions and shorter shelf lives of the produce, leading to **challenges in ensuring proper quality**.

Packaging efficiency is an important factor for transportation of produce across long supply chains. The packaging materials need to withstand sudden temperature changes when transferred from one transportation mode to another, when being moved between refrigerated trucks/containers. **The sudden temperature drops prompt water condensation that plastic-free packaging cannot withstand** as efficiently as plastic if not modified, coated, or altered to withstand the effects of condensation.

Moreover, plastic packaging offers crucial **structural integrity** when stacking produce containers during transportation, **providing protection against physical damage and bruising.** Transporting produce in bulk and plastic-free packaging, such as paper, often leads to increased damage, particularly for delicate produce like lettuce and berries. An interviewed produce transportation company highlighted that **bulk transportation of lettuce alone currently results in approximately 30% waste** due to damage incurred during transit.

Furthermore, shipping efficiency is an important factor during transportation and distribution of produce. Fibre packaging requires more mass and volume to be properly stacked in transportation modes, meaning that less volume and more mass of produce is transported per trip. This means that, compared to plastic packaging, **fibre packaging such as illustrated below requires more trips to transport the same volume of produce with more mass**. This transportation inefficiency leads to **more emissions** which is an environmental concern to be limited.

Illustration 2: Strawberries in plastic clamshells vs plastic free packaging

3.2.1.5. Disruption to Retailers

Illustration 3: Value-Added produce in plastic packaging for sale

The P2 Notice presents significant challenges for retailers, primarily due to **reduced shelf life associated with bulk and plastic-free packaging**. Delays in distribution and sorting times before the produce reaches store shelves exacerbate the issue, accelerating spoilage once displayed for sale. This compromised quality not only affects the produce offered but also escalates the quantity of discarded and wasted items.

Conversations with major produce Retailers in Canada reveal **the infeasibility of selling 95% of produce in bulk or plastic-free packaging.** Selling produce in bulk would require consumers to pause repeatedly at the section of the produce they would like to purchase to fill their bags, prompting **additional traffic in the produce section**. Moreover, the ability to inspect the product is a key packaging performance requirement. As plastic-free packaging isn't transparent, packaging which includes **plastic windows allows consumers to visualize and inspect the produce before purchasing**. It is known that produce shoppers' perception of produce quality is an important buying decision factor *(More on this in section 3.2.1.6).* If given the option to open the package, omitting the plastic window would prompt customers to open the packaging, physically touch and inspect the contents, leading to sanitary, food safety and quality risks. Furthermore, retailers closely monitor customer

demand and have observed a persistent attraction towards plastic-packaged produce, particularly after the onset of the COVID-19 pandemic. Heightened concerns regarding sanitary requirements have reinforced customers' preference for plastic-packaged produce, presenting a challenge for retailers aiming to meet evolving consumer expectations.

3.2.1.6. Disruption to Consumers

The main disruption to consumers is explored by assessing their behavior when making fresh produce buying decisions. In a survey done by McKinsey, 10,000 consumers globally answered questions to better understand the influence of COVID-19 on consumers' attitude towards packaging [(3)]. When asked about their current perception on the importance of **hygiene and food safety** when thinking of packaging, **71% of surveyed US respondents are more concerned about hygiene & food safety compared to the time before the COVID-19 pandemic**. Plastic packaging remains the most hygienic packaging option in the market and is perceived as such by consumers. Switching to bulk/non-plastic packaging modes puts at risk fresh produce consumption trends due to reluctance of consumers on the hygiene of non-packaged foods.

Furthermore, non-transparent packaging may diminish the confidence in the quality of fresh produce. In a second survey by McKinsey [(4)] on factors influencing buying decisions of U.S. consumers, it was found that for fresh produce as well as all other consumer goods, **perception of quality ranks first as the most important buying decision**. Bulk fresh produce show signs of less quality due to handling induced, in contrast to the plastic packaged alternative. The increase of fresh produce prices due to the adoption of the P2 Notice also would influence buying decisions as **price ranks as close second within the list of buying decisions criteria**.

In another survey on the importance of packaging factors for consumers in multiple countries [(4)], **shelf life ranked second after hygiene & food safety** for U.S. respondents. As plastic packaging increases shelf life substantially compared to other packaging types, it remains the best option to guarantee shelf life.

In a recent Abacus data survey compiled in October 2023 [(12)], 1,500 adult Canadians were asked about their perception of eliminating plastic packaging from fresh produce. The survey results have revealed a shift in consumer preferences, with more than **69% of Canadian consumers giving priority to affordability over quality and taste (31%).** This marks an increase from

2019 when only 59% of consumers leaned towards price rather than quality. Furthermore, when presented with a choice, **two-thirds of consumers emphasize the importance of affordability for fresh produce (67%), overshadowing the reduction in plastic usage (33%).** This shift in consumer sentiment holds implications, particularly when considering that **62% of Canadian consumers express concerns about the potential price consequences for fresh fruits and vegetables if the government successfully attains its goal of reducing plastic packaging for produce by 95% by 2028.**

3.2.1.7. Produce availability across Canadian regions

Transitioning to bulk and plastic-free packaging presents a challenge in maintaining the shelf life of produce, particularly impacting the delivery of fresh and safe produce to remote communities. Illustrating this challenge, a distribution company serving remote Canadian regions outlined the arduous transportation timeline for produce originating from California. The journey spans 5-7 days from California to Toronto, where it is stored for two days before embarking on a 2-day ferry journey. Subsequent distribution to remote retail points extends the timeline by an additional 2 days. Ferry voyages, susceptible to disruptions like cold weather or mechanical issues, may prolong the journey by 3-4 days. **In a worst-case scenario, transportation from a California grower to its destination can span up to 15 days, significantly reducing shelf life at the store and with the end consumer**. Statistics Canada notes that approximately 4.4% of the Canadian population resides in remote or most remote areas, rising to 12% when moderately remote regions are included. This highlights the need for packaging that preserves produce freshness during transit, curbing food waste due to spoilage [(19)]. This reinforces the importance of using packaging that ensures the produce remains fresh during its journey and limits food waste due to spoilage.

Coastal California, imperial valley of Arizona and central Mexico are major growing regions supplying produce to Canada. Long-distance shipments of about **5-7 days** are required to get these products to Canada. Without current packaging technology, 5-7 days would virtually **eliminate any remaining shelf life for bulk or non-packaged product**. Improvements in Modified Atmosphere Plastic Packaging have allowed Value-Add produce manufacturers to ship finished products to end destinations and still provide the consumer an average of **10-15 days of remaining shelf life**.

Assessment of impact of P2 Notice on produce availability in Canada:

To **assess the impact on produce availability in Canada**, the top Fruit & Vegetable commodities imported to Canada by value in 2022 have been considered. A shift to bulk or plastic free packaging for these commodities would put their availability in Canadian grocery stores at risk for the following reasons:

- The increase in costs would constitute an obstacle to exporting to Canada.
- Exporters would stop sending commodities highly susceptible to bruising and physical damage in bulk or plastic free packaging due to absence of structural protection to Canada.
- Increase in food waste during transportation due to shelf-life decrease, bruising, spoilage, and contamination.
- The increased uncertainty in the grower's ability to ensure that the grade of the produce that was sold is maintained throughout the supply chain, especially given the economic impacts as they would not be paid if the produce grade is not maintained during transportation.

According to these factors, it is assumed **infeasible for countries outside North & South America to ship to Canada, a decrease in shipments from North American countries (U.S. and Mexico)** varying from 25%, 50% to 75%, and **a decrease in shipments from South American countries** varying from 85%, 90% to 95% to present a range of impact as follows:

Table 1: At risk % due to P2 Notice scenario

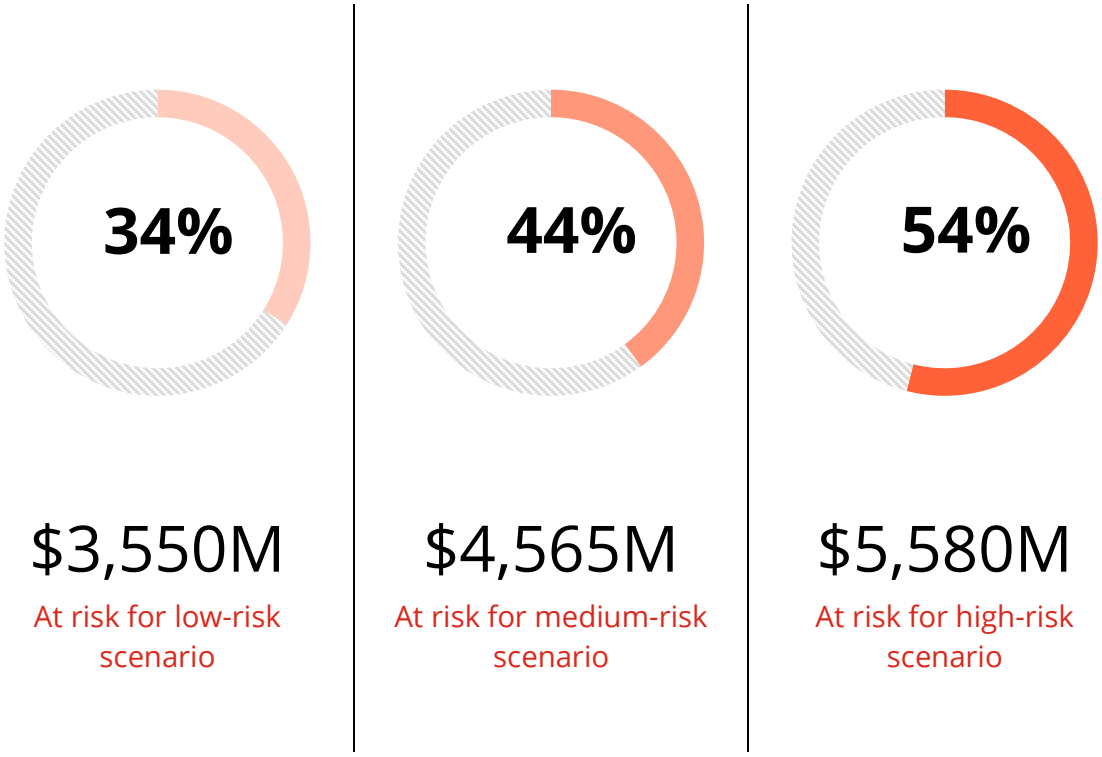
	Low risk	Medium risk	High risk
North America	25%	50%	75%
South America	85%	90%	95%
Europe	100%	100%	100%
Asia - Oceania	100%	100%	100%
Africa	100%	100%	100%

Also, **the Value-Add produce offering will be completely removed from the market**, as bulk and plastic-free packaging options are not feasible *(See section 3.2.1.2 for details):*

Table 2: Value-add and produce market size

VA (Value-Add) % of produce market	12.5%
VA total sales	$1,300M
Total Canada produce market (Non-VA)	$9,100M
Total Canada produce market (VA & Non-VA)	$10,400M

The following summarizes findings on the impact of the P2 Notice on produce availability in Canada *(See appendix section 5.5.1. for detailed calculations)*:



To summarize, **34% to 54% of the annual Canadian market is at risk, including all the Value-Add segment and a portion of imports no longer being shipped to Canada, due to the P2 Notice**.

Moreover, Canadians residing in close proximity to U.S. borders have convenient access to U.S.-based retailers, facilitating cross-border shopping for plastic-packaged produce that can be brought back and consumed within

Canada. This practice would result in the disposal of plastic packaging in Canada, which contradicts the regulation's intended goal of reducing plastic packaging. Additionally, it leads to increased cross-border trips, resulting in higher emissions compared to local shopping at nearby grocery stores. This surge in cross-border traffic places added strain on CBSA services and leads to longer waiting times at the borders.

3.2.2. Sustainability Impact

3.2.2.1. Food waste

Fresh produce food loss & waste (FLW) currently sits at approximately 11% of the produce volume within the retail sector in the U.S. [(1)]. FLW creates a myriad of environmental impacts due to the waste of the resources used to produce it, namely agricultural land, water, pesticides, fertilizer & energy. The proposed P2 Notice ad regulations would create an increase in fresh produce waste. FLW occurs in all phases of Cradle-to-Consumer food supply chain: Primary Production, Distribution, Processing, Retail & Consumption. **Fruits & Vegetables (F&V) is the food category that constitutes the most food waste** at 40% of the total volume in the U.S. [(1)], making it a critical category in FLW management.

