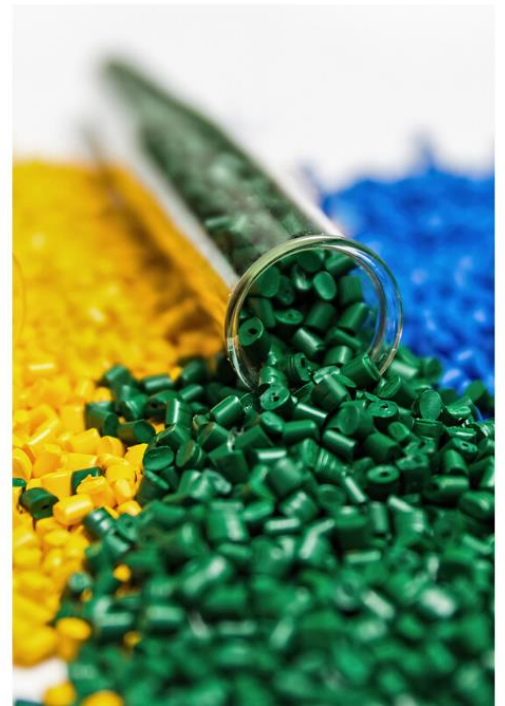


# ECONOMIC IMPACT FROM REGULATION OF SINGLE-USE PLASTICS

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*Independent Fiscal Office*  
*Commonwealth of Pennsylvania*  
JUNE 2020





## **About the Independent Fiscal Office**

The Independent Fiscal Office (IFO) provides revenue projections for use in the state budget process along with impartial and timely analysis of fiscal, economic and budgetary issues to assist Commonwealth residents and the General Assembly in their evaluation of policy decisions. In that capacity, the IFO does not support or oppose any policies it analyzes, and will disclose the methodologies, data sources and assumptions used in published reports and estimates.

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The Independent Fiscal Office was created  
by the Act of Nov. 23, 2010 (P.L.1269, No.120).

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## INDEPENDENT FISCAL OFFICE

June 30, 2020

The Honorable Members of the Pennsylvania General Assembly:

Act 20 of 2019 requires the Independent Fiscal Office (IFO) to “evaluate the economic impact to the Commonwealth, its industry partners and consumers for any regulation impacting single-use plastics, reusable plastics, auxiliary containers, wrappings or polystyrene containers and submit a full report of its findings to the General Assembly no later than July 1, 2020.” The act also requires the Legislative Budget and Finance Committee (LBFC) to “evaluate the environmental impact and impact on residents” for the same types of regulations. The IFO submits this report to fulfill its obligations under Act 20.

States and municipalities may regulate certain products to encourage more efficient production and consumption decisions. This report considers three types of regulation that have been applied to single-use plastics: a ban, a fee and a ban-plus-fee. These forms of regulation have been enacted by many jurisdictions and this report examines outcomes if they were applied statewide to plastic retail bags. The report finds that the three options have notably different outcomes for consumers, retailers and manufacturers.

The IFO would like to thank the many stakeholders who met with office staff to describe their operations and how regulations on single-use plastics might affect their firms, organizations, industries and municipalities. A list of organizations that met with the IFO is contained in Appendix D. If stakeholders elected to submit comments, those letters are also included. The IFO would also like to thank staff from the Department of Environmental Protection and the Department of General Services for data and insights.

I hope you find this report useful and informative for future deliberations. If you have questions about this report or its content, please do not hesitate to contact my office.

Sincerely,

A handwritten signature in blue ink that reads "Matthew J. Knittel".

Dr. Matthew J. Knittel  
Director

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# Staff Acknowledgements

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The IFO acknowledges the following staff for their work on this report:

## **Kathleen Hall, Revenue Analyst II**

Ms. Hall joined the IFO in May 2019. Primary responsibilities include forecasting corporate net income tax revenues, business- and economic-related research, performance-based budgeting initiatives and various other projects including the Special Education Funding Formula survey.

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## **Jesse Bushman, Revenue Analyst II**

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# Executive Summary

Act 20 of 2019 requires the Independent Fiscal Office (IFO) to “evaluate the economic impact to the Commonwealth, its industry partners and consumers for any regulation impacting single-use plastics, reusable plastics, auxiliary containers, wrappings or polystyrene containers....” Based on additional guidance from legislative staff, the focus of this report is the regulation of plastic retail bags. The report examines three policy options that have been enacted by other states and cities to regulate plastic retail bags: a ban, a fee and a ban-plus-fee. Based on a statewide implementation, the results are as follows:

- A **ban** would eliminate the annual demand for roughly 3.0 billion light-weight plastic bags (LWPBs). In their place, retailers would shift to paper bags and heavy-weight plastic bags (HWPBs), and consumers would purchase slightly more reusable bags. Overall bag demand would fall by 1.6 billion bags. Some consumers would also purchase regular trash bags because LWPBs were previously repurposed as trash bin liners or for other uses (e.g., pet clean up). Total consumer costs increase by \$72 million and per capita costs for all state residents increase by \$5.60. (See table.)
- A **fee** (10 cents per bag) would eliminate the demand for 1.4 billion LWPBs and 588 million paper bags. Total consumer costs fall by \$82 million and per capita costs fall by \$6.40. The fee option is the most efficient option because it motivates strong consumer response but allows retailers to continue to provide the lowest cost bag option, as LWPBs are much less expensive than traditional replacements. Projected fee revenues (\$275 million) are not included in the per capita cost computation and that treatment is discussed later in the report.

## Impact of Regulations on Retail Bag Demand and Costs

	Baseline	Ban	Fee	Ban + Fee
<b><u>Number of Bags</u></b>				
LWPB	3,035	0	1,677	0
Paper	1,313	1,576	726	1,576
HWPB	230	1,434	346	517
Reusable	9	10	14	14
<b>Total</b>	<b>4,587</b>	<b>3,020</b>	<b>2,762</b>	<b>2,107</b>
<b><u>Consumer Costs</u></b>				
LWPB	\$71	\$0	\$39	\$0
Paper	\$169	\$203	\$93	\$203
HWPB	\$18	\$112	\$27	\$41
Reusable	\$14	\$16	\$22	\$23
<b>Total</b>	<b>\$272</b>	<b>\$331</b>	<b>\$181</b>	<b>\$266</b>
New Trash Bin Liners	--	\$13	\$9	\$20
Change in Consumer Costs		\$72	-\$82	\$14
Per Capita Cost	\$21.30	\$26.90	\$14.90	\$22.40
Fee Revenues	--	--	\$275	\$209

Note: Number of bags and costs (except per capita) in millions.

- A **ban-plus-fee** (10 cents per bag) would eliminate the demand for roughly 3.0 billion LWPBs but increase demand for all other bag types. Overall bag demand would fall by 2.5 billion bags. Total consumer costs increase by \$14 million and per capita costs increase by \$1.10. Projected fee revenues (\$209 million) are not included in the per capita cost computation.

Changes in consumer and retailer bag costs will also affect manufacturers and other firms in the supply chain. The analysis uses the change in these costs, along with data on supply chain relationships to inform the impact on Pennsylvania manufacturers and other firms. The economic impact analysis finds that:

- A **ban** increases consumer spending on retail bags because retailers switch to more expensive options and pass all bag costs forward to consumers. In response, consumers reduce spending on other goods and services by \$69 million. Because a high proportion of alternative bags and raw materials are imported, only a portion of the higher consumer spending flows to Pennsylvania manufacturers. Employment falls by 507 jobs and labor earnings decline by \$22 million.
- A **fee** (10 cents) increases consumer spending on other goods and services as spending on retail bags declines, as many consumers forego disposable bags and retailers may continue to provide LWPBs, which are the lowest cost option. Roughly one-half of the lower consumer costs flow back to Pennsylvania manufacturers. Employment increases by 260 jobs and labor earnings increase by \$10 million. This positive result occurs because a larger portion of the redirected consumer spending remains in the state compared to spending on retail bags.
- A **ban-plus-fee** (10 cents) reduces consumer spending on other goods and services by \$34 million. Payroll employment falls by 363 jobs and labor earnings decline by \$17 million.

#### Net Economic Impact from Regulations

	Dollar Change from Baseline		
	Ban	Fee	Ban + Fee
Consumer Spending on Other Goods	-\$69	\$50	-\$34
Flows to In-State Bag Manufacturers	\$14	-\$24	-\$12
All Payroll Employment	-507	260	-363
Labor Earnings	-\$22	\$10	-\$17

Note: Millions of dollars.

The final section of the report extends the analysis to consider a ban on expanded polystyrene (EPS) foam foodservice products. Four states (Maryland, Vermont, Maine and New York) recently enacted bans on these products. The report finds that a ban would reduce employment by nearly 1,800 jobs, reduce labor earnings by \$76 million and increase General Fund revenues by roughly \$2 to \$3 million. The ban would also impose costs on government entities, schools, charities and other non-profits that currently use these products because the analysis finds that the average cost of alternatives is 86 percent higher than comparable EPS foodservice products.

# Section 1: Introduction

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Act 20 of 2019 requires the Independent Fiscal Office (IFO) to “evaluate the economic impact to the Commonwealth, its industry partners and consumers for any regulation impacting single-use plastics, reusable plastics, auxiliary containers, wrappings or polystyrene containers and submit a full report of its findings to the General Assembly no later than July 1, 2020.” The act also requires the Legislative Budget and Finance Committee (LBFC) to “evaluate the environmental impact and impact on residents” for the same types of regulations. Finally, the act prohibits a local government body or agency from enacting any regulation or ordinance related to the use of single-use plastics until the submission of this report.<sup>1</sup>

The IFO and LBFC obtained further guidance regarding the purpose and intent of the broad language of the act to fulfill the statutory obligations. (See Appendix C.) Based on that guidance, this report focuses primarily on retail and foodservice use of plastic bags to transport merchandise purchased by customers, and three types of regulation that may impact their use: (1) a ban, (2) a fee and (3) a ban-plus-fee.

## Scope

This report provides a general economic overview of the affected industries and the potential impact on employment, income and economic activity from the three policy options noted above. The report only considers the direct economic implications and does not attempt to estimate the monetary value of externalities such as reduced pollution. The report does not include a review of environmental and other impacts and externalities associated with the use and regulation of single-use plastics. Those issues are covered in a separate report published by the LBFC.