FLW during Distribution, Processing & Retail (Shipping, Storage & Point-of-Sale): Contrary to popular belief, FLW during these stages is substantial, **varying from 10% to 35% of the total lost volume in the U.S. according to various studies** [(1)]. According to the "Food Waste Causes in Fruit and Vegetables Supply Chain" research article [(8)], the main reasons of produce waste include **short product shelf life & inadequate or defective packaging**. According to an Ameripen Food Waste Study Report [(20)], **56% of unpacked fresh produce is spoiled before reaching the consumption level** in the U.S. Furthermore, substitution of plastic packaging with non-plastic options including fibre, has shown a reduction in shelf life of sensitive fresh produce by upward of 40% [(1)], inducing an addition in FLW. Interviewed Growers estimated that produce waste in the case of a shift to bulk or plastic free packaging would **increase produce waste up to 50%** for their operations, while a Retail stakeholder estimated **a 15% increase in food waste** in their retail locations. Other produce waste factors include physical damage during handling and storage. Plastic packaging ensures produce is protected during handling and storage and minimizes physical damage caused by friction and contact. It is also less likely to be **defective** compared

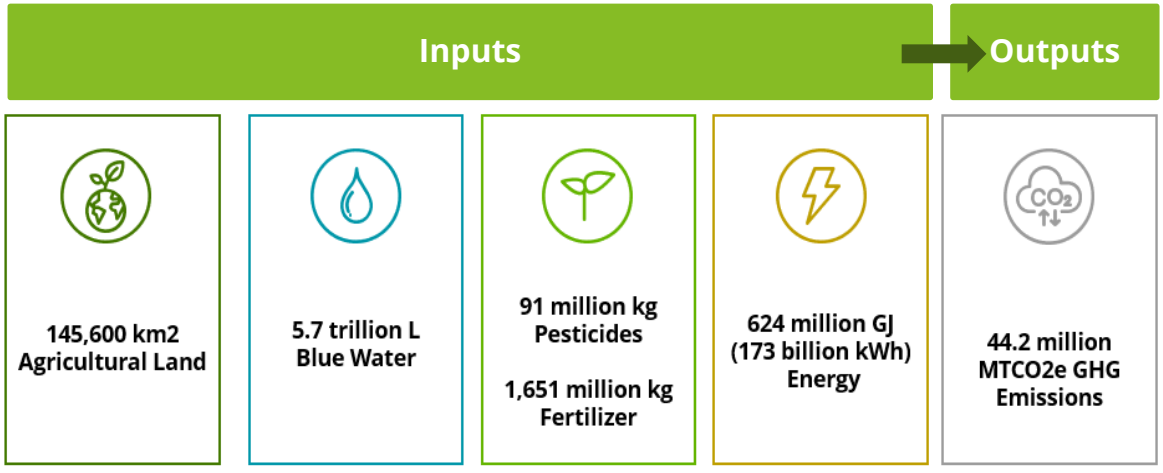
to other packaging materials as it is more robust and thus optimizes produce durability.

FLW during consumption: The American Institute for Packaging and the Environment indicated that improper use of packaging might increase 10% to 15% of food waste at the store level and 20% to 25% of food waste at the household level [(1)]. Plastic packaging remains the best option in terms of product shelf life and longevity.

In Canada, the National Zero Waste Council reported that the average Canadian household wasted **140 kg of food in 2022**, that amounts to almost **2.3 million tons** of edible food wasted last year, costing Canadians **in excess of $20 billion**. The most prominently wasted foods by weight are Fruits & Vegetables at **45% of the total volume** [(10)].

With the average Canadian household wasting 140 kg of food in 2022 and an average household size of 2.9 people [(11)], the per-person yearly FLW in Canada amounted to 48.3 kg. As produce constitutes 45% of the total volume of FLW, **the yearly per-person produce waste in Canada reached 21.7 kg** in 2022.

Given the absence of specific environmental footprint data for produce waste in Canada, we applied the U.S. data's extrapolation percentage to estimate the environmental footprint of produce waste in Canada for 2022 *(See section 5.2 in Appendix for data used and extrapolation)*



Note: MTCO2 is equivalent to Metric Tonnes of CO2

44.2 million MTCO2 emissions resulting from produce waste in 2022 are equivalent to [21]:

- The manufacturing of **2 billion bags of cement.**
- Powering **44.2 million homes for 7 months.**
- Heating **44.2 million homes for 4 months.**
- Driving **198.9 billion kilometers.**
- Extracting **663 million barrels of oil.**

In the case where the proposed P2 Notice is adopted, a potential 50% increase in food waste resulting from the transition to plastic-free packaging **could add 22.1 million MTCO2e of GHG emissions**, significantly amplifying the negative environmental impact.

The environmental effects of produce waste in Canada are thus substantial and cannot be neglected when planning for future environmental and pollution reduction targets.

3.2.2.2 Food safety

Packaging plays a critical role in ensuring food safety for many products. There is concern that ECCC's proposed risk management objective could hinder the fresh produce industry's ability to meet food safety requirements as stated in the **Safe Foods for Canadians Regulations**.

Plastic packaging helps to mitigate threats to domestic production from invasive pests, plant disease and food borne illness more efficiently than bulk & plastic-free packaging. The potential food safety and plant health implications resulting from an increase in bulk distribution and a transition to non-plastic packaging options would have to be mitigated through **changes in supply chain practices, leading to additional cost increases**.

3.2.3. Economic Impact

To quantify the economic impact of the proposed regulations, this study investigates the cost of the entire supply chain and then evaluates the cost in comparison with two other scenarios.

The three scenarios are as follows:

- Scenario One outlines the baseline for our study, by outlining the current operational cost breakdown for growers, distributors and retailers which are used as a baseline for comparison to the other scenarios.
- Scenario Two calculates the economic impact on the consumer if current packaging were to be shifted to recyclable plastic packaging.
- Scenario Three focuses on assessing the economic impact anticipated by the implementation of the P2 Planning Notice.

Scenario One: Baseline (Current State)

From an economic standpoint, the objective function of our study is to assess how the P2 regulations will affect the cost of the final consumer produce.

Factors that contribute to the final cost on a consumer good are influenced by:

- Growers
- Distribution
- Retail

Based on interviews *(See Section 5.4)* and extensive research, we've compiled a pie chart illustrating the current breakdown of costs associated with produce sold to Canadian consumers.

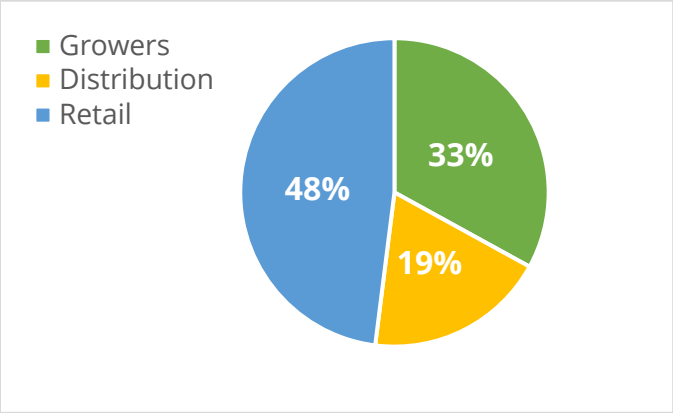


Figure 2: Cost breakdown of produce sold to a Canadian consumer

Translating the above pie chart, **for every dollar that it costs the consumer, the growers get $0.33, distribution gets $0.19, and retailers $0.48.**

Growers:

Following an extensive interview process with multiple Growers that supply the Canadian market, the flow of their operations and the costs involved were understood to include:

- Labour
- Manufacturing
- Equipment
- Maintenance
- Training
- Transportation
- Laboratory Testing
- Packaging
- Food waste

A breakdown of the costs is shown in the figure below:

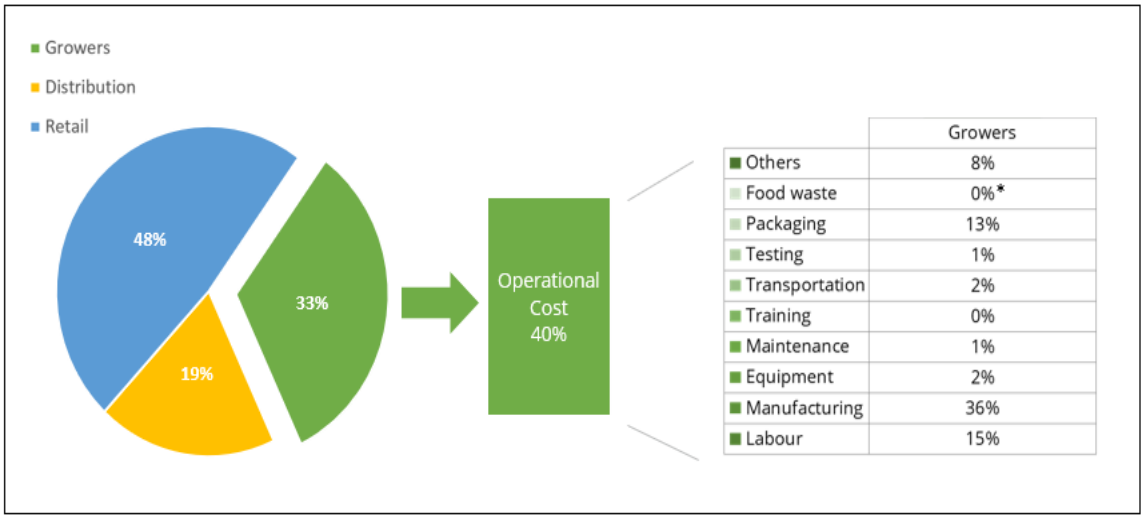


Figure 3: Growers Cost Breakdown

** From the data collected, only a few Growers mentioned food waste as a **separate entity** in their operational cost breakdown*

Distribution:

Among the operational costs in the distribution of produce that could be impacted by the P2 Notice, the following are recognized:

- Warehousing
- Transportation

A breakdown of the costs is shown in the figure below:

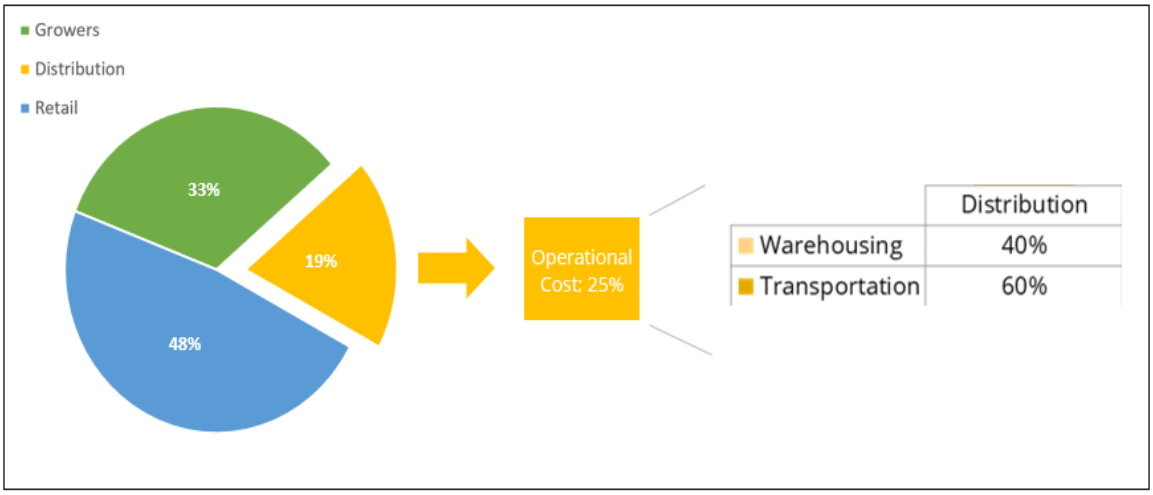


Figure 4: Distribution Cost Breakdown

Retailers:

Among the operational costs of retailers that could be impacted by the P2 Notice, the following are recognized:

- Labour
- Storage & Handling

A breakdown of the costs is shown in the figure below:

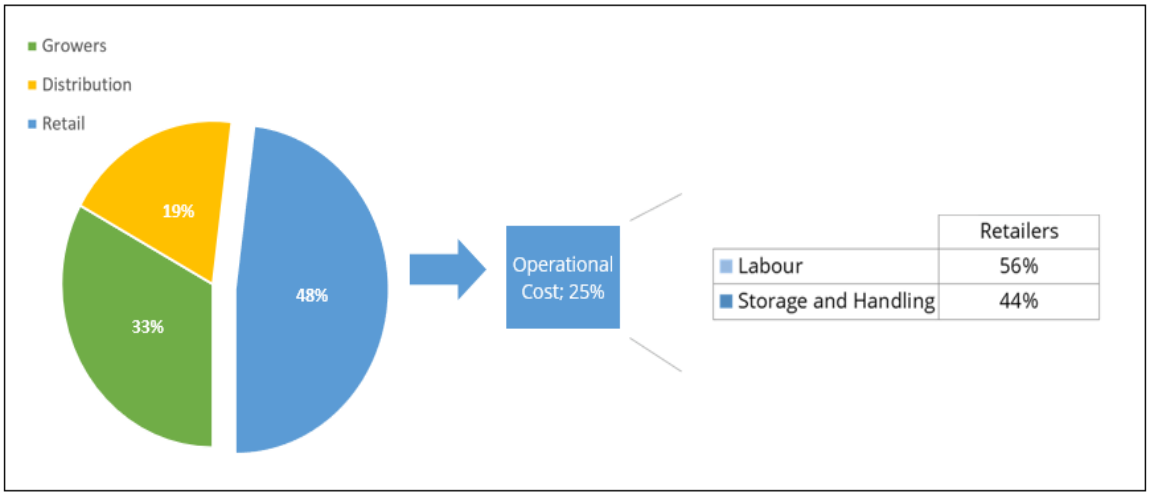


Figure 5: Retail Cost Breakdown

Considering that the previous operational costs are factors that contribute to determining the final cost of the consumer good. Through interviews with Growers, we gathered insights into the percentage breakdown (cost ratio) of their operations and the anticipated changes resulting from the implementation of the P2 Notice. This information allows us to calculate the total weighted impact the notice would have on consumer costs.

The formula used to derive the weighted impact on consumer cost is:

$$\sum(\Delta c * \Delta d) = \mathrm{z}$$

z: weighted impact on consumer cost
Δc: cost breakdown
Δd: change in cost

Weighted consideration: Brand identity, variety of service offerings, among other factors, are reasons why growers have different cost breakdowns in their operations. To reflect this, the analysis was conducted with weighted factors based on revenue. Details on this can be found in Table 14 of the appendix.

Scenario Two: Shift to recyclable plastic packaging

As companies evaluate the importance of the P2 Notice, the need for sustainable alternatives is recognized. In the following scenario, the economic impact of shifting to recyclable plastic packaging is presented.

Impact on Growers:

Considering the **packaging cost increases by 67%** *(in section 5.4.2)* on average within the operational costs of growers when shifting from current operations to using fully recyclable plastics, an overall operational cost **increase of 9%** is obtained, which equals a **4% increase in the final price of grower goods.**

Table 3: Impact on Operational Costs of Growers with Recyclable Plastic

Growers			
Operation	Cost Breakdown (Δc)	Change in Cost (Δd)	Change in Operational Cost (z)
	∑(Δc*Δd) = z		
Labour	15%	0%	0%
Manufacturing	36%	0%	0%
Equipment	2%	0%	0%
Maintenance	1%	0%	0%
Training	0%	0%	0%
Transportation	2%	0%	0%
Testing	1%	0%	0%
Packaging	13%	67%	9%
Food Waste	0%	0%	0%
Others	8%	0%	0%
Sales and Admin	0%	0%	0%
Financial	0%	0%	0%
Total			9%

Impact on Distribution:

Assuming that a shift from regular to recyclable plastic packaging does not affect distribution operations as produce can still be transported, stored and handled in the same manner as current plastic packaging.

Impact on Retailers:

As communicated by our interviewed Retailers, the shift from regular to recyclable plastic packaging affects **retail operations by 5%** *(in section 5.4.5).* Thus, once received, the change in operational cost for retailers is as follows:

Table 4: Impact on Operational Costs of Retail with Recyclable Plastic

Retail			
Operation	Cost Breakdown (Δc)	Change in Cost (Δd)	Change in Operational Cost (z)
	∑(Δc*Δd) = z		
Labour	56%	6%	3%
Storage & Handling	44%	5%	2%
Total			5%

Impact on Consumer:

Based on the cost breakdown from Figure 3 for growers, 40% of the costs are operational therefore the 9% increase in operational costs for growers highlighted in table 3 increases the RPP pricing by **4%** (9%*40%). Similarly, for retailers, 25% of the costs are operational therefore the 5% increase in their operational costs raises the RPP pricing by **1%** (5%*25%).

To summarize, **with recyclable plastic packaging (RPP), the price to the consumer increases 5% from the baseline scenario**.

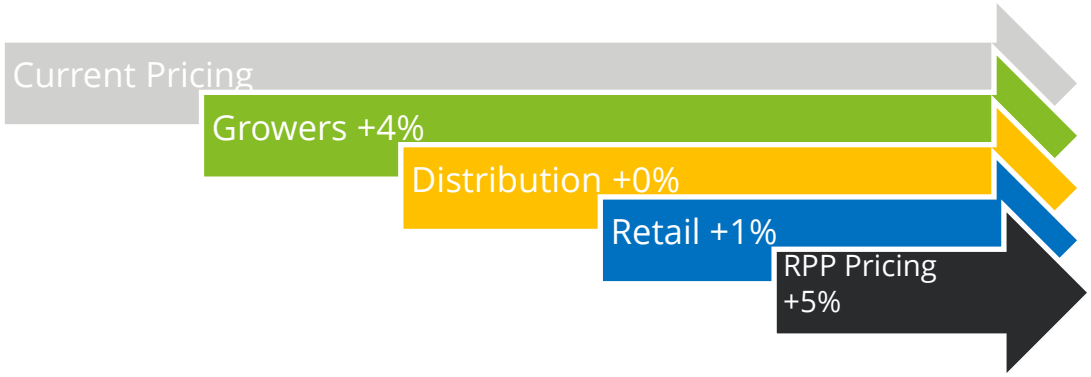


Figure 6: Change in average produce price to consumer with shift to recyclable plastic packaging

Scenario Three: Shift to proposed P2 Planning Notice

Following over 10 interviews with Growers, Distributors and Retailers, scenario three evaluates the foreseen impacts of implementing the P2 Notice on the Canadian consumer. The data used was collected from conducted surveys, research papers, articles among many more.

Impact on Growers:

In the interviews, Growers were asked in reference to the objectives of the P2 Notice, what would be the percentage change in the cost of their operational if:

1) All their packaging had to shift to bulk.
2) All their packaging had to shift to plastic-free alternatives.

In the case of shifting to bulk, for 50% of the interviewed Growers, the transition to bulk emerged as an unfeasible option, leading some to consider exiting the Canadian market. For the remaining 50%, the estimated **increase in operational costs is approximately 4%.** *(See Table:12, Section 5.4.2)*

In the case of shifting to the plastic-free alternative, the **operational cost increase for growers is 55%**, if growers don't exit the market.

Table 5: Impact on Operational Costs of Growers with P2 Notice

Growers			
Operation	Cost Breakdown (Δc)	Change in Cost (Δd)	Change in Operational Cost (z)
	∑(Δc*Δd) = z		
Labour	15%	33%	5%
Manufacturing	36%	6%	2%
Equipment	2%	50%	1%
Maintenance	1%	0%	0%
Training	0%	6%	0%
Transportation	2%	0%	0%
Testing	1%	100%	1%
Packaging	13%	338%	44%
Food Waste	1%	100% *	1%
Others	8%	2%	1%
Sales and Admin	0%	0%	0%
Financial	0%	0%	0%
Total			55%

** 100% change in cost means the cost is twice as much as it was before the P2 Notice*

Impact on Distribution:

Due to the heavier and bulkier nature of some plastic-free materials, the **increase in operational costs with a shift to the notice for distribution is 10%**.

According to an interviewed distribution company *(See section 5.4.4),* insufficient testing on plastic packaging alternatives has considerable impacts on the distribution process. Plastic-free packaging occupies more volume than plastic packaging, therefore more space is used in stacking-up materials in the trucks and additional trips are required to transport the same amount of produce, leading to an increase in freight costs. Not only would that induce economic impacts, but environmental ones as well by escalating carbon emissions per delivery, as the heavier plastic-free material would increase fuel consumption thereby increasing fuel emissions.

The cost inputs of distribution will change in the following way:

Table 6: Impact on Operational Costs of Distribution with the P2 Notice

Distribution			
Operation	Cost Breakdown (Δc)	Change in Cost (Δd)	Change in Operational Cost (z)
	∑(Δc*Δd) = z		
Warehouse	40%	13%	5%
Transportation	60%	9%	5%
Total			10%

Impact on Retailers:

The **increase in operational costs with a shift to the notice for retailers** is 40% *(in section 5.4.5)* as communicated during our interviews. Because of increased handling of produce, retailers foresee an increase in labour. They also foresee a revamp of produce spaces within retail locations to accommodate bulk/plastic free packaging.

The table below outlines the breakdown of the cost changes for retailers:

Table 7: Impact on Operational Costs of Retail with the P2 Notice

Retail			
Operation	Cost Breakdown (Δc)	Change in Cost (Δd)	Change in Operational Cost (z)
	∑(Δc*Δd) = z		
Labour	56%	35%	20%
Storage & Handling	44%	45%	20%
Total			40%

Impact on Consumer:

Based on the cost breakdown from Figure 3 for growers, 40% of the costs are operational therefore the 55% increase in operational costs for growers highlighted in table 3 increases the RPP pricing by **22%** (55%*40%). For distribution, 25% of the costs are operational therefore the 10% increase in their operational costs raises the P2 pricing by **2%** (10%*25%). Similarly, for retailers, 25% of the costs are operational therefore the 40% increase in their operational costs raises the RPP pricing by **10%** (40%*25%).

To summarize, **with plastic free packaging (P2), the price to the consumer increases 34% from the baseline scenario**

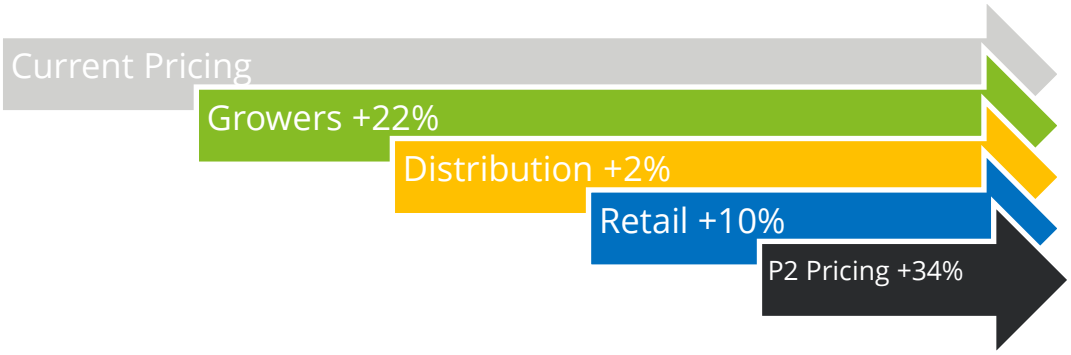


Figure 7: Change in average produce price to consumer with P2 Notice

Even considering a sensitivity analysis at an outermost cost boundary by estimating the increases at 60% of those provided during interviews, the final price to the consumer with the P2 Notice in effect **is still considerable at 20% above the current prices.**

3.2.4. Comparative assessment of scenarios

To assess the proposed regulations' impact on the Canadian produce market and on Canadian consumers, a comparison will be made between a **scenario where the proposed regulations (i.e., a 95% shift to bulk/plastic-free packaging is achieved by 2028) are adopted based on a 100% shift to plastic free packaging** and the following two scenarios:

- **Current (Baseline) Scenario**: This scenario assumes the status quo within the produce industry, with no modifications made to its existing packaging strategies.
- **Shift to Recyclable Plastics Packaging Scenario:** Here, we examine the potential outcomes resulting from an industry-wide shift towards the use of recyclable plastics. This shift aligns with ongoing efforts in innovation and adoption of recyclable plastic packaging practices.