In order to estimate the economic impact on in-state manufacturers, retailers and consumers, three types of plastic retail bag regulation were analyzed at the statewide level. Although there have been no legislative proposals for a statewide regulation of plastic retail bags, the analysis assumes that any regulation would be implemented statewide because outcomes would vary considerably across the state for regulations imposed at the municipal or county level. This analysis also considers the potential fiscal impacts to local and state governments due to changes in litter, waste and recycling demands because those changes can have indirect economic impacts. Finally, the statutory language includes several single-use plastic products, not just plastic retail bags. Therefore, the final section of this report extends the analysis to **expanded polystyrene foam** foodservice products, more commonly known by the trademarked brand “Styrofoam.”<sup>2</sup> These products were selected because several states have recently enacted similar bans.

## Motivation for Single-Use Plastics Regulation

The first U.S. patent for the traditional plastic bag was filed by Celloplast in 1965.<sup>3</sup> Marketed as a highly-efficient and environmentally-friendly alternative to paper bags, two of the largest U.S. supermarket chains made plastic bags available to customers in 1982, and by 1996 plastic bags captured 80 percent of the retail market.<sup>4</sup> The rapid proliferation of plastic bags and an increased awareness of negative environmental

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<sup>1</sup> [Act 23 of 2020](#) extends the prohibition “until July 1, 2021 or six months after the termination of the order issued by the Governor on March 6, 2020 published at 50 PA.B. 1644 (March 21, 2020) and any renewal of the state COVID-19 emergency declaration, whichever is later.”

<sup>2</sup> This report features a glossary in Appendix A. All text highlighted in green are defined there.

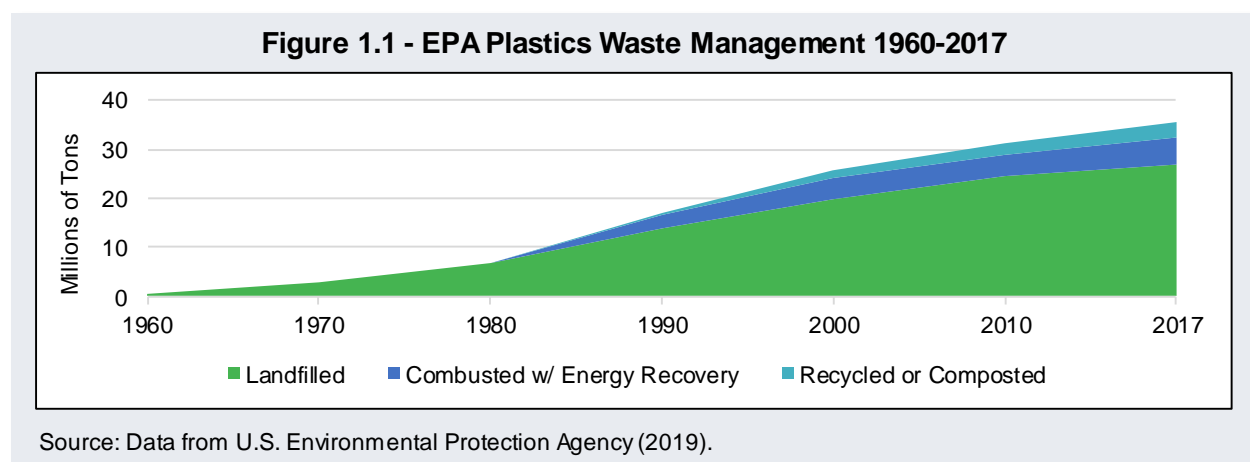
<sup>3</sup> Sarah Laskow, “How the Plastic Bag Became So Popular,” *The Atlantic* (2014).

<sup>4</sup> John Roach, “Are Plastic Grocery Bags Sacking the Environment,” *National Geographic* (2003).

impacts led to calls for the regulation of single-use plastics. These regulations serve as policy tools that attempt to incentivize consumers, retailers or manufacturers to recognize social and other costs imposed on society by the consumption, sale or manufacture of certain products. For consumers, regulations could eliminate options (bans) or raise prices (fees). Both types of regulation have economic implications not only for consumers, but also retailers, manufacturers and state and local governments.

For 2018, Freedonia Custom Research, an independent international market research firm, estimated that the U.S. consumed 70 billion **single-use plastic bags**.<sup>5</sup> Data from the Environmental Protection Agency (EPA) reveal that the great majority of bags and other plastics products are eventually landfilled. **Figure 1.1** displays waste management data from the EPA for all plastics from 1960 to 2017. Landfilled plastics grew from 0.39 million tons in 1960 to 26.8 million tons by 2017.

The rapid growth of plastics products and waste over the 40-year period between 1960 and 2000 motivated several countries to enact restrictions on the use of plastic products that many consumers view as “single-use” or disposable. In 2002, Bangladesh became the first country to ban plastic bags after they were found to block drainage systems during floods.<sup>6</sup> For 2018 (latest data available), 127 countries had enacted regulations to reduce plastic bag consumption.<sup>7</sup>



For the U.S., state and local regulation of single-use plastics has followed a similar trend. In 2007, San Francisco was the first U.S. jurisdiction to enact a regulation on single-use plastic bags. As of June 2020, more than 470 local jurisdictions in 28 states adopted single-use plastic bag ordinances.<sup>8</sup> Those jurisdictions include three Pennsylvania municipalities: Narberth, West Chester and Philadelphia. At the state level, nine states (and the District of Columbia) with extensive coastlines have enacted uniform statewide laws that regulate single-use plastic bag consumption. Conversely, 14 states have preempted local jurisdictions from enacting regulations. These states cite concerns such as: compliance challenges for businesses due to a patchwork of regulations across municipalities and a need to better understand the economic consequences of regulation on consumers and businesses.

<sup>5</sup> The Freedonia Group, “Industry Study #3786 Retail Bags,” Freedonia Custom Research (2019).

<sup>6</sup> “From Birth to Ban: A History of the Plastic Shopping Bag,” UN Environment Programme (2018).

<sup>7</sup> “Legal Limits on Single-Use Plastics and Microplastics,” UN Environment Programme (2018).

<sup>8</sup> “Bag Laws,” S. Walter Packaging (2020) and “Plastic Bag Law Maps,” PlasticBagLaws.org (2019).

## Bag Types Considered

This analysis focuses on four bag types that are used in the retail shopping and foodservice industry. The bag types include: light-weight plastic bags (LWPBs), paper bags, heavy-weight plastic bags (HWPBs) and reusable stitched bags. These bags are categorized as either **disposable bags** or **reusable bags** based on their intended use and the reusable standards adopted in certain jurisdictions.

### Disposable Bags

**Light-Weight Plastic Bag (LWPB):** Bag made through the process of **blown film extrusion** that is intended to be used once and then disposed (though many consumers reuse for secondary uses, such as **trash bin liners**). They are often less than one mil (thousandth of an inch) thick, but this parameter ultimately depends on jurisdictional definitions.



*Light-Weight Plastic Bag*



*Paper Bag with Handles*

**Paper Bag:** Bag often made of unbleached **kraft paper** commonly used in the foodservice industry and offered as an alternative to LWPBs in retail and grocery establishments. Jurisdictions often require that paper bags be at least partially made from recyclable material (typically 40 percent) in order to qualify as an allowable alternative.

### Reusable Bags

**Heavy-Weight Plastic Bag (HWPB):** Bag often made through the process of blown film extrusion that is intended to be used more than once. Jurisdictions have various qualifications to be considered reusable, but the minimum thickness is generally 2.25 mils. This thickness implies that the bags could be reused up to 125 times before exhaustion.



*Heavy-Weight Plastic Bag 2.25 mils thick*



*Stitched Nonwoven Polypropylene Bag*

**Reusable Stitched Bag:** Bag with stitching in the handles designed for durability and reuse. These bags are most often made from **nonwoven polypropylene**, but also include bags made from other plastics or natural fibers such as cotton. Stitched handles are labor intensive and due to this reason, most retail bags that include stitching are manufactured abroad and imported to the U.S.

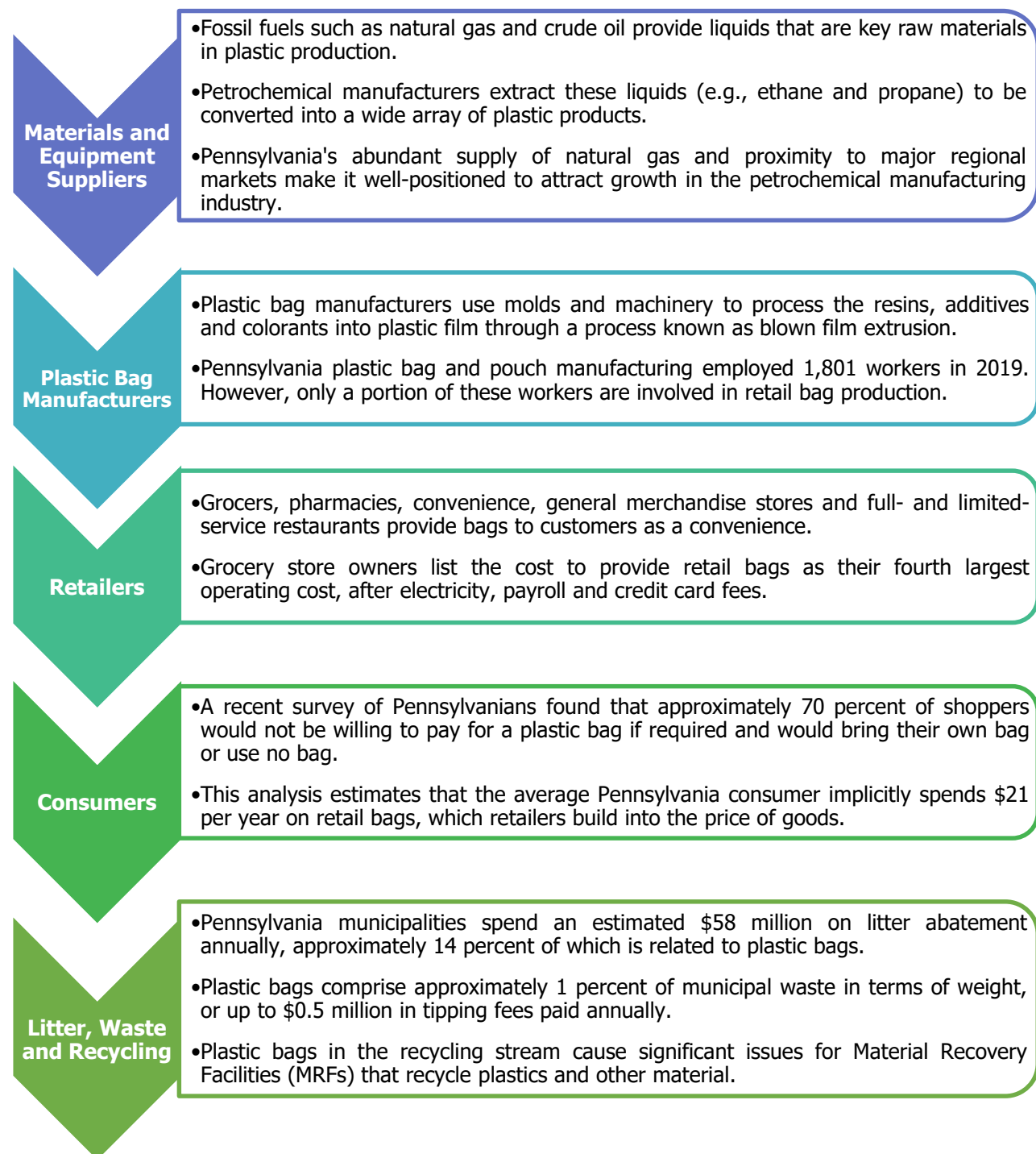
**Bag Types Not Considered:** In addition to certain product exemptions common in enacted regulations (e.g., plastic trash bin liners), this study does not consider **compostable** or biodegradable bag types. These bag types comprise less than one percent of national bag demand and have