Assessment criteria:

The evaluation of these scenarios will be based on several key criteria:

Cost to consumers: Using an economical model, percentage change of the produce cost per unit was computed to assess the cost impact on the Canadian consumer. The % increase in packaging & operational costs for each explored scenario influences the produce cost at retail points *(See economical model section 3.2.3 for full walkthrough).*

Food waste: Comparing the increase/decrease of food waste generated throughout the supply chain.

Food safety/quality: Assessing the impact of each scenario on food safety throughout the supply chain, including safety from contamination, physical and spoilage damage, and quality preservation.

Food availability: Assessing the scenario's impact on volume change, feasibility of shipping to Canadian regions (Including rural & remote communities), trade implications and the impact on produce assortment at Canadian produce retail points.

Environmental Impact: Environmental footprint for each of the scenarios.

Scoring:

Each alternative is scored on a pre-defined scale (e.g., 0-5) based on how well it meets each criterion. Important: a higher score means "better", so for example a low cost should get a high score.

Scenario One: Baseline (Current State)

By interviewing Growers producing multiple types of fruits & vegetables, it was found that plastic is the main type of packaging currently used (recyclable and non-recyclable), followed by minor percentages of paper and carton packaging, as well as minor occurrences of bulk handling mainly for food service.

Assessment:

Cost to consumers: In the Baseline scenario, where no impact on current consumer costs exists, a score of 5 was designated.

Food Waste: Food waste in Canada amounts to almost **2.3 million tons** of edible food wasted last year, costing Canadians **in excess of $20 billion**. The most prominently wasted foods by weight are Fruits & Vegetables at **45% of the total volume** [(10)]. As this scenario would not affect current food waste levels, a score of 5 was assigned.

Food safety: The current plastic packaging technologies ensure the safety of produce by protecting the inside contents from contaminants, as well as maintaining the quality of produce by minimizing physical handling damaging during shipping, storage, and shelving. As this scenario would not affect current food safety levels, a score of 5 was assigned.

Food availability: Currently, Canadian retail points all over the country have access to a variety of produce types. The produce assortment is also assured by importing out-of-season produce year-round. As this scenario would not affect current food availability levels, a score of 5 was assigned.

Environmental Impact: According to a Canada Plastic Pact study on Canadian Plastic Packaging Flows [(13)]**, only 12% of plastic packaging is estimated to have been recycled in 2021.** The rest ended up in **landfills, incinerators or directly in the natural environment.** Given the lower levels of plastic packaging recycling for the baseline scenario, a score of 2 was assigned.

Scenario Two: Shift to recyclable plastic packaging

Assessment:

Cost: The shift to recyclable plastics results in a **5%** increase in cost to consumers, warranting a score of 4 for this scenario.

Food Waste: As plastic is the most efficient packaging material in terms of shelf life and produce quality, a shift to recyclable plastics packaging would maintain food waste levels throughout the supply chain with produce freshness lasting longer at the consumer stage. As this scenario would not affect food waste levels, a score of 5 was assigned.

Food Safety: A shift to recyclable plastic packaging will ensure a continued maintenance of produce safety and quality while allowing packaging companies and growers to continue their innovation toward modified atmosphere packaging technologies. As this scenario would not affect food safety levels, a score of 5 was assigned.

Food Availability: Food availability is foreseen to be maintained at the current levels since a shift to recyclable plastic packaging maintains shelf life. As this scenario would not affect food availability levels, a score of 5 was assigned.

Environmental Impact: A report by McKinsey [(14)] examines the total GHG contributions of plastics versus its alternatives, including product life cycle and impact of use. It was found that in the packaging sector, **plastics have a lower greenhouse gas impact than paper, with 20 to 80% less GHG contribution**. This shows that although plastics are perceived negatively, their role in enhancing use efficiencies such as decreasing food spoilage and reducing GHG emissions is often overlooked. This is especially true when plastic is recyclable, allowing multi-use of packaging. Moreover, shifting to more recyclable plastics would have a positive environmental impact. Given the lower levels of greenhouse gas impacts for plastic packaging and the positive environmental impact of shifting to recyclable plastics, a score of 4 was assigned for this scenario.

Scenario Three: Shift to proposed P2 Planning Notice

Cost: Shifting to the proposed P2 regulation increases the cost by **34%.** Given the significant increase in cost compared to the other scenarios, a score of 1 was assigned.

Food waste: The 2023 Plastic Packaging Landscape Review by Value Chain Management International (VCMI) for CPMA [(5)], extensively delved into FLW (food loss and waste) through industry surveys and validation interviews with 15 key stakeholders representing 20 commodity types, accounting for 67% of total fresh produce purchased by Canadian consumers. **Responses suggested that non-utilization of preferred plastic packaging for these commodities could lead to an estimated 467,000-ton increase in produce waste**, surpassing current levels significantly. The substantial rise in food waste compared to other scenarios led to a score of 1.

Food Safety: As mentioned in section 3.2.2.2, a shift to bulk or plastic-free packaging would increase threats to domestic production from invasive pests and plant disease, contamination and overall quality and freshness deterioration. Also, shifting to bulk poses traceability challenges to linking the produce to the grower and source, price differentiation and food quality & safety investigations. Given the decrease in food safety levels compared to the other scenarios, a score of 2 was assigned.

Food availability: As explained in section 3.2.1.5, shifting to bulk or plastic-free packaging will create a discrepancy in Canadians' access to fresh produce based on their locations, with habitants located in urban areas having an advantage, while the decrease in produce shelf life puts remote communities produce availability and assortment at risk. It was found that **34% to 54% of produce total annual value is at risk of not being shipped to Canada due to the P2 Notice.** Given the decrease in food availability levels compared to the other scenarios, a score of 2 was assigned.

Environmental Impact: As mentioned for Scenario two, a report by McKinsey [(14)] found that in the packaging sector, **paper packaging generates 20-80% more GHG emissions**. It is also important to note that **not all plastic-free packaging is recyclable** as it is based on composition and use of coatings. This shows that an opportunity exists for a more balanced, science-based perspective on plastics versus alternative materials by deep-diving into the environmental impact and the life cycle analysis of the materials. Furthermore, **shifting to bulk & plastic free packaging increases food waste** as explained previously in the food waste criteria. Food waste leads to substantial negative environmental impacts such as an increase in GHG emissions. Due to food waste environmental impacts and lack of recyclability of plastic-free packaging, a score of 3 was assigned.

Decision Matrix:

In the decision matrix, each alternative is scored on a pre-defined scale (e.g., 0-5) based on how well it meets each criterion. Important: a higher score means "better", so for example a low cost should get a high score. All criteria are weighted equally.

Table 8: Decision Matrix

		Scenarios		
Criteria:		**Baseline**	**Recyclable Plastic**	**P2 Planning Notice**
1	Cost	5	4	1
2	Food Waste	5	5	1
3	Food Safety	5	5	2
4	Food Availability	5	5	2
5	Environmental Impact	2	4	3
	Total Scores:	**22**	**23**	**9**

To conclude, a **shift to recyclable plastic packaging scored the best overall**, with the **implementation of the P2 Notice ranking last** when assessed against the criteria. Even considering potential variability in scoring as outlined in Table 8, it doesn't change the key conclusion that the proposed P2 Planning Notice would have an adverse impact on the produce industry in Canada.

3.2.5. Waste management industry capacity

Another important consideration is the capacity of the waste management industry to adjust to changing demand/volumes across the three scenarios compared in section 3.2.3.1.

Baseline (Current State): According to a Canada Plastic Pact study on Canadian Plastic Packaging Flows [(13)], **Canada generated 1.89 million tonnes of plastic packaging in 2019**. Overall, **only 12% of plastic packaging is estimated to have been recycled**, with 21% of rigid plastic being recycled and 1% of flexible packaging being recycled. There is a discrepancy in recycling levels by system, with **63% for plastic packaging under deposit**, **16% for plastic packaging from residences**, and

5% for plastic packaging from businesses and institutions. A report by Environment Defence Canada [15] found that Canada cannot eliminate plastic packaging waste by 2030 without a substantial new effort by Canada's provinces and territories to implement systems capable of collection, reclaiming, and ultimately recycling or reusing all plastic packaging.

Shift to recyclable plastic packaging: As mentioned in the previous paragraph, in 2019, 12% of plastic packaging is estimated to have been recycled. If the volumes of recyclable plastics generated by the produce industry are increased, **the current collection, sorting and recycling system should be substantially improved to meet the volumes**. The Canada Plastics Pact undertook ambitious actions to ensure that at least 50% of plastic packaging is effectively recycled by 2025.

Shift to proposed P2 regulations: Under this scenario, produce plastic packaging ceases to contribute to plastic pollution. While there's no immediate need to expand recycling infrastructure to accommodate increased produce plastic packaging volumes**, a transition to alternative materials demands a robust waste management industry.**

3.2.6. The economic burden of low consumption of produce in Canada

Between 2015 and 2021, the **percentage of the Canadian population consuming fresh produce below recommended levels increased by 6.5%,** from 83.3% (29.7 million Canadians) to 89.8% (34.4 million Canadians).

During this same period, the annual economic burden attributable to low fresh produce consumption in Canada surged from **$4.94 to $7.95 billion**. Population growth was responsible for 17.8% of this increase and inflation, including healthcare costs, for a further 48.5%. **Most importantly, change in the fresh produce consumption patterns was responsible for 33.7%, or just over one billion dollars, of this increase [2].**

Implementing the P2 Notice and its effect on produce cost coupled with inflation would lead to Canadians' consumption to decrease further and incur additional healthcare costs to Canada.

3.2.7. Impact on Canadians' health and well-being

As mentioned in the previous sections, the P2 plan could **adversely impact Canadians' consumption level of fruits and vegetables**. The potential price inflation would have a more significant effect on middle and lower social classes. It goes without saying that **fruit and vegetable consumption has extremely beneficial effects on health and overall well-being**. CPMA has partnered with the Heart and Stroke foundation, the Canadian Public Health Association, and the Canadian Cancer Society for the "Half Your Plate" [(22)] initiative aiming to improve fruit and vegetable consumption in Canada. The initiative underscores **the positive role produce consumption plays in a healthy lifestyle**, as fruits and vegetables are full of important nutrients such as vitamins, minerals, and fibre, may help reduce risk of some types of cancer and heart disease.

Another notable initiative by Community Food Centres Canada is the "Produce Prescription" or "Green Rx" [(23)] program through which low-income individuals who experience a variety of diet-related conditions are given a prescription by health care providers to be redeemed weekly for fresh produce at community centers. This initiative not only **increases fruit and vegetable consumption** but also significantly **improves individuals' health, sense of community, and financial stability.** However, the potential decrease in produce availability and price inflation resulting from the P2 regulations could **diminish the quantity and variety of fruits and vegetables** distributed through such programs, potentially **jeopardizing their continuation.**

Limiting Canadian's access to produce might drive them toward less healthy alternatives such as fast food, disrupting the balance of their diets. This outcome would significantly impact Canadians' overall well-being and livelihood.

4. APPENDIX

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4.2. Data Sources

Current State Value Chain Assumptions with Sources:

- Growers: Costs estimated as 60% for produce & 40% for operations, on average, as per interviews and data survey with Growers.
- Distribution: According to a study by the USDA, the average distribution cost for fresh produce in the United States is approximately 25% of the total farm value of the produce. It is also used as a rule of thumb for calculating distribution costs for fresh produce in the United States.
- Retail: Operational costs at retail estimated at 25% of the value of produce purchased (general industry estimate about produce retailing).

Yearly per person produce waste in the U.S.:
As the daily per person FLW in the U.S. in 2020 is 501g [(1)], the yearly per person FLW in the U.S. is 183 kg as of 2020. As produce constitutes 40% of the total volume, the yearly per person produce waste in the U.S. is 73.2 kg in 2020. According to the United Fresh Produce Association's FreshFacts on retail report, the growth rate of produce sales from 2020 to 2021 was 11.3%. As a growth rate is still not available for 2021 to 2022, the average of 2.4% from 2015-2019 (pre-COVID) is taken. This means that the **yearly per person produce waste in the U.S. is 83.2** kg in 2022.

Environmental impact of food waste in the U.S.:
The US Environmental Protection Agency (EPA) published a report in 2021 on the environmental impacts of FLW, estimating the following environmental footprint for uneaten food in the US [(1)]:

- **560 000 km^2 agricultural land** – approximately 16 percent of U.S. agricultural land.
- **22 trillion L blue water** – equal to the annual water use of more than 50 million American homes.
- **350 million kg pesticides**
- **6 350 million kg fertilizer**
- **2 400 million GJ (664 billion kWh) energy** – enough energy to power more than 50 million U.S. homes.
- **170 million MTCO2e GHG emissions** (excluding landfill emissions) each year – equal to emissions of 42 coal-fired power plants.

Extrapolation:
The **yearly per person produce waste in the U.S. is 83.2** kg in 2022.
The **yearly per person produce waste in Canada is 21.7** kg in 2022.
This means that Canadians yearly per person produce waste constitutes **26%** of the U.S. yearly per person produce waste.
Applying 26% on the **environmental impact of food waste in the U.S. numbers** gives the following environmental footprint for produce waste in Canada in 2022:

- **145 600 km^2 agricultural land**
- **5.72 trillion L blue water**
- **91 million kg pesticides**
- **1 651 million kg fertilizer**
- **624 million GJ (664 billion kWh) energy**
- **44.2 million MTCO2e GHG emissions**

4.3. Interview guides

4.3.1. Interview Guide for Growers:

Background & Objectives

On April 2023, ECCC published a Regulatory Framework Paper on Recycled content and labelling rules for plastics, which outlines the following target:

- Ban of **non-compostable plastic PLU stickers** under the Labelling & Recycled Content Framework.

as well as a Pollution Prevention (P2) Plan that would set requirements for Canadian businesses within the grocery retail supply chain with an aim for zero plastic waste from primary food plastic packaging, outlining the following objectives:

- Pollution **prevention planning notice** (P2 Notice) **for primary food plastic packaging**: Targets for reduction, reuse, redesign, and recycled content.
- P2 Notice Risk Management Objective for fresh produce: Fresh fruits and vegetables are distributed and sold in **bulk and/or in plastic-free packaging – at least 75% by 2026; at least 95% by 2028**.

The objectives of today's session:

- ✓ Establish your **concerns** regarding the adoption of these regulations
- ✓ Understand current **pain points and challenges** with respect to the proposed shifts
- ✓ Understand **cost implications** associated with shifting packaging to bulk/plastic-free alternatives & the non-compostable plastic PLU ban

Workshop Questions - General

We'd like to know more about your operations and packaging strategies:

Questions	Answers
• Tell us about your operations	
• What are the current packaging types used for your produce? • What are the advantages behind this/these types of packaging justifying adoption?	
• What percentage of your packaging is recyclable? • What is the trend of your recyclable usage % over the last years?	
• What are your company's defined targets into shifting to sustainable packaging?	

Workshop Questions – P2 Notice RMO for fresh produce

Regulation:

- Fresh fruits and vegetables to be distributed and sold in **bulk and/or in plastic-free packaging – at least 75% by 2026; at least 95% by 2028**
- **100% of all primary food plastic packaging** to be **reusable, recyclable, or compostable by 2028**

Questions	Answers
• What is the potential **produce waste** impact % you foresee with this packaging shift?	*Factors: Shelf life, biological compatibility with packaging*
• What are some pain points you foresee related to **produce availability**?	*Factors: Impact on volume change, produce assortment, delivery to large urban vs. remote/rural communities, stronger secondary packaging requirements, contractual obligations with regards to shipping times,*
• What challenges do you foresee in terms of **produce safety** with a packaging shift?	*Factors: Traceability standards, Contamination*
• What is the % breakdown of your **cost structure**?	*Raw Materials, Labor, Equipment, Maintenance, Training, Transportation*
• What **percentage increase in costs** do you foresee as a direct result of the P2 notice in the case of a shift to bulk handling? • To other plastic-free packaging?	*Raw Materials, Labor, Equipment, Maintenance, Training, Transportation*
• Any **other pain points/challenges** you would like to mention?	
• Are there any aspects of the regulations you deem workable? Any more feasible alternative scenarios/timelines of the regulations from your perspective?	

Workshop Questions – Non-compostable plastic PLU ban

Regulation:

- Ban of **non-compostable plastic PLU stickers** under the Labelling & Recycled Content Framework.

Questions	Answers
• How are PLUs applied on your produce?	*Manual, automated, semi-automated process?*
• What **advantages** specific to your produced fruit/vegetable does a plastic PLU stickers offer?	*Factors: Compatibility of adhesive or material with outer layer of fruit/vegetable, humidity requirements, price differentiation*
• What is the impact of the non-compostable PLU plastic ban on the **feasibility of shipping** of your produce?	
• What **cost implications** associated with the adoption of PLU alternatives will be incurred to your business?	
• What is the resulting **potential produce cost impact** (% increase over current costs)?	

4.3.2 Interview Guide for Packaging companies:

Workshop Questions - General

We'd like to know more about your operations and packaging strategies:

Questions	Answers
• Tell us about your operations	
• What **packaging solutions** do you offer to the fresh produce market? • What **recyclable packaging solutions** do you offer to the fresh produce market? *(Can recyclable packaging solutions reach 100% recycled content?)* • If solutions are not recyclable, what **alternative sustainable packaging solutions** do you offer? (e.g., compostable, reusable, other?)	
• What **barriers or challenges** does your packaging solution address for fresh produce?	
• What is your market share and revenue from the Canadian market? • What % of your revenue in Canada is tied with non-recyclable packaging? Recyclable packaging?	

Workshop Questions – P2 Notice RMO for fresh produce

Regulation:

- Fresh fruits and vegetables to be distributed and sold in **bulk and/or in plastic-free packaging – at least 75% by 2026; at least 95% by 2028**

Questions	Answers
• What is the **% impact** of shifting to plastic-free packaging on produce **shelf-life**?	
• What challenges do you foresee in terms of **produce safety & quality** with a shift to plastic-free packaging?	
• What **capital cost impacts** would be incurred by your business in case of a shift to plastic-free packaging production?	
• What **percentage increase** do you foresee **in your packaging solution's price** with a shift to **recyclable plastic packaging**? **Other plastic-free packaging?**	
• What **cost impacts** tied with your **business' presence in the Canadian market** do you foresee in the case of a shift to bulk packaging? To plastic-free packaging?	
• Any **other considerations** you would like to mention?	
• Other than the factors discussed, what other **barriers** are preventing you from shifting to **sustainable packaging options**?	
• Are there any aspects of the regulations you deem workable? Any more feasible alternative scenarios/timelines of the regulations from your perspective?	

Workshop Questions – Non-compostable plastic PLU ban

Regulation:

- Ban of **non-compostable plastic PLU stickers** under the Labelling & Recycled Content Framework.

Questions	Answers
• Please describe the **advantages of each component of the PLU sticker** in the current non-compostable form (Face, ink, adhesive)	
• What **percentage increase** do you foresee **in your PLU solution's price** with a ban of non-compostable plastic PLU stickers?	
• What **cost impacts** tied with your **business' presence in the Canadian market** do you foresee in the case of a ban of non-compostable plastic PLU?	
• What **additional risks** do you foresee if the current ban of non-compostable plastic PLU stickers is brought into force?	
• Are there any aspects of the regulations you deem workable? Any more feasible alternative scenarios/timelines of the regulations from your perspective?	

4.3.3 Interview Guide for Retailers:

Workshop Questions - General

Questions	Answers
• What percentage does produce represent from the total merchandise sold at your locations?	
• What **% of the total volume** of produce sold at your location is in **bulk**? What percentage is **packaged**?	
• What is the **current % breakdown of the fresh produce packaging types** offered at your locations: - **Bulk:** with PLU stickers, with no PLU stickers - **Packaged:** recyclable plastic, other plastic, non-plastic	
• What **in-store packaging options (Bags, other)** do you offer for bulk produce? Are these bags recyclable or compostable?	
• What are your company's **defined targets** into shifting to **sustainable packaging**? How are these targets communicated and worked towards with your produce suppliers?	

Workshop Questions – P2 Notice RMO for fresh produce

Regulation:

- Fresh fruits and vegetables to be distributed and sold in **bulk and/or in plastic-free packaging – at least 75% by 2026; at least 95% by 2028**

Questions	Answers
• What potential **produce waste** impact % do you foresee with this packaging shift?	*Factors: Shelf life*
• What are some pain points you foresee related to **produce availability**?	*Factors: Impact on volume change, produce assortment, delivery to large urban vs. remote/rural communities*
• What challenges do you foresee in terms of **produce safety** with a packaging shift?	*Factors: Traceability standards, Contamination, Sanitary considerations (Covid 19)*
• What challenges do you foresee in terms of **shelving & logistics** with a packaging shift?	*Factors: Revamp of produce spaces within retail locations to accommodate bulk/plastic free packaging*
• What is the **% breakdown of your produce annual sales** in terms of **packaging**: Bulk, recyclable plastic, other plastic, non-plastic?	
• Any **other pain points/challenges** you would like to mention?	
• Do you gather **feedback from your costumers** on their preference for produce packaging? If so, what is the **ranking of packaging types** in terms of their **preference**?	
• Are there any aspects of the regulations you deem workable? Any more feasible alternative scenarios/timelines of the regulations from your perspective?	

Workshop Questions – Non-compostable plastic PLU ban

Regulation:

- Ban of **non-compostable plastic PLU stickers** under the Labelling & Recycled Content Framework.

Questions	Answers
• What is the impact of the non-compostable plastic PLU ban on the **feasibility of shipping** of produce from your suppliers?	*Factors: Produce reliant on stickers (Example: Melons, Watermelons), produce with heavy use of PLU stickers produce (Example: Apples, Citrus)*
• What are some pain points you foresee related to **produce availability** at your retail locations?	*Factors: Produce assortment*
• What **cost implications** associated with the adoption of PLU alternatives will be incurred to your business?	

4.3.4 Interview Guide for Distribution:

Workshop Questions - General

We'd like to know more about your operations:

Questions	Answers
• Tell us about your operations	
• In what **packaging forms** do you store & transport produce? • How do the **different types of packaging** impact the **distribution and transportation** of produce? • What **advantages** does **plastic packaging** bring to produce distribution?	*Factors: Shelf life, damage control, quality preservation, ease of handling*

Workshop Questions – P2 Notice RMO for fresh produce

Regulation:

- Fresh fruits and vegetables to be distributed and sold in **bulk and/or in plastic-free packaging – at least 75% by 2026; at least 95% by 2028**

Questions	Answers
• What is the potential **produce waste** impact % you foresee with this packaging shift?	*Factors: Shelf life, physical damage to the produce during transportation*
• What are some pain points you foresee related to **produce availability**?	*Factors: Inventory management, Average shipping times vs shelf-life, Shipping to remote rural communities, Contractual obligations with retailers*
• What challenges do you foresee in terms of **produce safety** with a packaging shift?	*Factors: Contamination, Sanitary Considerations*
• How would a shift to **recyclable plastics** impact your operations? (% impact)	*Labor, Vehicle requirements, Maintenance & Cleaning, Time efficiency*
• What **percentage increase in costs** do you foresee as a direct result of the P2 notice in the case of a shift to bulk handling? • To other plastic-free packaging?	*Labor, Vehicle requirements, Maintenance & Cleaning, Time efficiency*
• What is the resulting **potential impact on the price of your services** (% increase over current costs)?	
• Any **other pain points/challenges** you would like to mention?	
• Are there any aspects of the regulations you deem workable? Any more feasible alternative scenarios/timelines of the regulations from your perspective?	

Workshop Questions – Non-compostable plastic PLU ban

Regulation:

- Ban of **non-compostable plastic PLU stickers** under the Labelling & Recycled Content Framework.

Questions	Answers
• What **advantages** does plastic PLU stickers offer during bulk transportation?	*Factors: PLU stickers coming off in the case of low-quality adhesive, high humidity environments*
• What is the impact of a ban of non-compostable plastic PLUs on your **operations**?	*Factors: Produce reliant on stickers (Example: Melons, Watermelons), produce with heavy use of PLU stickers produce (Example: Apples, Citrus)*
• What **cost implications** associated with the adoption of PLU alternatives will be incurred to your business?	*Factors: Stronger secondary packaging requirements*
• What is the resulting **potential impact on the price of your services** (% increase over current costs)?	

4.3.5 Interview Guide for Government:

Workshop Questions

Regulations:

- Fresh fruits and vegetables to be distributed and sold in **bulk and/or in plastic-free packaging – at least 75% by 2026; at least 95% by 2028**
- **100% of all primary food plastic packaging** to be **reusable, recyclable, or compostable by 2028**
- Ban of **non-compostable plastic PLU stickers** under the Labelling & Recycled Content Framework.