been cited by environmental groups as undesirable alternatives to LWPBs due to their inability to break down in air-sealed landfills.<sup>9</sup>

<sup>9</sup> Jennie Romer, "Plastic Bag Law Activist Toolkit," Surfrider Foundation (2019).

## Plastic Retail Bag Supply Chain

Before carrying home retail goods, the plastic retail bag travels along a number of points in the supply chain. A change to one link in the supply chain will ripple through all connected parties and the larger statewide economy. The **figure below** outlines the supply chain for plastic retail bags. The economic impact on stakeholders from certain regulations will be discussed in **Sections 3 through 7**.





## Section 2: Regulatory Policy Scenarios

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The technical language of Act 20 of 2019 did not specify a particular regulation to be used for the purpose of this analysis. Therefore, the IFO reviewed regulations enacted in states and large municipalities that have plastic retail bag regulations to establish relevant policy options. From that review, three policy scenarios were developed to “evaluate the economic impact to the Commonwealth, its industry partners and consumers for any regulation impacting single-use plastics....” This section defines the key features of each policy scenario and the bag types affected. It concludes with a brief discussion of recent regulations imposed on other single use plastic products.

### Policy Options and Scenarios

Three policy scenarios were developed to standardize and analyze the possible effects of certain plastic bag regulations in the Commonwealth. These are not policies endorsed by the IFO. **Table 2.1** (see next page) displays the relevant characteristics of each option. The three policy options are as follows:

**Ban:** Prohibits certain retailers from providing LWPBs to consumers. The regulation also stipulates other bag types that retailers may provide to consumers.

**Fee:** Uses economic incentives to discourage consumers from using LWPBs. Retailers may continue to provide bags, but they must charge consumers a standard fee for each bag used. In some cases, there are individual and/or industry exemptions available.

**Ban-plus-fee:** A hybrid of the previous two options. Retailers may not provide LWPBs at checkout, and must charge a fee on alternative bags used in their stead (e.g., paper bags).

### Key Features of Plastic Retail Bag Policies

In addition to these three types of regulation, state and local governments make policy choices that affect the market for plastic retail bags. Some example are as follows:

**Reusable Plastic Bag Standards:** The majority of jurisdictions define a reusable plastic retail bag by thickness, measured in mils. The thickness required to be classified as a reusable plastic bag typically ranges between 2.25 and 4.0 mils. More recently, jurisdictions have used other features to classify a plastic bag as reusable including: the manufacturing process by which the bag is made, the presence of stitched handles and/or the number of times the bag can be reused.

**Fee Recipient:** The fee can be retained by the retailer, split between the retailer and the government, or retained by the government and the fee recipient often varies based on the type of regulation enacted. In jurisdictions that adopt a ban-plus-fee option, retailers usually retain the entire fee to offset the higher cost of alternative bags. In jurisdictions that adopt a fee option, the local or state government is more likely to retain fees. Some jurisdictions also require sales tax to be collected on the bag fee.

**Fee Amount:** The fee amount varies across state and local governments. Most jurisdictions set amounts in 5-cent increments, and fees typically range between 5 cents and 25 cents per bag. To determine the amount of the fee, policymakers may consider the cost to retailers to switch to alternative bag types, as well as the amount that should incentivize consumers to change behavior.

**Product Exemptions:** Exempted products include small item bags (e.g., deli bags, produce bags and bags designed to hold bulk items like small hardware products) and bags sold pre-packaged (e.g., pet waste bags, trash bin liners and food storage bags). Product exemptions are a common feature across policies enacted in other jurisdictions.

**Individual Exemptions:** Certain jurisdictions exempt low-income individuals from bag fees. Eligible individuals include those participating in federal or state food assistance programs (including the Women, Infants, and Children (WIC) program and the Supplemental Nutrition Assistance Program (SNAP)).

**Vendors Impacted:** All retail stores are generally subject to regulations, but the treatment of restaurants is less consistent across jurisdictions. Four statewide regulations include all restaurants, three others include a broad exemption for restaurants and the remaining two states exempt specific restaurants.

**Table 2.1 - Plastic Retail Bag Regulatory Scenarios**

Policy Feature	Ban	Fee	Ban + Fee
Banned Product	LWPB	--	LWPB
Fee Products	--	All Carryout Bags	HWPB; Paper
Fee (Cents)	--	10	10
Fee Recipient	--	Government or Retailer	Retailer
Reusable Mil Standard	2.25	--	2.25
Restaurants Included	Y	Y	Y
Small Item Bags Excluded <sup>1</sup>	Y	Y	Y
Trash Bags Excluded	Y	Y	Y
Low Income Exclusion	--	N	N

<sup>1</sup> Small item bags refer to products such as: deli bags, produce bags, bags designed to hold bulk items like small hardware products and bags sold pre-packaged (e.g., pet waste bags and food storage bags).

**Table 2.2** (see next page) displays states and large cities that enacted some form of single-use plastics regulation and represent some of the jurisdictions that the IFO used to develop its three policy options. The cities included in the table are generally located in states that have not enacted single-use plastics regulations. While this report only considers the statewide economic impact from the regulation of single-use plastics, large cities also provide useful data on business and consumer response, as well as bag-use reduction estimates.

**Table 2.3** (see next page) lists three Pennsylvania municipalities that have enacted some form of plastic retail bag regulation. The regulatory policies for Philadelphia and West Chester may take effect as early as July 2, 2021.

**Table 2.2 - Regulations on Plastic Bags**

	Year Effective	Policy Type	Fee	Fee Recipient	Reusable Bag Standard (mils)
<b>Select Cities</b>					
Washington D.C.	2010	Fee	5¢	City (4¢); Retailer (1¢)	2.25
Seattle, WA	2012	Ban + Fee	5	Retailer	2.25
Chicago, IL	2016	Fee	7	City (5¢); Retailer (2¢)	--
Boston, MA	2018	Ban + Fee	5	Retailer	3.0
Denver, CO <sup>1</sup>	2020	Fee	10	City (6¢); Retailer (4¢)	n.a. <sup>2</sup>
<b>States</b>					
Hawaii <sup>3</sup>	2012	Ban + Fee	15	Retailer	10.0
California	2016	Ban + Fee	10	Retailer	2.25
Connecticut	2019	Fee	10	State	4.0
New York <sup>1</sup>	2020	Ban	--	--	10.0
Oregon <sup>1</sup>	2020	Ban + Fee	5	Retailer	4.0
Vermont	2020	Ban + Fee	10	Retailer	n.a. <sup>4</sup>
Delaware	2021	Ban	--	--	2.25
Maine	2021	Ban + Fee	5	Retailer	4.0
Washington <sup>5</sup>	2021	Ban + Fee	8	Retailer	2.25

1 Jurisdiction has delayed implementation of plastic retail bag policy due to the COVID-19 pandemic. Dates listed were anticipated effective dates, final dates are to be determined.

2 Denver's definition of "reusable bag" does not allow for any bag made of plastic with a thickness measurable in mils.

3 Table reflects specifications for Honolulu, the most populous area within the state. Regulations vary between all five counties that make up the de facto statewide ban. The initial mil requirement in 2012 was 2.25; the law was updated with a 10 mil requirement as of 2020.

4 Vermont does not include mil thickness as a factor to determine if a plastic bag is classified as reusable. Instead the state defines a bag as reusable only if it includes stitched handles.

5 Washington's ban-plus-fee model will charge 8 cents for bags under 2.25 mils in thickness. In 2026 the minimum thickness for plastic bags increases to 4.0 mils and the charge increases to 12 cents.

**Table 2.3 - Pennsylvania Municipal Single-Use Plastic Bag Regulations**

Municipality	County	Year Effective <sup>1</sup>	Policy Type	Fee	Fee Recipient	Reusable Bag Standard (mils)
Narberth	Montgomery	2019	Fee	10¢	Retailer	3.00
Philadelphia <sup>2</sup>	Philadelphia	2021	Ban	--	--	2.25
West Chester	Chester	2021	Ban + Fee	10	Retailer	4.00

1 Ordinances adopted in Philadelphia and West Chester were set to become effective on July 2, 2020 in accordance with the language in Act 20 of 2019. Act 23 of 2020 delayed implementation by at least one year.

2 Philadelphia's policy allows for bags over 2.25 mils to be considered reusable, but only if they are not made through a blown-film extrusion process. The inclusion of this language effectively limits the city's compliant bag types to only paper or stitched polypropylene and cloth bags with handles.

## Outcomes in Other Jurisdictions

This analysis reviewed outcomes for other states and localities in order to inform the impact that regulations may have on plastic bag use in Pennsylvania. At the state level, plastic bag regulations are new or have not yet taken effect; two exceptions are California and Hawai'i. Therefore, this report also uses data from large cities that have enacted regulations over the past decade.

**Chicago** initially banned LWPBs less than 2.25 mils thick in 2015. In response to the ban, large retail chains within Chicago switched to plastic bags greater than 2.25 mils thick or paper bags, and customers generally used both as single-use bags. In November 2016, the City Council repealed its plastic bag ban due to ineffectiveness. In place of the ban, the City Council enacted a 7-cent fee on all paper and plastic carryout bags beginning February 2017. A 2018 study by a consortium of researchers found that the fee led to a decrease in the likelihood of carryout bag usage by 28 percent.<sup>10</sup> This included a 22 percent reduction in number of bags used per trip from 2.3 to 1.8 bags. The study found that use of **reusable bags** with stitched handles increased to 29 percent, more than double the prior rate of 13 percent. The study also found that the effects of the fee were largely the same in both low- and high-income areas of the city.

Three years after implementation of a plastic bag ban-plus-fee regulation (5-cent fee), **Washington D.C.** contracted a survey of residents and businesses in 2013.<sup>11</sup> The survey found that 80 percent of residents reduced their consumption of **disposable bags** by an estimated 60 percent, reducing average household bag usage from 10 bags to four bags per week. The business survey showed similar results with 79 percent of businesses responding that they provided fewer bags to customers, and a 35 percent reduction in the average number of bags provided to customers. Businesses also reported a 50 percent average reduction in the number of bags purchased for their establishments. Of those same businesses, 50 percent reported that the policy allowed their businesses to save money. Overall, 69 percent of firms reported no negative impact on their business due to the regulation.

In 2016, **California** became the first state to enact restrictions (ban-plus-fee) on LWPBs at the state level. In February 2019, California's Department of Resources, Recycling and Recovery (CalRecycle) published a report that analyzed the impacts of the regulation.<sup>12</sup> To estimate the impact, the agency sent a data request on bag usage to corporate offices that represented over 6,500 stores statewide. Data from 1,500 stores showed that over a six-month period prior to the law's enactment, approximately 551 million (435 million plastic and 116 million paper) disposable retail bags were distributed to customers. In the six months after the law became effective, there was a nearly 80 percent (111 million) reduction in single-use retail bags. Of that amount, HWPB consumption fell nearly 85 percent (66 million), while paper bag consumption dropped 61 percent (45 million). The report noted that the data could be skewed due to local bag ordinances already enacted within the state. Finally, the agency noted that data from the International Coastal Cleanup Day show that in 2008, 8 to 10 percent of littered items in the state were plastic or paper bags. By 2017, the share had dropped to 3.9 percent.

Early remittances from **Connecticut's** retail bag fee (10 cents) motivated significant reductions in fee revenue projections. In August 2019, the Connecticut Budget Office projected the state would receive \$27.7

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<sup>10</sup> Tatiana Homonoff, Kao, Palmer, and Seybolt, "Skipping the Bag: Assessing the Impact of Chicago's Tax on Disposable Bags," Ideas42 (2018).

<sup>11</sup> Opinionworks, "D.C. Resident and Business Bag Use Surveys," (2013).

<sup>12</sup> "SB 270 Report to the Legislature: Implementation Update and Policy Considerations for Management of Reusable Grocery Bags in California," CalRecycle (2019).

million in fee revenues for the first year, generated from LWPBs only (there is no fee for paper, HWPBs over 4.0 mils or purchased stitched bags). In December 2019, the Hartford Courant reported that updated projections from the state were reduced to approximately \$7 million, a quarter of the initial estimate.<sup>13</sup> The Budget Office noted that the reduction stemmed from a decline in consumer demand for LWPBs, combined with large retailers phasing out LWPBs earlier than expected.

## Other Single-Use Plastics Regulations

Certain states and municipalities have enacted regulations that affect other single-use plastic products, such as foam containers made from expanded polystyrene or plastic straws and utensils. **Table 2.4** lists states and large cities that have enacted restrictions or bans on the use of these products. In most cases, alternative products are required to be reusable, recyclable or compostable.

**Table 2.4 - Regulations on Other Single-Use Plastic Products**

Jurisdiction	Effective	Items Banned
<b>Select Cities</b>		
San Francisco, CA	2007	Plastic Straws, Utensils, Stirrers & Expanded Polystyrene Products
Seattle, WA	2009	Plastic Straws, Utensils & Expanded Polystyrene Food Containers
Washington D.C.	2014	Plastic Straws & Expanded Polystyrene Food Containers
Minneapolis, MN	2015	Polystyrene Food Containers, Lids & Polyethylene-Lined Paper Cups
New York City, NY	2019	Expanded Polystyrene Food Containers
<b>States</b>		
California	2019	Plastic Straws
Maryland	2020	Expanded Polystyrene Food Containers
Oregon	2020	Plastic Straws
Vermont	2020	Plastic Straws, Stirrers & Expanded Polystyrene Food Containers
Maine	2021	Expanded Polystyrene Food Containers
New York	2022	Expanded Polystyrene Food Containers

<sup>13</sup> Eliza Fawcett, "Connecticut Isn't Raising Much from a Plastic Bag Tax. That's a Good Thing," Hartford Courant (2019).

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## Section 3: Consumers

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The analysis begins with the projected impact each policy option has on consumer behavior and spending. Regulation of LWPBs alters consumer behavior by restricting options (bans) or altering prices (fees). Consumer response to new policies will drive the direct economic impacts to retailers and manufacturers which then reverberates through other sectors of the state economy. Pennsylvania consumers are also the stakeholders that will largely bear the economic costs or benefits of any regulation.

### National Retail Bag Trends

For 2018, a recent study estimates that U.S. residents consumed 70 billion LWPBs.<sup>14</sup> The same study found that grocery stores account for nearly 50 percent of the LWPB demand, while general merchandise and foodservice stores account for approximately 30 and 20 percent, respectively. Over the next five years, the national retail bag market is projected to expand by 5 percent, but LWPB demand is projected to contract.<sup>15</sup> The latter outcome is primarily due to state and local government regulation of LWPBs, as well as self-initiated policies by private firms. For example, in 2016, Ahold Delhaize, the parent company of Giant and Stop & Shop brands (operating 2,000 stores across 23 states) reduced its use of LWPBs by one billion over a five-year period and is committed to making all plastic packaging fully reusable, recyclable or compostable by 2025.<sup>16</sup> In 2018, The Kroger Co. (operating 2,758 grocery stores in 35 states) announced that it will phase-out all LWPBs from its stores by 2025.<sup>17</sup> Other grocers such as Whole Foods Market, Trader Joe's and Aldi no longer provide LWPBs to customers, opting for paper or reusable products.

### Pennsylvania Retail Bag Demand

In order to quantify the total demand for plastic retail bags in Pennsylvania, the IFO submitted questions for the Spring 2020 Lion Poll conducted by the Center for Survey Research (CSR) at Penn State Harrisburg.<sup>18</sup> The poll was conducted between February and April 2020 and includes 1,051 responses representative of households across the state. In addition to statewide bag consumption, the survey asked about consumer attitudes towards a retail bag fee and collected demographic data such as household size, income level and county of residence.

#### LWPB Demand

When combined with other research, the statewide survey suggests that Pennsylvanians consume approximately 4.6 billion retail bags annually, and 3.0 billion (66 percent) are LWPBs.<sup>19</sup> The 4.6 billion figure includes demand across all bag types, including plastic, paper and reusable. This estimate implies that the average person uses 237 LWPBs per year, or five per week. **Table 3.1** summarizes responses to the Penn

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<sup>14</sup> The Freedonia Group, "Industry Study #3786 Retail Bags," Freedonia Custom Research (2019).

<sup>15</sup> Ibid.

<sup>16</sup> "Plastic Waste: Reducing Plastic Packaging and Single-Use Plastics," and "United States: All the Facts About our Stores in the U.S.," Ahold Delhaize (2020).

<sup>17</sup> "Kroger to phase out single-use plastic bags by 2025," PR Newswire (2018) and "Our Business," The Kroger Co. (2020).

<sup>18</sup> The Lion Poll is an omnibus survey conducted by the CSR. The poll included 1,051 self-administered web surveys completed by adult Pennsylvanians between February 24 and April 7, 2020. Detail on the survey questions and IFO adjustments can be found in Appendix B.

<sup>19</sup> Statewide plastic retail bag demand estimate based on the Spring 2020 Lion Poll survey administered by the Penn State Center for Survey Research. Statewide retail bag demand composition estimated using data from Freedonia Custom Research.

State Lion Poll by household type and size. The largest group of respondents was a two-adult household with no children. This group reported using 12 LWPBs per week, or 610 bags per year. The households with the highest bag usage include children, as single parent households use 15 bags per week (757 per year) and two adult, multiple children households use 16 bags per week (829 per year).

**Table 3.1 - LWPB Usage by Household Type**

Household Type	# of Responses <sup>1</sup>	Bags per Week	Bags per Year
One adult, no children	191	8	406
One adult, at least one child	26	15	757
Two adults, no children	389	12	610
Two adults, one child	79	12	646
Two adults, multiple children	99	16	829
Other (more than two adults)	<u>263</u>	<u>14</u>	<u>720</u>
<b>Total</b>	<b>1,047</b>	<b>12</b>	<b>628</b>

Note: Total bags per week and total bags per year represent weighted averages.

<sup>1</sup> Four responses were identified as outliers and removed from the bag use calculations.

**Table 3.2 - Urban vs. Rural Annual LWPB Use**

County	Per Person <sup>1</sup>	Pop.	Total LWPBs	% of Total	County	Per Person <sup>1</sup>	Pop.	Total LWPBs	% of Total
<b>Urban</b>					<b>Rural</b>				
Philadelphia	260	1,584	411	13.7%	Jefferson	436	44	19	0.6%
Allegheny	225	1,218	274	9.1	McKean	419	41	17	0.6
Berks	201	420	85	2.8	Tioga	310	41	13	0.4
Lehigh	206	368	76	2.5	Clinton	179	39	7	0.2
Dauphin	<u>210</u>	277	<u>58</u>	<u>1.9</u>	Potter	<u>279</u>	17	<u>5</u>	<u>0.2</u>
<b>Total</b>	<b>234</b>		<b>904</b>	<b>30.1</b>		<b>334</b>		<b>60</b>	<b>2.0</b>

Note: Total bag usage in millions. Population in thousands and is from U.S. Census Bureau County Population Estimates (2019).

<sup>1</sup> Per person annual total represents weighted average of counties shown.