Questions	Answers
• What are the **current regulations on produce packaging** in the U.S.?	
• What are the **current regulations on PLU stickers** in the U.S.?	
• What is the **U.S.' future strategy** on produce packaging sustainability?	
• What **potential impacts** do you foresee with Canada adopting the **P2 notice** on produce packaging?	
• What **potential impacts** do you foresee with Canada adopting the **non-compostable plastic PLU ban**?	*Factors: Trade implications, lack of jurisdiction harmonization*
• What **workable alternatives** do you propose for Canada in terms of **produce packaging**?	
• What **workable alternatives** do you propose for Canada in terms of **PLU sticker regulations**?	

4.4. Interview Summaries

4.4.1. Interviewed stakeholders

Growers:

- Small potatoes Grower shipping in Canada & the United States.
- Commercial greenhouse produce company growing to North America, serving a variety of produce: Berries, Peppers, Tomatoes, Cucumbers, Organics and Meal kits.
- Fresh produce company shipping to Canada & the U.S., serving tomatoes, peppers & cucumbers.
- California based Grower servicing Canada & the U.S., with main produce offered: Artichokes, Broccoli, Cauliflower, Celery & more.
- U.S. based Grower offering a variety of produce and value-add produce: Broccoli, Cauliflower, Celery, Celery Sticks, Corn, Citrus & more.
- Quebec based Grower producing variety of lettuce, cucumbers & tomatoes in mostly packaged form.
- California based strawberry producer shipping to Canada & the U.S.
- U.S. & Canada based producer of value-add fruit & vegetables in various forms: salad kits, snacks, vegetable trays, vegetable blends, meal kits & more.
- Organization representing farmers and Growers based in the U.S. with members shipping to Canada.

Packaging:

- Major PLU sticker manufacturer offering compostable and non-compostable PLU solutions for produce for the Canadian & U.S. markets.
- Canadian flexible packaging manufacturer offering flexible plastic packaging solutions for produce.
- Post-consumer plastic recycling and reprocessing company based in Canada.

Retail:

- Major supermarket chain in Canada offering online and in-store produce shopping.
- Major wholesale Retailer in Canada offering in-store produce shopping.

Distribution:

- Canada based wholesale Distributor of a vast array of both grocery and foodservice products.

Government:

- Representatives from North America.

4.4.2 Interview Summaries - Growers:

Growers reported the following packaging types used in their operations:

- ***Highest volume:*** The higher volume usage of produce packaging includes **plastic film**, **plastic bags** (recyclable AND non-recyclable), **foil trays** and **twist bands.**
- ***Lowest volume*****:** There are various lower volume packaging options used such as **bulk, paper, carton,** and **wax carton**. Bulk packaging is compostable, paper and carton packaging are recyclable, while wax carton packaging is non-recyclable and can have a negative impact on the environment if not disposed of properly.

Table 9: Growers' Produce Packaging

	Bulk	Paper	Carton	Wax Carton	Plastic Film	Plastic bags	Foil Trays	Twist Tag	Rubber band
Grower A	○		○			●	◎		
Grower 2	◎	○			●	●			
Grower 3					●	●	◎		
Grower 5					●		●		
Grower 8	◎		○	◎	●	●		●	◎

● High volume

◎ Moderate volume

○ Low volume

Tables 10: Compiled data on Grower's packaging types

GROWER 2				
Bulk		Packaging		
20%		80%		
With PLU	Without PLU	Recyclable	Non-Recyclable	Non-Plastic
90%	10%	35%	45%	10%

GROWER 5				
Bulk		Packaging		
6%		94%		
With PLU	Without PLU	Recyclable	Non-Recyclable	Non-Plastic
33%	67%	94%	0%	0%

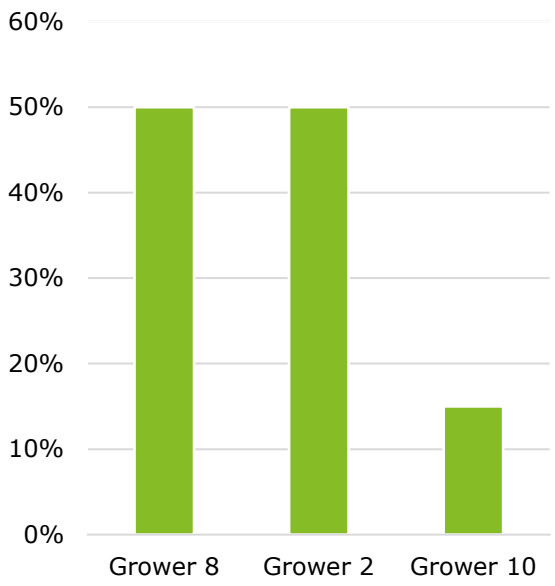
GROWER 6				
Bulk		Packaging		
0%		100%		
With PLU	Without PLU	Recyclable	Non-Recyclable	Non-Plastic
0%	0%	100%	0%	0%

GROWER 7				
Bulk		Packaging		
3%		97%		
With PLU	Without PLU	Recyclable	Non-Recyclable	Non-Plastic
100%	0%	96%	2%	2%

GROWER 11				
Bulk		Packaging		
30%		70%		
With PLU	Without PLU	Recyclable	Non-Recyclable	Non-Plastic
100%	0%	100%	0%	0%

The following insights were gathered from Growers when discussing the packaging regulations proposed by ECCC:

P2 Notice RMO for fresh produce	
Advantages of plastic packaging mentioned by Growers:	• ***Preservation:*** All Growers agreed on the important advantage plastic packaging allows in terms of shelf life. Growers reported that plastic packaging doubles shelf life of most produce. Furthermore, some Growers have their plastic packaging engineered to provide an adequate modified atmosphere and oxygen levels to prevent oxidation and fast spoilage of their products. This enables **preservation** of goods by increasing shelf life. • ***Marketing:*** Plastic packaging **communicates** nutrition info and promotes brand identity for Growers that sell their products based on their brand name. Plastic packaging is essential in providing easy print solutions for the product name as well as recipes and flash information promoting the sales of their products. • ***Food Traceability:*** Bulk produce poses traceability challenges due to the inability of using produce identifiers. • ***Innovation:*** For Growers whose primary products are value-add, imposing bulk or plastic-free packaging limits their ability to offer multiple types of products bundled in one package (Example: Bag with assortment of colored potatoes or lettuce types). This would be impossible in a bulk setting. • ***Sanitary Concerns:*** Growers shared that consumers are requiring plastic packaging as they view it as the safest option in terms of sanitary packaging. This sentiment was accentuated with the COVID-19 pandemic putting food safety as a top priority.
Foreseen % impact of produce waste:	The following graph represents Grower estimations on the increase of produce waste with a packaging shift:

	
Foreseen challenges of produce availability:	• ***Exit from the Canadian market:*** All interviewed Growers expressed their readiness to exit the Canadian market in case these regulations go through, mainly for cost and feasibility considerations. Shipping to Canada would be too costly and an unfavorable business endeavor. • ***Lack of jurisdiction uniformity:*** The **lack of jurisdiction uniformity** across the regulations prevents this notice form being effective to stakeholders • ***Discontinuation of some produce types***: Some items will inevitably be **discontinued** since they can't be delivered in bulk (e.g., Lettuce) • ***Delivery to rural communities***: The absence of plastic packaging could hinder the transportation of goods across **long distances** as it may reduce their shelf life when alternative wrapping materials are used. This could result in **limited supplies** to numerous rural communities which would receive produce of **lower quality standards**.
Foreseen challenges of produce safety	• ***Contamination:*** Plastic packaging is agreed upon by interviewed Growers as the best option in terms of contamination safety. • ***Quality:*** Bulk and paper packaging do not offer structural integrity when transporting produce, leading to damage & spoilage of important quantities. • ***Reduced nutritional Value:*** The porous nature of many fruits and vegetables along other characteristics make them incompatible to be packaged in plastic-free materials. These substitutes are very absorbent and would dry out the fruit, decreasing its shelf life and making it unsafe to consume.

Other pain points	• ***Contractual obligations:*** Some businesses are unable to terminate existing contracts on short notice due to legal obligations, which can lead to an increase in costs that may not be financially feasible in the timeframe suggested by P2. • ***Infeasible supply chain timeline:*** Growers have suggested that the P2 timeline isn't feasible to allow for their supply chain to adapt within the proposed frame. • ***Stronger secondary packaging:*** Eliminating primary plastic packaging does not address the issue of transporting goods from one location to another. In fact, it may result in businesses relying more on secondary packaging materials, some of which may still contain plastic. This could potentially undermine the effectiveness of the notice aimed at reducing plastic waste. • ***Transportation across long distances:*** These regulations will not only prohibit Canadian Growers from exporting high-quality produce outside of Canada but also restrict their ability to distribute it within the country, including to remote regions. • ***Inconsistency across their business structure:*** Many of these Growers do not sell their offerings to Canadian consumers alone. Therefore, by having to adapt to the P2 regulations they must re-adjust their business structure and cost breakdown. • ***Misconceived focus of the notice on produces:*** While produce only encompasses a small amount of plastic consumption in the Canadian market, the notice seems to only be targeting the produce sector.
Workable alternatives suggested by Growers:	• ***Extended timeline:*** With a larger range of time for adjustment, some Growers can see potential change towards implementing the current proposed P2 Notice • ***Focus on recyclable plastic:*** Another proposed alternative would be to first continue focusing on recyclable plastic packaging options which is the current strategy followed by most Growers in North America, before imposing a brutal shift to bulk and or plastic-free solutions. Note that Growers shifted to recyclable plastic in some cases to respond to demands of Retailers and consumers • ***Focus on recyclable plastic infrastructure:*** Growers also reflected on the need to focus and expand recycling/composting facilities network to serve recycling needs, as they deem a shift to recyclable or compostable material is not enough to close the loop. • ***Work on a circular plastic economy:*** Currently, very few identified "recyclable" plastics are being handled post-consumption. It is said that only 25% of it makes it to recycling facilities

	3 cost impact scenarios initial suggestion: • *Current (Baseline)* • *Shift to recyclable plastics* • *Worst case scenario (implementation of notice)*
Non-compostable plastic PLU ban	
PLU stickers application methods:	• PLU application is done manually for some Growers, as well as fully automated application for others.
Advantages of PLU stickers:	• ***Equipment requirements:*** Current machines are made for plastic PLUs. A PLU material shift would mean new equipment and/or substantial retooling which would incur capital investments for Growers. • ***Compatibility with produce:*** Plastic PLUs adhesive allows an efficient sticking and plastic withstands humidity longer and better. This is especially beneficial in the humid and wet climate of Canada.
Cost implications associated with the adoption of PLU alternatives	• **PLU purchasing cost:** Growers estimated that a shift from plastic to paper PLUs would incur a **200% increase in PLU cost**, and 250% and higher for fully composable PLUs.
Potential cost impact on produce with the adoption of PLU alternatives (% increase over current costs)	• Growers estimated that the costs incurred by their business for a PLU change would carry **30% costs to consumers**, especially with the produce industry being generally low margin.

The following cost breakdown data points were collected from interviewed Growers:

Table 11: Operational Cost Breakdown

	Grower 1	Grower 2	Grower 3	Grower 4	Grower 5	Grower 6	Grower 7	Grower 8	Grower 9
Labour	59%	40%		3%	24%	45%	34.57%	50%	31%
Manufacturing	15%	1%		77%	5%		29.84%	17%	40%
Equipment	6%	5%			5%	10%	2.88%	3%	7%
Maintenance	3%	4%			5%		3.79%	3%	
Training	1%	1%			1%		0.13%		4%
Transportation		11%		2%	6%	15%	7.5%	15%	
Testing	1%	1%			3%				1%
Packaging	15%	29%	14%	9%	17%	15%	13.08%	12%	17%
Sales and Admin							5.61%		
Financial							2.61%		
Others				8%	34%				
Farm Inputs						15%			

Cost implications:

When discussing the shift to bulk or plastic free packaging, Growers agreed on a decrease in packaging cost for bulk handling & an increase in packaging costs for plastic-free alternatives, and the following cost buckets would also be impacted:

Labour: Growers forecasted the need for more headcount requirements to service bulk packaging and transportation. This would incur cost implications, but also Growers based in California mentioned an important labour shortage that would make hiring and retention challenging.