The survey identifies the respondent's county of residence which allows an analysis of regional demand trends. The data show that per person bag usage is higher in rural counties, but urban counties account for a much larger share of the statewide total. To illustrate these characteristics, **Table 3.2** compares LWPB usage in five select urban counties and five select rural counties. Total bag usage in Philadelphia County (411 million) alone accounts for 13.7 percent of statewide usage, whereas the five rural counties shown comprise just 2.0 percent of total usage. The five urban counties account for 904 million bags per year, or nearly one-third of statewide LWPB usage. The table also shows the disparity in per person usage for rural and urban counties; average annual per person bag usage is 334 for rural counties and 234 for the urban counties. Higher usage in rural counties could be due to various factors including the distance to stores and retail establishments (i.e., fewer trips), lack of walkability and less awareness of reusable bags.



The survey also captures household income levels. As shown by **Table 3.3**, per person bag usage is significantly higher for households in lower income ranges. Respondents with household income less than \$40,000 reported using 292 bags per person per year. That level is 60 bags (25.9 percent) higher than the next income group and nearly double the annual usage for respondents with household income that exceeds \$150,000. Because LWPB regulations generally increase consumer costs, lower-income households would likely be disproportionately affected due to their higher per capita utilization rate.

**Table 3.3 - Bag Usage by Household Income**

Household Income	% of Respondents	ACS Share <sup>1</sup>	Average # of People	Per Person Weekly	Per Person Annual
\$0 to \$39,999	34.0%	33.8%	2.2	6	292
\$40,000 to \$79,999	35.1	28.6	2.7	4	232
\$80,000 to \$119,999	13.6	17.5	3.0	4	204
\$120,000 to \$149,999	6.0	7.3	3.1	4	211
\$150,000 or more	6.9	12.8	3.3	3	169
Don't know	4.5	--	3.0	4	210

<sup>1</sup> The percentage of households in each income category based on the U.S. Census Bureau's 2018 American Community Survey (ACS) 1-Year Public Use Microdata Sample.

### Consumer Attitudes Toward Plastic Retail Bag Fees

The survey also provides insight regarding consumers' willingness to pay for a plastic bag. **Table 3.4** displays results when respondents were asked how much they would pay if plastic bags were not provided free of charge at restaurants, grocery, retail or convenience stores. Highlights include:

- Most respondents (70.3 percent) reported that they are not willing to pay for a plastic retail bag.
- Slightly more than one quarter (26.5 percent) are willing to pay 10 cents or less. These figures inform how Pennsylvanians might respond to policy scenarios 2 and 3, which both include a 10-cent fee on LWPBs and other bags.
- The responses quantify the intrinsic value of services provided by a plastic bag, and confirm that the plastic retail bag is a highly elastic good to which consumers are price sensitive.

**Table 3.4 - Willingness to Pay for a Plastic Bag**

Maximum Amount Willing to Pay	Count	Share of Respondents
Not willing to pay - zero cents	739	70.3%
5 cents or less	199	18.9
6 to 10 cents	80	7.6
More than 10 cents	<u>33</u>	<u>3.1</u>
<b>Total</b>	<b>1,051</b>	<b>100.0</b>

**Table 3.5** displays the same data as Table 3.4 based on household income group. Across all income groups, at least two-thirds of respondents reported they are not willing to pay for plastic bags and would

either bring their own reusable bag or not use a bag. As household income increases, the unwillingness to pay for a bag remains relatively consistent. Households in the median income group (\$40,000 to \$79,999) reported the lowest share unwilling to pay for a plastic bag (65.9 percent). Among those that reported their income level, households with income between \$120,000 and \$149,999 had the highest share of respondents unwilling to pay for a plastic bag (77.8 percent).

**Table 3.5 - Willingness to Pay by Household Income**

Household Income	Zero cents	5 cents or less	6 to 10 cents	More than 10 cents
\$0 to \$39,999	71.6%	17.5%	8.1%	2.8%
\$40,000 to \$79,999	65.9	22.6	7.6	3.8
\$80,000 to \$119,999	71.3	21.0	5.6	2.1
\$120,000 to \$149,999	77.8	9.5	11.1	1.6
\$150,000 or more	69.4	19.4	6.9	4.2
Don't know	83.0	6.4	6.4	4.3

## Baseline Demand for All Retail Bag Types

The Penn State Lion Poll survey finds average per capita LWPB use of 237 bags per annum. Given the 2019 statewide population of 12.8 million, this implies that Pennsylvanians consume 3.0 billion LWPBs each year. To extend that estimate to all bag types, the analysis uses national estimates of retail bag composition produced by Freedonia Custom Research for the U.S. and New York.<sup>20</sup> The research finds that 66 percent of all retail bags used or purchased are LWPBs, 29 percent are paper bags, 5 percent are HWPBs, and less than 1 percent are purchased or new reusable stitched bags.<sup>21</sup> Applying Pennsylvania's annual consumption of 3.0 billion LWPBs to national retail bag composition estimates implies that Pennsylvanians consume approximately 4.6 billion retail bags annually. (See **Table 3.6.**)

However, in order to assess and compare the impact of regulatory options, the services provided by various bag types must be converted into a common denominator. This must be done to illustrate the quantity of LWPBs that would be displaced by alternatives. This conversion is made by applying bag capacity and reuse rate adjustments discussed later in this section. Table 3.6 applies these conversion factors and finds that the baseline demand for the four bag types are equivalent to 5.7 billion LWPB units of demand per annum. Currently, over half (53 percent) of the LWPB unit demand is met through the use of LWPBs. Paper, HWPBs and reusable stitched bags satisfy the remaining 30, 8 and 9 percent of LWPB unit demand, respectively.

Table 3.6 only reflects retail bags provided by retailers or new bags purchased by consumers. This baseline demand does not include consumers that meet their current needs for retail bag services by using miscellaneous alternatives (e.g., backpacks, purses or no bags).

<sup>20</sup> See "Industry Study #3786 Retail Bags," Freedonia Custom Research (2019) and "New York Retail Bags Market Assessment," Freedonia Custom Research (2020).

<sup>21</sup> The estimate for Pennsylvania reusable bag demand was developed separately from the Freedonia data and is based on estimated household shopping patterns and reuse rates. Unlike other retail bags, it is assumed that not all demand is driven by retail shopping needs. Reusable stitched bags can be purchased by consumers for personal use external to shopping, or purchased by businesses as part of promotions and giveaways.

**Table 3.6 - Conversion to LWPBs by Bag Type**

	LWPB	Paper	HWPB	Reusable Stitched	Total
<b><u>Retail Bag Demand (millions)</u></b>					
Baseline # of bags	3,035	1,313	230	9	4,587
Percent of total	66.2%	28.6%	5.0%	0.2%	100.0%
<b><u>Conversion to LWPBs</u></b>					
Capacity adjustment	1.0	1.3	1.3	1.5	--
Average # of reuses <sup>1</sup>	1.0	1.0	1.5	40.0	--
<b><u>Demand for LWPBs (millions)</u></b>					
Units of LWPB demand <sup>2</sup>	3,035	1,707	448	529	5,719
Percent of total	53.1%	29.9%	7.8%	9.3%	100.0%

1 Average number of reuses only considers consumers reusing the bag to carry out merchandise. While LWPB and paper bags may be reused for other applications, they are intended for a single use.

2 Units of LWPB demand represent the equivalent number of LWPBs used to meet the retail bag demand of Pennsylvania consumers.

Source: Penn State Lion Poll Spring 2020 Survey, Freedonia Custom Research (2019), various studies.

## Impact of Policy Options on Pennsylvania Retail Bag Demand

The three policy options described in **Section 2** will change how Pennsylvania consumers satisfy their annual demand for 5.7 billion LWPB-equivalent units. While some options shift the composition of retail bags demanded, others motivate certain consumers to exit the retail bag market in favor of bringing/reusing their own bag or using no bag. It is also possible that regulations motivate vendors to offer fewer bags, and they would not voluntarily provide bags if few items are purchased.

Although retailers appear to provide free bags as a convenience to customers, the full cost of retail bags is built into final prices of merchandise. Therefore, consumers (not retailers) will generally bear the cost burden of any regulation. The regulation of LWPBs can impact consumers in two ways: (1) a ban limits consumer choice and requires consumers and retailers to switch to alternatives or (2) a fee assigns a value to the retail bag through an explicit price, to which consumers respond. The approach of regulating quantities (ban) versus prices (fee) leads to different outcomes in consumer demand for plastic and other retail bags.<sup>22</sup>

The IFO reviewed studies from other jurisdictions that enacted a ban or fee to inform the potential reduction in retail bags demanded by consumers. Based on that research, this analysis finds that the total number of retail bags demanded falls **34 percent** under a ban scenario, **40 percent** under a fee scenario, and **54 percent** under a ban-plus-fee scenario. The research and assumptions that inform those estimates are described in the subsections that follow.

<sup>22</sup> "Prices vs. Quantities," Weitzman (1974) and "Bans vs. Fees: Disposable Carryout Bag Policies and Bag Usage," Taylor and Villas-Boas (2016).

## Ban

Jurisdictions that enact a ban cite ease of implementation and higher rates of compliance compared to a fee policy, but there is limited evidence regarding its ability to reduce overall bag consumption.<sup>23</sup> Ban policies eliminate LWPB use, but municipalities and retailers have noted a commensurate increase in paper and other retail bag use after a LWPB ban becomes effective.<sup>24</sup> This outcome occurs because consumers still view the service provided by retail bags as free and retailers compete for customers by providing alternatives. Ban policies are often adopted in smaller jurisdictions that are restricted from levying a fee. These small jurisdictions lack sufficient resources to study the impact of a ban policy and therefore, existing research is limited.

However, Chicago and San Francisco implemented a ban policy that can be used to inform possible outcomes. One year after Chicago implemented a LWPB ban (2015), retailers noted large increases in paper and HWPBs demanded by consumers.<sup>25,26</sup> The ban was repealed after 15 months and replaced with a fee. San Francisco implemented a ban policy in 2007 before adding a fee in 2012. Prior to imposition of the fee, the San Francisco Office of Economic Analysis estimated that the LWPB ban reduced the demand for carryout bags from 150 million LWPBs (2007) to 134 million paper/compostable bags (2011), a 10 percent reduction.<sup>27</sup>

## Fees

Research suggests that a fee policy can have a significant impact on consumer behavior. When a fee is introduced and an explicit price is placed on retail bags, most consumers are not willing to pay it, since they are loss-averse and their reference point is that retail bags are free.<sup>28</sup> The survey performed for this analysis found that approximately 70 percent of respondents reported that they would use no bag or bring their own bag instead of paying a 10-cent fee. This response suggests that consumers are price-sensitive to retail bags (i.e., demand for the good is highly elastic). However, consumers often forget to bring a reusable bag, or make unplanned shopping trips. In those cases, consumers may place a higher value on a LWPB at the point of sale.<sup>29</sup> A national survey by Edelman Berland finds that approximately 50 percent of consumers who stated a preference for reusable bags used a LWPB during their most recent shopping trip.<sup>30</sup> These caveats are factored into the computations of retail bag reduction estimates for fee-based policies later in this section.

## Prior Studies of Consumer Response to Bag Fees

Previous studies on the regulation of LWPBs are limited in their applicability to this analysis for two reasons: (1) most research only considers bag demand at large grocery stores and does not reflect foodservice and general merchandise vendors and (2) most research uses the consumer as the unit of analysis (i.e., does not control for volume of bags used) and provides limited data on the types of reusable bags used as

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<sup>23</sup> "An Analysis of the Impact of Single-Use Plastic Bags," New York State Plastic Bag Task Force (2018), p. 13.

<sup>24</sup> *Ibid.*, p. 20.

<sup>25</sup> Taylor Scheibe, "Has Chicago's Plastic Bag Ban Helped?," Chicago Magazine (2016).

<sup>26</sup> Alexia Elejalde-Ruiz, "The Result of Chicago Plastic Bag Ban: Shopping Bags to Be Sturdier," Chicago Tribune (2015).

<sup>27</sup> Ted Egan and Kurt Fuchs, "Checkout Bag Charge: Economic Impact Report," San Francisco Office of Economic Analysis (2011).

<sup>28</sup> Tatiana Homonoff, et al., "Skipping the Bag: Assessing the Impact of Chicago's Tax on Disposable Bags," (2018).

<sup>29</sup> "Phasing Out Light-Weight Plastic Bags," The Allen Consulting Group (2012).

<sup>30</sup> "Reusable Bag Study," Edelman Berland (2014).

alternatives.<sup>31</sup> Therefore, this analysis relies on existing research but makes relevant modifications to develop its bag-demand reduction estimates under the three policy options.

Some jurisdictions performed a pre- and post-regulation study of consumer behavior at checkout for a sample of retailers to assess the impact from the imposition of a fee. This observational sample measures the share of consumers that use a bag provided by the retailer, bring their own bag or use no bag. This method has been used by several U.S. jurisdictions and researchers including: Los Angeles County, California (AECOM Technical Services, 2010); San Jose, California (City of San Jose, 2012); San Diego, California (University of San Diego, Equinox Center, 2013); Santa Monica, California (Team Marine, 2013); Montgomery County, Maryland (Homonoff, 2018); Richmond, California (Taylor and Villas-Boas, 2016); Chicago, Illinois (Homonoff, et al., 2018).<sup>32</sup>

**Table 3.7 - Impact of Fee-Based Policies on Retail Bag Demand**

Jurisdiction	Study Year	% Change in Consumers Using			% Change in Disposable Bags Used
		Disposable Bags	Reusable/ Own Bags	No Bag	
<b><u>Fee</u></b>					
Montgomery Co., MD	2018	-42%	33%	11%	-8%
Chicago, IL	2018	-28	16	13	-22
<b><u>Ban-Plus-Fee</u></b>					
Richmond, CA	2016	-35	30	9	--

Note: These studies only considered the impact on bag demand in large grocery stores. Disposable bags include both plastic and paper bags provided by grocery stores at checkout. Reusable bags include any type of stitched reusable bag purchased or bags brought from home.

Source: Homonoff (2018); Homonoff, et al., (2018) and Taylor and Villas-Boas (2016).

Three of these studies use a standardized methodology and statistical test (difference-in-difference) to estimate bag-use reduction under a fee and ban-plus-fee scenario.<sup>33</sup> **Table 3.7** displays the results of these studies, which are used by this analysis to inform bag reduction estimates in response to a fee.

The studies find that a fee reduces the number of consumers that demand disposable bags (i.e., LWPBs and paper bags provided at checkout) by an average of 35 percent. Moreover, the studies find that (1) the number of consumers using a reusable bag increases by an average of 26 percent, (2) consumers using no bag increases by an average of 11 percent and (3) consumers that continue to use disposable bags reduce the number of bags consumed by an average of 15 percent.

<sup>31</sup> Only Taylor and Villas-Boas (2016) distinguish between consumers' switch to HWPBs and purchase of reusable stitched bags.

<sup>32</sup> Links to studies included in references.

<sup>33</sup> These studies are: Montgomery County, Maryland (Homonoff, 2018); Richmond, California (Taylor and Villas-Boas, 2016); Chicago, Illinois (Homonoff, et al., 2018).

## Bag Capacity and Reuse Rates

The research cited above quantifies consumer response to the imposition of a fee. However, it is less useful to determine the number and composition of bags that will be used under the three policy options. For that purpose, the analysis must also establish the carrying capacity and reuse rates of alternative bag types. When those parameters are established, then it is possible to translate consumer response into the change in number of bags demanded or used. For example, under a ban scenario, LWPBs are eliminated as a consumer option, a reduction of 100 percent or 3.0 billion bags. However, this analysis estimates that consumer demand for a carryout bag only falls by 10 percent (300 million bags) due to consumers bringing their own bag or using no bag. The remaining demand (2.7 billion bags) is satisfied because retailers switch to alternative bag types (i.e., paper and HWPBs). Hence, the number of alternative retail bags used to displace LWPBs will depend on the carrying capacity and reuse rate for each bag type.

### Bag Capacity

The carrying capacity of alternative bag types used in this report is based on various life-cycle assessment studies for retail bags. A life-cycle assessment is a standardized method to compare the environmental impacts of using a product throughout its entire life cycle, from production to disposal. To perform these studies, researchers must develop a “functional unit,” such as the number of bags necessary for a household to carry home items from a typical grocery trip each week for one year. As part of this work, researchers perform a reference flow study or make assumptions that inform the number of bags required to fulfil a functional unit. This allows carrying capacity to be compared across bag types.

**Table 3.8 - Bag Capacity Relative to LWPBs**

Life Cycle Assessment	Country	Year	Paper	HWPB	Reusable Stitched
Clemson University	United States	2014	1.2	1.2	1.5
UK Environment Agency	United Kingdom	2011	1.3	1.3	1.2
Boustead Consulting	United States	2007	1.5	--	--
Nolan-ITU Pty. Ltd	Australia	2002	1.0	1.5	1.2
Franklin Associates	United States	1990	1.5 to 2.0	--	--

Note: These figures represent estimated carrying capacity of alternative bag types relative to LWPBs.

Source: Kimmel (2014), p. 29; Edwards and Fry (2011), p. 18; Chaffee and Yaros (2007), p. 7; Nolan ITU Pty Ltd (2002), p. 35; Franklin Associates (1990), p. 1-2.

A recent reference flow study performed by researchers at Clemson University used a statistically-based approach in which 60 participants bagged 52 items that represented a typical weekly shopping trip across each of the four bag types considered in this report (LWPB, paper, HWPB and stitched reusable).<sup>34</sup> The study determined that, on average, a paper bag replaces 1.16 LWPBs, a HWPB replaces 1.18 LWPBs and

<sup>34</sup> The study only considered the carrying capacity of nonwoven polypropylene stitched reusable bags. While the stitched reusable category in this report includes all reusable bag types containing stitching, nonwoven polypropylene makes up the majority of the stitched reusable bag market, and it is assumed this would be the primary stitched reusable alternative for consumers.

a reusable stitched bag replaces 1.46 LWPBs.<sup>35</sup> **Table 3.8** details the findings of this study and other studies that estimate the carrying capacity of alternative bag types relative to LWPBs.<sup>36</sup>

Previous studies find a similar range of capacities and replacement rates for each bag type: 1.2 to 2.0 for paper bags, 1.2 to 1.5 for HWPBs, and 1.2 to 1.5 for reusable stitched bags.<sup>37</sup> A notable outcome of prior research is that bag carrying capacities appear to be limited by the volume of the items carried rather than their weight. While HWPBs are thicker and stronger than LWPBs, often certified for 125 reuses before exhaustion, a 2011 consumer survey commissioned by the UK Environment Agency found that a LWPB carries an average of 5.88 items and a HWPB carries an average of 7.96 items.<sup>38</sup> Therefore, while HWPBs may be able to hold more weight, the number of bags required for an average shopping trip is determined by the volume of the items purchased.

A concern with carrying capacities determined by life-cycle assessments is that they may not account for double-bagging. Some consumers and store clerks may double bag both paper and plastic bags. This practice can alter the replacement rates of alternative bag types. Franklin Associates (1990) raises this concern stating, "one reason for the use of more plastic sacks seems to be the inexperience on the part of grocery clerks and consumers on how to pack them so that they may hold their designed capacity."<sup>39</sup> Due to this issue, that study used both a replacement rate of 1.5 and 2.0 for paper bags.

Previous life-cycle assessments primarily consider grocery bags and grocery shopping trips. Nearly half of LWPB demand comes from grocery stores, and it is an important reference point for this analysis. However, this analysis also considers the shopping and retail bag-use habits of general merchandise and foodservice vendors, where the volume of items purchased is typically lower. With this in mind, the IFO employed relatively conservative assumptions for LWPB capacity replacement rates: **1.3 for paper bags, 1.3 for HWPBs, and 1.5 for reusable stitched bags.**

## Bag Reuse Rates

Reusable stitched bags and HWPBs are designed to be reused many times to transport merchandise. Therefore, policy options must consider the average number of times these bags are reused before a new bag is needed or purchased. A review of the (limited) research finds a broad range of reuse rates.

In 2012, the Waste and Resources Action Programme (WRAP) reviewed the impact of the United Kingdom's supermarket voluntary carrier bag agreement, adopted in 2006.<sup>40</sup> WRAP, a registered charity that seeks to reduce waste and develop sustainable products, found that the voluntary agreement reduced the number

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<sup>35</sup> Richard Kimmel, "Life Cycle Assessment of Grocery Bags in Common Use in the United States," (2014), p. 29.

<sup>36</sup> Chris Edwards and Jonna Fry "Life Cycle Assessment of Supermarket Carrier bags: A Review of the Bags Available in 2006," (2011).