Training: A shift to an alternative packaging type is accompanied by the need to train employees. A Grower forecasted at least a doubling in training costs.

Transportation: A complete rethinking on how produce is transported to Canada will take place.

Equipment: A shift of the packaging strategy means Growers need to discard completely or partially some of their existing equipment tailored to plastic packaging and the purchase of new specialized equipment costing Growers across the board millions of dollars. Furthermore, the efficiency of the alternative equipment does not mean current standards and may put in peril operations speed.

The following inputs were gathered when discussing a shift to bulk packaging:

Table 12: Percentage Cost Change from shifting to bulk

	Grower 1	Grower 2	Grower 3	Grower 4	Grower 5	Grower 6	Grower 7	Grower 8	Grower 9
Labour		-10%			20%		5%	-20%	40%
Manufacturing					3%		-30%		27%
Equipment		800%			3%				11%
Maintenance		-10			3%				
Training		300%			2%		5%		6%
Transportation		15%			20%		-5%		
Testing		300%			4%				
Packaging		-15%			12%		-80%		14%
Food Waste		800%							
Others					34%				
Farm inputs									

The following inputs were gathered when discussing a shift to plastic-free packaging:

Table 13: Percentage Cost Change from shifting to plastic free packaging

	Grower 1	Grower 2	Grower 3	Grower 4	Grower 5	Grower 6	Grower 7	Grower 8	Grower 9
Labour	3%	500%			20%	5%	10%		40%
Manufacturing	7%			5%	3%		-15%		27%
Equipment	10%	1200%			3%	5%			11%
Maintenance	10%	15%			3%				
Training		300%			2%				6%
Transportation		33%			20%		-5%		
Testing		5000%			4%				
Packaging	30%	600%	900%	300%	30%	30%	10%	40%	14%
Food Waste		400%							
Others					15%				
Farm inputs									

Table 14: Weighted factor for Growers based on revenue

Grower	Weighted Factor
Grower 1	10%
Grower 2	2%
Grower 3	23%
Grower 4	40%
Grower 5	16%
Grower 6	2%
Grower 7	1%
Grower 8	1%
Grower 9	5%

4.4.3 Interview Summaries - Packaging:

Non-compostable plastic PLU ban	
Barriers and challenges addressed by non- plastic PLU option:	• ***Cost friendly option:*** On average, compostable PLU solutions cost 50% to 60% higher than non-compostable plastic PLUs. • ***Performance throughout the supply chain:*** Although non-compostable paper PLUs cost less than non-compostable plastic PLUs, they perform poorly through the supply chain in terms of durability and robustness and are thus not chosen by Growers as a PLU solution.
Advantages of each component of the PLU sticker in the current non-compostable form (Face, ink, adhesive)	• ***Food safety:*** Some Growers don't wash certain types of fruit like Kiwi, they proceed by a dry-rub and do not treat the fruit with bactericides and fungicides to not add chemicals. This poses the risk of mold and other microbes can live on the surface of the fruit. When paper PLUs are attached to this surface and becomes wet, it becomes a host for these microbes and mold posing a safety risk. Thus, chances of food safety risks arising from the use of paper or compostable PLUs can be higher than those associated with plastic PLUs. • ***Compatibility with environmental requirements:*** Fruit & Vegetables are submitted to varying temperatures throughout the supply chain, from below 0 degrees Celsius to warm conditions. When fruits are refrigerated during storage and are taken out of warmer temperatures, condensation produces water on the fruit and the PLU sticker. Also, some Retailers regularly mist the produce to keep it fresh. Within these scenarios, plastic PLUs are highly advantageous compared to paper PLUs that perform poorly when subjected to water. They are therefore not suited to all situations that occur during the distribution and sale of fresh produce. • ***Performance of the PLU adhesive:*** PLU stickers also need to adhere to the surface shape of the produce. Plastic PLUs are more flexible than other material alternatives and are thus easily applied to a variety of surfaces. The surface texture of the produce also challenges the performance of the PLU stickers. As well known, surface texture varies from produce type to the other (Examples: Knitted (Cantaloupe), Hairy (Kiwi)), thus a good solution is required for these variations. The adhesives currently certified as compostable are inadequate for certain produce items. This results in PLUs falling off and failing to perform their intended task.

Cost impacts tied with PLU production business' presence in the Canadian market	A PLU manufacturing company stated they will lose an important portion of their Canadian customers' sales in the case of the ban. Due to the cost increase barrier in the case of the adoption of compostable PLUs, they foresee Grower companies shifting back towards packaging the produce they deliver to Canada.
Additional risks of the ban	***Lack of harmony of the jurisdiction with the rest of the world:*** Concern was stated about how this ban would single out Canada in the North American and global market. For many Growers, having to acquire other types of labels and adjust their operations to service the Canadian market may prove to be a non-viable option economically, with businesses left with the choice of incurring these capital costs or pulling out of the Canadian market.
P2 Notice RMO for fresh produce	
Barriers or challenges addressed by plastic packaging solution:	***Food waste efficiency:*** The proposed recycled plastic packaging solution addresses shelf-life optimization and thus minimizes food waste across the supply chain. The stakeholder provided potatoes as an example losing 3 times their shelf-life when packaged in plastic-free solutions.
Percentage increase of packaging solution's price with a shift to recyclable plastic-free packaging	Stakeholder mentioned that compostable packaging costs **3 times more** than their current recycled plastic solutions.
Other considerations:	***Value-add produce:*** For companies that provide value-add fruits and vegetables to the market such as pre-cut vegetables or snack boxes, this regulation is unachievable as they will not be capable to offer their produce in bulk or plastic free packaging. The question is: Does the remaining 25% in 2026 and 5% in 2028 include value-add products or commodities that are constrained to be bulk such as melons? How is

	the decision on the repartition going to be concluded? The percentages and timeline outlined lack many clarifications. ***Consumer awareness:*** It was re-enforced that the packaging material should not be the primary focus, but a strategy to target consumer behavior such as composting, and recycling education should be undertaken to achieve circular economy. ***Loss of local packaging manufacturers to the US market:*** With most of their sales in Canada, local based packaging companies deem this regulation as devastating to their presence in the Canadian market and they are looking to exporting their sales as well as their manufacturing facilities to the U.S. to survive the regulation. This would be an important loss to the Canadian packaging economy and loss of employment opportunities to other countries.
Point of view on the notice	A packaging company shared their feeling that the regulation's timeline and approach are wrong. It is also felt that ECCC did not vet this properly with all stakeholders of the supply chain. Investment into plastic recycling should be the primary focus to achieve packaging that is designed for recyclability and achieve circular economy by building the required infrastructure as well as educate consumers of recycling behaviours.

4.4.4 Interview Summaries - Distribution:

Risk of bulk shift	• ***Further increase in food waste:*** Transport already wastes 30% of the produce being shipped • ***Product damage:*** Transporting material in bulk makes it more fragile and susceptible to damage. • ***Susceptible to bruising***: If products aren't wrapped correctly, they are easily bruised by temperature deviation. • ***Non- availability to rural locations:*** Already dealing with transporting to locations in the less 5 big national chains • ***Challenges of Canadian geography:*** Already held captive with food networking and accessibility to foods in some locations *A solution is needed before pulling the tool*
Risk of Plastic-free shift	• ***Insufficient testing:*** Paper can't be used in comparison to plastic, not sufficient testing of the material on produce

	• ***Sustainable controversy:*** Freight cost is significant – it is impossible to transport the same amount of goods with the new packaging type without having to increase the number of transports required. • ***Crossing long-distances***: Life-cycle Analysis on the foods that will reach all geographies
Risk of Recycled plastic	• ***Cost:*** Historically, can increase with future initiative • ***Plastic integrity:*** Is it durable? Does it reform the same way? Does it operate the same way? When dealing with wholesale, the high quality of goods received is necessary otherwise they won't sell.
Other points	• ***Inconsistency in taking rural regions into account:*** The government doesn't always consider everyone, but limits considerations to 5 national chains. They rarely consider if it works for broader remote areas, further north

4.4.5 Interview Summaries - Retailers:

Defined target to shift to sustainable	• ***Increase circular economy of plastic*****:** have as much pre-recyclable content
	• ***4 pillars of work:*** Reduce packaging overall, reduce plastic, increase recycled content, focus on the needs to be labeled
	• ***Reduce greenhouse emission:*** Working closely with suppliers since:
	  ○ Only 10% is of greenhouse stems from packaging
	  ○ But 90% greenhouse stems from the produce itself

Risk of bulk shift	• ***Pallet handling will increase food waste***: from 10- 30% food waste loss • ***Time constraint:*** It will take a couple of years to redesign packaging • ***Produce safety:*** Containers have different levels of cleanliness • ***Produce availability:*** Industry will be impacted: some produce must be packaged in plastic
Risk of plastic-free packaging	• ***Unsatisfied customers:*** While some companies started the shift, their stack didn't sell, and they had to go back to their traditional packaging type. • ***Lack of testing on new packaging types:*** While the notice imposes change, it doesn't support stakeholders with the right amount of time to test the performance of the new materials. • ***Unpredictability:*** Sales are often a reflection of consumer preferences, making it imperative for Retailers to stay informed

	about what their customers want. Failing to do so can be risky, as it may result in a shift away from popular products and a decline in sales. Therefore, it is crucial for Retailers to remain knowledgeable about consumer preferences before making any changes to their product offerings.
Other points	• ***Inconsistency across plastic users:*** 95% of global economy needs to change, not just what seems to be a targeted entity (produce), better off if it's targeted to brand owners, • ***Education Programs***: Sustainable impacts should be centered on educating plastic users about recycling programs. (e.g., food loss in garbage increases gas emission) • ***Not rooted in reality***: Zero plastic is a very extreme approach that seems to be counter-active with the effort put by the government

4.4.6 Interview Summaries – Recycled plastics producer:

Problems raised following implementing the P2 Notice	• ***Inconsistent targeting:*** Plastic chemical industry has no interest in changing by themselves • ***Decrease in shelf life:*** Moving away from multi-layer packaging to recycled content is very difficult, to make sure the shelf-life of food lasts • ***Produce safety:*** Make sure that compostable packaging is sustainable, and that packaging cannot impact our health • ***Economical issue:*** Not easy for recyclers, they're going out of business because regulations are not ready, they're just coming in.
Defined targets	• ***Advantages of the notice:*** Opportunity for stakeholders to rethink where the industry is going • ***Create a circular economy:*** Prime resin still is being used, why not use it to be recyclable and increase the circular economy. Focus the effort on feeding recycled content since the ecosystem's current infrastructures are not yet built to have a circular economy of plastic usage.