<sup>37</sup> The studies included in the table are: Richard Kimmel, "Life Cycle Assessment of Grocery Bags in Common Use in the United States," (2014); Chris Edwards and Jonna Fry "Life Cycle Assessment of Supermarket Carrier Bags," (2011); Chet Chaffee and Bernard R. Yaros, "Life Cycle Assessment for Three Types of Grocery Bags-Recyclable Plastic; Compostable, Biodegradable Plastic; and Recycled, Recyclable Paper," (2007); Nolan-ITU Pty Ltd., "Plastic Shopping Bag: Analysis of Levies and Environmental Impacts," (2002); Franklin Associates, "Resource and Environmental Profile Analysis of Polyethylene and Unbleached Paper Grocery Sacks," (1990).

<sup>38</sup> Edwards and Fry "Life Cycle Assessment of Supermarket Carrier Bags," (2011).

<sup>39</sup> Franklin Associates, "Resource and Environmental Profile Analysis of Grocery Sacks," (1990), p. 1-2.

<sup>40</sup> In 2006 governments within the United Kingdom and seven large supermarket chains entered into a voluntary agreement to target a 50 percent reduction in thin-gauge carrier bags (LWPBs) by 2009. Fees on LWPBs were introduced in several jurisdictions across the U.K. including Wales, Northern Ireland, Scotland and England.



of LWPBs consumed by 4.0 billion bags annually. Eunomia Research and Consulting (2012) interpolated that this result implies a reuse rate of 26 times for HWPBs and 171 for reusable stitched bags.<sup>41</sup>

In 2014, Edelman Berland performed a national survey of U.S. consumers that received or purchased a reusable bag in the past year. Edelman is a public relations firm that represents the American Progressive Bag Alliance, an organization which represents the U.S. plastic bag manufacturing and recycling industry. They find that while 61 percent of respondents preferred using a reusable stitched bag, shoppers forget bags on approximately 40 percent of shopping trips. Developing a bag-reuse formula that accounts for frequency of use, they find that reusable stitched bags are reused an average of 14.6 times and HWPBs are reused an average of 3.1 times. They also find that the average reuse rate for jurisdictions that have enacted LWPB regulations is 17.3 times, compared to 13.9 times for non-regulated areas. This implies that LWPB regulation increases reusable stitched bag reuse rates by approximately 25 percent.

Given that prior estimates of reuse rates for reusable stitched bags range from 13.9 to 171 reuses, this analysis considers what certain reuse rates imply for the average Pennsylvania household. For example, if 15 percent of Pennsylvania households use reusable stitched bags for over half of all shopping trips, a reuse rate of 13.9 times implies that these households would purchase approximately 33 reusable bags per year. Conversely, a reuse rate of 171 times implies that the average Pennsylvania household using reusable bags purchases only two reusable stitched bags per year. A reuse rate of **40 times** implies 11.7 reusable bags demanded annually (roughly one per month), which is a plausible estimate for the average Pennsylvania household that uses reusable bags for a little over half of all shopping trips. Under a LWPB regulation that includes a fee on alternative bag types, this reuse rate is assumed to increase 25 percent to **50 times**.

For HWPBs, there are limited data available on reuse rates because many of these bag types are already provided by department stores as disposable carryout bags. While previous studies cite reuse rates that range from 3.1 to 26, recent reports from Chicago and California that offer HWPBs as a reusable alternative have found that these bags are often consumed at a rate similar to LWPBs.<sup>42</sup> Therefore, accounting for the various types of retailers affected, this analysis uses a HWPB reuse rate of **1.5 times**, growing 25 percent to **1.9 times** under a LWPB regulation that includes a fee on alternative bag types.

Finally, this analysis does not assume that paper bags are reused to transport merchandise. Like LWPBs, paper bags are assumed to be single-use, though they may be reused for secondary applications. As noted, this analysis includes the impact on the foodservice sector, which accounts for 66 percent of paper bag demand.<sup>43</sup> Paper bags are not commonly reused in this context due to food safety and sanitation concerns.

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<sup>41</sup> Chris Sherrington, et al., "Assistance to the Commission to Complement an Assessment of the Socio-economic Costs and Benefits of Options to Reduce the Use of Single-Use Plastic Carrier Bags in the EU," Eunomia Consulting (2012).

<sup>42</sup> Dustin Gardiner, "California Banned Plastic Bags. So Why Do Stores Keep Using Them?" San Francisco Chronicle (2019), also Alexia Elejalde-Ruiz "Six Months in, Chicago's Plastic Bag Ban a Mixed Bag," Chicago Tribune (2016).

<sup>43</sup> The Freedonia Group, "Industry Study #3786 Retail Bags," Freedonia Custom Research (2019).



## Retail Bag Demand Profiles

**Table 3.9** displays the baseline retail bag demand from Table 3.6 and the estimated change in bag use under the three policy options. The number of retail bags demanded falls **34 percent** under a ban scenario, **40 percent** in a fee scenario, and **54 percent** in a ban-plus-fee scenario. When converted to LWPB units of demand, the table shows that the ban scenario primarily shifts demand to HWPBs and paper bags, and the amount of LWPB units of demand falls by 275 million. Under the two fee-based scenarios, the units of LWPB demand fall by 1.2 to 1.3 billion as consumers leave the market in favor of bringing their own bag or using no bag. It is noted that the retail bag demand figures in the table reflect supply constraints in the paper industry and will be discussed in **Section 5 (Manufacturers)**.

**Table 3.9 - Retail Bag Demand Profiles**

	LWPB	Paper	HWPB	Reusable Stitched	No Bag/ Own Bag <sup>1</sup>	Total
<b># Retail Bags Demanded</b>						
Baseline	3,035	1,313	230	9	--	4,587
Ban	0	1,576	1,434	10	--	3,020
Fee	1,677	726	346	14	--	2,762
Ban-Plus-Fee	0	1,576	517	14	--	2,107
<b>% Change in Bag Demand</b>						
Ban	-100%	20%	524%	13%	--	-34%
Fee	-45%	-45%	51%	54%	--	-40%
Ban-Plus-Fee	-100%	20%	125%	62%	--	-54%
<b>Conversion to LWPB Units of Demand</b>						
Baseline	3,035	1,707	448	529	--	5,719
Ban	0	2,049	2,795	600	275	5,719
Fee	1,677	943	843	1,015	1,241	5,719
Ban-Plus-Fee	0	2,049	1,260	1,075	1,336	5,719
<b>Composition of LWPB Units of Demand</b>						
Baseline	53%	30%	8%	9%	--	100%
Ban	0%	36%	49%	10%	5%	100%
Fee	29%	16%	15%	18%	22%	100%
Ban-Plus-Fee	0%	36%	22%	19%	23%	100%

Note: Bag demand figures in millions.

1 No Bag/Own Bag represents LWPB units of demand that are no longer consumed as a result of the regulation. The baseline amount for the number of consumers who do not use a bag or bring their own bag is not relevant to the analysis.

## Consumer Impacts

The analysis estimates that Pennsylvania residents currently spend \$21.30 each year on retail bags.<sup>44</sup> **Table 3.10** combines consumption data (Table 3.9) and price data (Table 4.2) to estimate consumer spending on retail bags under the three policy options. As noted, all policy options assume that the cost of all bag types are ultimately passed forward to final consumers through higher prices. Three main factors motivate the estimated monetary impact on consumers: (1) the cost of switching to more expensive alternative bag types, (2) new demand for trash bin liners and (3) the payment of any fee under the fee-based scenarios for consumers that continue to use bags at checkout.

### Cost to Switch Bag Types

Each scenario requires consumers to switch to alternative bag types. Consumers implicitly pay (through final prices) for retailers to switch to more expensive paper and HWPBs, as well as to purchase new reusable stitched bags. In Scenario 2 (fee), savings from reduced bag demand offsets the cost to switch to alternatives and results in consumer savings. In Scenarios 1 (ban) and 3 (ban-plus-fee) the cost to switch to alternatives exceeds the savings from reduced bag consumption and consumer costs increase.

Consumers can avoid fees by purchasing a new reusable stitched bag to meet their demand for a bag at checkout. These products include bags made from **polypropylene**, other plastics or natural fabrics. Bags made of **woven/nonwoven polypropylene** comprise nearly 90 percent of consumer demand for stitched reusable bags and they are often available for purchase at checkout.<sup>45</sup> A review of reusable stitched bags offered for purchase at retail stores revealed that prices typically range from \$0.99 to \$4.99 depending on the product specifications.<sup>46</sup> Since the majority of consumers will opt for the lower price alternative, a conservative price estimate was established of \$1.50 per bag.

### New Demand for Trash Bin Liners

Once in consumers' homes, plastic bags are often used as a trash bin liner. One recent study found that in jurisdictions with no plastic bag regulation, 12 percent of plastic bags (1 in 8) are reused as trash bags.<sup>47</sup> Estimated annual LWPB and HWPB use in Pennsylvania (3.3 billion) implies that 392 million bags are reused as trash bags or liners. The analysis assumes that regulations would cause some consumers to increase the share of HWPBs and LWPBs used as trash bags, but also create new demand from consumers who forego the use of LWPBs and HWPBs in favor of bringing their own bag or using no bag.

This analysis assumes that all three scenarios would lead to an increase in trash bin liner demand that is equal to 5 percent of the associated net LWPB and HWPB reduction. As shown in **Table 3.10**, this equates to higher consumer costs of \$13 million, \$9 million and \$20 million, respectively.<sup>48</sup>

### Fee Payments

Consumers must pay a fee on LWPBs, HWPBs or paper bags in two of the scenarios. The 10-cent fee is an added cost for consumers who continue to use bags provided at checkout. For the purpose of this analysis,

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<sup>44</sup> Excludes reusable stitched bags which consumers pay for explicitly.

<sup>45</sup> The Freedonia Group, "Industry Study #3786 Retail Bags," Freedonia Custom Research (2019).

<sup>46</sup> This included a review of Pennsylvania retailers and the price offered for these bags at checkout, where most consumers purchase this item.

<sup>47</sup> Rebecca Taylor, "Bag Leakage: The Effect of Disposable Carryout Bag Regulations on Unregulated Bags," (2019).