4.5. Detailed calculations

4.5.1 Produce Availability (Section 3.2.1.5) detailed calculations:

Table 15: Impact of P2 Notice on produce availability

	Low risk	Medium risk	High risk
Fruits Impact $	$1,645M	$2,090M	$2,540M
Greenhouse Vegetables Impact $	$110M	$215M	$320M
Field Vegetables Impact $	$495M	$960M	$1 425M
Total (Non-VA):	$2,250M	$3,265M	$4,280M
% Impact (Non-VA):	25%	36%	47%
Total (VA):	$1,300M	$1,300M	$1,300M
% Impact (VA):	13%	13%	13%
Total (VA + non-VA):	$3,550M	$4,565M	$5,580M
% Impact (VA + non-VA)	34%	44%	54%

Table 16: Detailed calculations - Impact of P2 Notice on produce availability

All data sources: Statistics Canada (9)

				Low risk	Medium risk	High risk
	Country	Region	Value Imported $	At risk $	At risk $	At risk $
Fruits						
Grapes	United States	North America	$300M	$75M	$150M	$225M
	Peru	South America	$132M	$112M	$119M	$126M
	Chile	South America	$96M	$82M	$87M	$91M
	South Africa	Europe	$85M	$85M	$85M	$85M
	Mexico	North America	$65M	$16M	$33M	$49M
Strawberries	United States	North America	$450M	$113M	$225M	$338M

	Mexico	North America	$141M	$35M	$70M	$106M
	Peru	South America	$19M	$16M	$17M	$18M
	Chile	South America	$19M	$16M	$17M	$18M
	Turkey	Europe	$11M	$11M	$11M	$11M
Bananas	Guatemala	South America	$320M	$272M	$288M	$304M
	Costa Rica	South America	$80M	$68M	$72M	$76M
	Colombia	South America	$72M	$61M	$65M	$69M
	Ecuador	South America	$63M	$54M	$57M	$60M
	Honduras	South America	$50M	$42M	$45M	$47M
Highbush blueberries	United States	North America	$177M	$44M	$89M	$133M
	Peru	South America	$153M	$130M	$138M	$146M
	Mexico	North America	$82M	$21M	$41M	$62M
	Chile	South America	$52M	$44M	$47M	$50M
	Argentina	South America	$3M	$3M	$3M	$3M
Raspberries	Mexico	North America	$348M	$87M	$174M	$261M
	United States	Europe	$196M	$196M	$196M	$196M
	Chile	South America	$43M	$37M	$39M	$41M
	Serbia	Europe	$18M	$18M	$18M	$18M
	China	Asia - Oceania	$5M	$5M	$5M	$5M
Greenhouse Vegetables						
Peppers	Mexico	North America	$187M	$47M	$94M	$140M

	United States	North America	$4M	$1M	$2M	$3M
	Spain	Europe	$4M	$4M	$4M	$4M
	Netherlands	Europe	$0M	$0M	$0M	$0M
Tomatoes	Mexico	North America	$155M	$39M	$77M	$116M
	United States	North America	$35M	$9M	$17M	$26M
	Guatemala	South America	$0M	$0M	$0M	$0M
	New Zealand	Asia - Oceania	$0M	$0M	$0M	$0M
Cucumbers & gherkins	Mexico	North America	$28M	$7M	$14M	$21M
	United States	North America	$13M	$3M	$6M	$9M
	Spain	Europe	$0M	$0M	$0M	$0M
	Netherlands	Europe	$0M	$0M	$0M	$0M
Lettuce	United States	North America	$1M	$0M	$0M	$0M
	South Korea	Asia - Oceania	$0M	$0M	$0M	$0M
	Spain	Europe	$0M	$0M	$0M	$0M
	Netherlands	Europe	$0M	$0M	$0M	$0M
Field Vegetables						
Lettuce	United States	North America	$654M	$163M	$327M	$490M
	Mexico	North America	$58M	$15M	$29M	$44M
	Spain	Europe	$2M	$2M	$2M	$2M
	China	Asia - Oceania	$0M	$0M	$0M	$0M
	Netherlands	Europe	$0M	$0M	$0M	$0M
Onions & shallots	United States	North America	$218M	$54M	$109M	$163M
	Mexico	North America	$81M	$20M	$41M	$61M
	Peru	South America	$10M	$8M	$9M	$9M
	Spain	Europe	$7M	$7M	$7M	$7M

	Netherlands	Europe	$3M	$3M	$3M	$3M
Cauliflowers & headed broccoli	United States	North America	$245M	$61M	$123M	$184M
	Mexico	North America	$64M	$16M	$32M	$48M
	Guatemala	South America	$6M	$5M	$6M	$6M
	Spain	Europe	$1M	$1M	$1M	$1M
	Netherlands	Europe	$0M	$0M	$0M	$0M
Cabbages	United States	North America	$246M	$62M	$123M	$185M
	Mexico	North America	$56M	$14M	$28M	$42M
	China	Asia - Oceania	$2M	$2M	$2M	$2M
	South Korea	Asia - Oceania	$0M	$0M	$0M	$0M
	India	Asia - Oceania	$0M	$0M	$0M	$0M
Tomatoes	Mexico	North America	$136M	$34M	$68M	$102M
	United States	North America	$99M	$25M	$49M	$74M
	Guatemala	South America	$1M	$1M	$1M	$1M
	Morocco	Africa	$0M	$0M	$0M	$0M
	Dominican Republic	South America	$0M	$0M	$0M	$0M
		Total (Non-VA):	$1,889M	$2,248M	$3,265M	$4,282M
			% Impact (Non-VA):	25%	36%	47%
			Total (VA):	$1,300M	$1,300M	$1,300M
			% Impact (Non-VA):	13%	13%	13%
			TOTAL (VA + Non-VA):	$3,548M	$4,565M	$5,582M
			% Impact (VA + Non-VA)	34%	44%	54%

4.6. Other

4.6.1 Additional Considerations

While the previous costs of growers, distributors, and retailers influence the final cost of a consumer good, it may not account for the additional lost costs in food waste and extra required costs for plastic recycling as this was not quantified by stakeholders and communicated during the interviews.

Unaccounted financial loss from food waste: While a lot of food waste is already accounted for in some of the growers' operational costs, a lot of it is overlooked across the rest of the supply chain. Considering 11% of food is wasted within the retail sector [(1)] and according to interviews, waste during food distribution can be up to 30%, this notice would add to these already considerably high numbers.

Viability of Canadian companies: Some interviewed Canadian Growers explicitly state that this notice will shift their entire business structure to the point of losing their brand identity. The severity of the issue would have implications for the Canadian economy.

Companies exiting the Canadian market: Going through with the interviews, several Growers communicated they would extract themselves from supplying to the Canadian market under the proposed regulations. With that in mind, Canadian retailers will have to look for new suppliers that can adjust to the notice constraints thereby adding pressure to the price of consumer goods.

Cost of recycling: With the new notice put in place, the demand for recycling increases which will require further investment in recycling units.

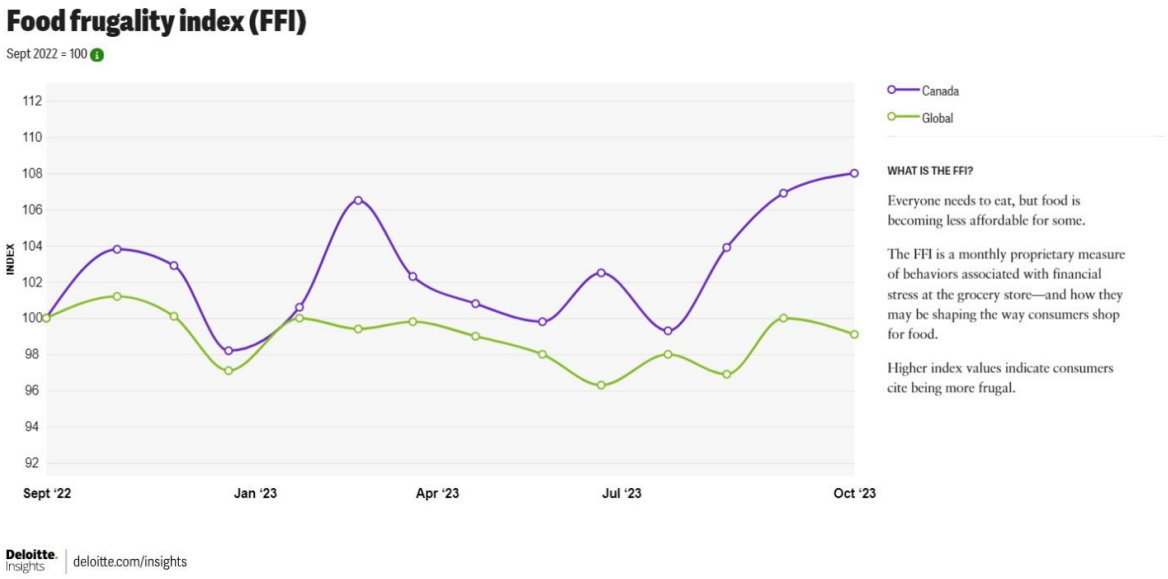
4.6.2 Additional data points from Deloitte insights:

According to Deloitte Insights survey ConsumerSignals, which is a longitudinal exploration of consumer spending behavior and the drivers behind it. Every month, Deloitte surveys thousands of consumers across more than a dozen countries about their sense of financial well-being, spending intentions, and upcoming purchases big and small—from their next trip to the grocery store to upcoming vacations, next vehicle purchase, and more.

Food Frugality Index (FFI):

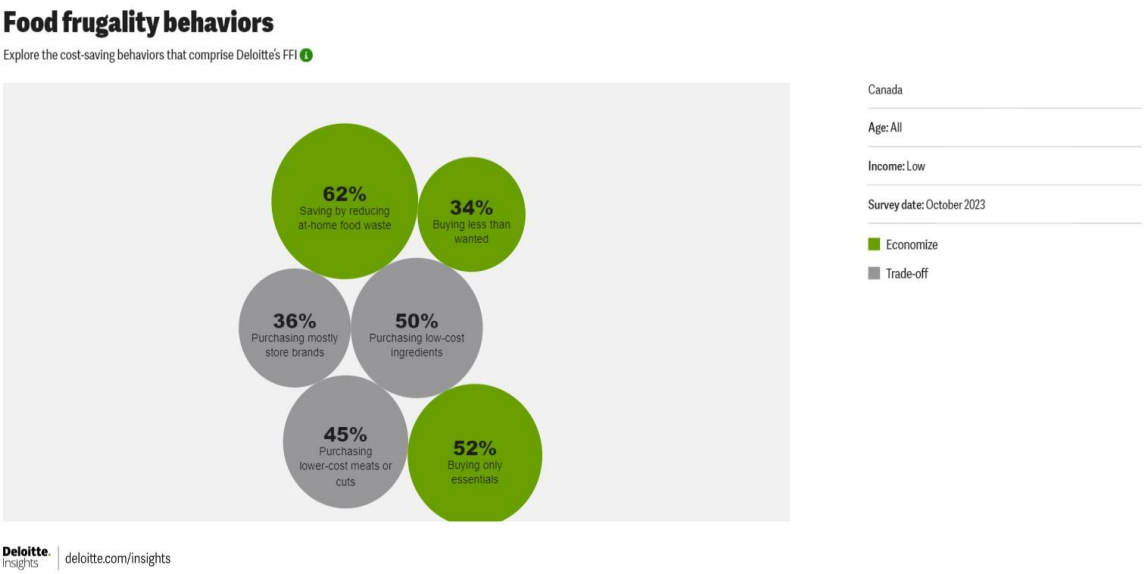
The FFI is a monthly proprietary measure of behaviors associated with financial stress at the grocery store—and how they may be shaping the way consumers shop for food. Higher index values indicate consumers cite being more frugal.

Figure 8: FFI in Canada vs globally from September 2022 to October 2023



The FFI in Canada was at 108 in October 2023, while the global average was lower at 99.1. Canada's FFI increased from the average to 108 in a span of 3 months from July to October 2023, an indicator that Canadians are more frugal at grocery stores, controlling and limiting spend due to the recent increase in grocery prices. Canadian consumers cannot afford an additional rise in prices.

Figure 9: Cost saving behaviors in Canada as of October 2023 for low-income classes



In Canada, saving by reducing at-home food waste and only buying essentials are the two most popular ways low-income consumers continue to navigate higher food prices.

4.6.3 Consumer Awareness:

According to an Abacus data survey for the Canadian Produce Marketing Association compiled in October 2023 [(12)], 1 500 adult Canadians were asked about their perception of plastic packaging. The survey showed that Canadians exhibit a diverse range of perspectives on plastic packaging. **A substantial 55% emphasize the reduction of plastic use, with less than one fifth (17%) advocating for its complete elimination, and 38% supporting recyclable alternatives when suitable.**

However, when given a range of reasons for the use of plastic packaging, such as enhancing product presentation, preventing food spoilage, extending shelf life, and offering lighter and more cost-effective transportation, **the findings show that almost two-thirds of Canadians believe these same objectives can be accomplished with alternative packaging materials.** These findings suggest that **Canadian consumers may not possess a comprehensive understanding of the recyclability of various packaging alternatives and have an anti-plastic bias,** which calls attention to the need for improved consumer awareness and education on this critical issue.

With the proper consumer awareness channels in place, Canadian consumers will be familiarized with the advantages of plastic packaging in its recyclable form. Also, communicating the importance of plastic recycling is important to introduce daily recycling behaviors to more Canadians.

4.6.4 Government grants:

When discussing the regulations with Growers, they highlighted the important investments that would be required to shift to bulk or/and plastic free packaging, namely in packaging technology research, packaging material and equipment replacement costs. **Government grants to accompany and alleviate the economic burden on these companies** need to be explored by the government. Additionally, multiple stakeholders invoked that they have made substantial advancement in recyclable plastic packaging, and that the advancement in recycling facilities and infrastructure in the past few years was less important. **It is primordial that the recycling and composting infrastructures in Canada are enhanced for a network that covers the potential increase in recycling and composting volumes in the future.**