<sup>48</sup> These cost increases were calculated using an average per unit trash bag price of \$0.14, based on general research on prices. The price is an average of small (4 gallon), medium (8 gallon) and large (13 gallon) trash bin liners.

it is assumed that the fee is retained by the retailer and passed back to consumers in the form of lower prices on retail goods if not fully used to offset bag costs. That is, the retailer only uses the fee to exactly offset bag costs and returns any amounts that remain to consumers in the form of lower prices on goods. In this case, consumers can purchase the same quantity of goods with or without the fee (the same net costs are passed to them), but the explicit fee incentivizes them to alter their choice of bags at checkout.

## Consumer Spending in Each Policy Scenario

**Table 3.10** displays estimates for consumer spending on retail bags and trash bags for each policy scenario. Fee revenues are itemized separately because the net economic impacts will depend on whether retailers or government entities receive the fee.<sup>49</sup> For now, the analysis simply assumes that the net cost of bags (including the receipt of any fee revenues) are fully passed forward from retailers to consumers through prices. Therefore, retailers and vendors are unaffected by the fee and indifferent to its levy. Section 6 relaxes this assumption to consider the implications if (1) retailers retain a portion of the fee or (2) government receives fee revenues. In the latter case, consumers would bear the cost of fees shown in Table 3.10.

**Table 3.10 - Consumer Spending on Bags**

	Baseline	Ban	Fee	Ban + Fee
Retail Bags <sup>1</sup>	\$272	\$331	\$181	\$266
New Trash Bin Liners <sup>2</sup>	<u>n.a.</u>	<u>13</u>	<u>9</u>	<u>20</u>
Total Spending on Bags	272	345	190	286
<b>Cost per Capita</b>	<b>21.30</b>	<b>26.90</b>	<b>14.90</b>	<b>22.40</b>
Fee	--	--	275	209
<b>Cost per Capita</b>	<b>0.00</b>	<b>0.00</b>	<b>21.50</b>	<b>16.30</b>

Note: Dollars in millions. Bag demand in millions. Per capita cost in whole dollars.

1 Includes spending on LWPBs, paper bags, HWPBs and reusable stitched bags. It is assumed that retailers pass on the cost of bags provided at checkout to consumers through prices on other goods. Spending on reusable stitched bags includes 6.0% Pennsylvania sales tax.

2 Includes 6.0% Pennsylvania sales tax. Reflects additional spending above the baseline amount.

Disregarding fees, consumer spending on retail bags increases under both policy scenarios that include a ban but declines in the fee scenario. In Scenario 1 (ban), consumer spending on retail and trash bags increases by \$72 million over current spending (\$5.60 per capita). In this scenario, the 34 percent decline in the number of retail bags demanded is not enough to offset the cost of switching to more expensive alternatives. In Scenario 3 (ban-plus-fee), consumer spending on bags increases by \$14 million. In this scenario, the cost of retail bags falls by \$6 million due to a 54 percent decline in the number of bags demanded, but is offset by \$20 million in new spending for trash bags. In Scenario 2 (fee), consumer demand for retail bags falls (and savings are assumed to be passed forward to consumers), but the use of LWPBs is not prohibited, so the higher cost to switch to alternatives is dampened. In this scenario, spending on retail bags falls by \$82 million or -\$6.40 per capita.

<sup>49</sup> The fee revenue estimates assume full compliance.

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## Section 4: Retailers

Retailers provide carryout bags to customers as a convenience, but they incur significant costs to provide this amenity. Under a LWPB regulation, retailers will continue to meet customer demand for retail bags, but will alter the quantity and composition of bags they choose to provide. The three policy options will have different impacts on retailers and consumers due to the relative cost of alternatives, consumer preferences and supply constraints.

### Pennsylvania Retail Industry Overview

A LWPB regulation would impact approximately 64,500 Pennsylvania private retail establishments that employ 993,300 workers. (See **Table 4.1.**) Grocery, pharmacy and convenience stores comprise nearly 50 percent of LWPB demand and employ 217,200 workers at more than 13,900 establishments across the state. The foodservice industry, employing 416,100 workers in the Commonwealth, comprises 20 percent of LWPB demand. Vendors in this sector are dependent on disposable retail bags due to concerns over food safety and sanitation. General merchandise retailers make up the remaining 30 percent of LWPB demand and employ 360,000 workers across 24,200 establishments. Since 2014, general merchandise retail employment has declined at an average rate of 1.1 percent per annum due to shifts to ecommerce. Each of these retail sectors operate in a highly competitive market in which consumers are sensitive to price and the in-store experience.

**Table 4.1 - Overview of Pennsylvania Retailers**

	# of Establishments			# of Jobs			Average Annual Pay		
	2014	2019	AAGR	2014	2019	AAGR	2014	2019	AAGR
Grocery	13,727	13,923	0.3%	220,634	217,183	-0.3%	\$23,574	\$27,084	2.8%
Foodservice	25,130	26,360	1.0	387,842	416,131	1.4	16,638	19,672	3.4
Other Retail	<u>25,498</u>	<u>24,208</u>	<u>-1.0</u>	<u>380,077</u>	<u>359,965</u>	<u>-1.1</u>	<u>26,859</u>	<u>30,324</u>	<u>2.5</u>
<b>Total</b>	<b>64,355</b>	<b>64,491</b>	<b>0.0</b>	<b>988,553</b>	<b>993,279</b>	<b>0.1</b>	<b>22,357</b>	<b>25,694</b>	<b>2.8</b>

Note: AAGR is average annual growth rate. Grocery includes supermarkets (NAIC 445), pharmacies (446) and convenience stores (44711). Other Retail includes general merchandise and department stores (NAIC 441-453), Foodservice includes restaurants and other eating places (NAIC 7225), drinking places (7224) and special food services (7223).

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

### Bag Prices

Retail bags are an input cost for retailers, similar to labor, rent or electricity. These input costs are a function of consumer demand for retail plastic bags and wholesale or supplier prices. **Section 3** outlined the retail bag demand profiles for consumers under each policy scenario. To quantify the impact on retailers, prices must be assigned to LWPBs, paper bags and HWPBs. Stitched reusable bags are excluded because customers explicitly pay for the use of those bags.

The analysis uses price data from stakeholders, national market analyses, bag-use studies in other jurisdictions and a review of various online retail bag outlets for LWPBs, paper bags, and HWPBs. Over 150

price points were collected for bags of various sizes and qualities to account for different retailer preferences. The price point research was compared to national and industry averages to develop a “median,” “high” and “low” price for each retail bag type. **Table 4.2** displays the results.

Table 4.2 - Bag Prices by Bag Type and Proposed Fee (in Cents)			
Price Per Bag	LWPB	Paper	HWPB
Median	2.3	12.9	7.8
High	4.0	18.4	12.6
Low	1.6	4.7	4.8
Proposed Fee	10.0	10.0	10.0
Note: This table reflects wholesale bag prices. Reusable stitched bags are excluded because they are explicitly paid for by consumers.			
Source: Stakeholders, national publications, studies completed for other jurisdictions and a review of various online retail bag outlets.			

While each bag type has a broad range of prices, LWPBs are consistently the lowest-cost option for retailers. HWPBs and paper bags are common alternatives for retailers under each policy scenario and are typically three to six times more expensive than LWPBs. Table 4.2 also shows the cost for bags that would be subject to a fee and the analysis assumes a 10-cent fee is levied, which is consistent with fees levied by other jurisdictions. The table shows that the proposed fee offsets the median cost to switch to a HWPB, but does not offset the median cost to switch to a paper retail bag.

## Cost Impacts Under Each Policy Scenario

**Table 4.3** details the cost impact to retailers under each policy scenario. The baseline scenario reflects the current annual number of bags demanded and annual spending on retail bags by retailers that operate in the Commonwealth. Following the baseline scenario, the change in the number of bags demanded and total annual spending on retail bags is detailed for retailers across each policy scenario.

Currently, Pennsylvania retailers spend an estimated \$258 million annually on retail bags provided to customers. These input costs are built into prices and passed on to consumers. Under the policy scenarios, retailers purchase fewer bags because more consumers bring their own bag or use no bag, but also due to the increased carrying capacity of HWPB and paper bag alternatives. However, alternative bags are an average of three to six times more expensive than LWPBs, so the cost savings from a reduction in demand is diminished. A summary of the results is as follows:

- Under a ban of LWPBs, overall spending on retail bags increases by 22 percent to \$315 million. While overall bag demand falls by 1.6 billion bags, retailers switch to more expensive paper and HWPB alternatives, which leads to an increase in input costs of \$57 million.
- Under a 10-cent fee, the cost of retail bag inputs falls to \$160 million, a 38 percent reduction. The number of retail bags demanded falls by 1.8 billion, and since there is no ban on LWPBs, retailers are able to provide a similar, albeit reduced, mix of retail bags. This leads to a savings of \$98 million on retail bag costs.

- Under a ban-plus-fee, retail bag demand falls by 2.5 billion. Although retailers switch to more expensive alternatives, retail bag costs fall by 6 percent to \$244 million. In this scenario, the cost savings from reduced demand is greater than the increased price of alternatives.

**Table 4.3 - Impact of Regulations on Retailer Bag Costs**

	LWPB	Paper	HWPB	Total	Avg Cost Per Bag
<b><u>Retail Bags Demanded</u></b>					
Baseline	3,035	1,313	230	<b>4,578</b>	--
Ban	0	1,576	1,434	<b>3,010</b>	--
Fee	1,677	726	346	<b>2,748</b>	--
Ban-Plus-Fee	0	1,576	517	<b>2,093</b>	--
<b><u>Average Cost Per Bag (cents)</u></b>	2.3	12.9	7.8	--	--
<b><u>Retailer Costs</u></b>					
Baseline	\$71	\$169	\$18	<b>\$258</b>	5.6
Ban	\$0	\$203	\$112	<b>\$315</b>	10.5
Fee	\$39	\$93	\$27	<b>\$160</b>	5.8
Ban-Plus-Fee	\$0	\$203	\$41	<b>\$244</b>	11.6
<b><u>Dollar Change in Retailer Costs</u></b>					
Ban	-\$71	\$34	\$94	<b>\$57</b>	--
Fee	-\$32	-\$76	\$9	<b>-\$98</b>	--
Ban-Plus-Fee	-\$71	\$34	\$23	<b>-\$15</b>	--

Notes: Bag numbers and dollars in millions. Average price and average cost per bag in cents.

The figures from Table 4.3 exclude the impact of any fee revenues. The analysis assumes that retailers are indifferent to any bag fee because they push all costs or savings related to the bags forward to final consumers. For example, if bags cost retailers \$200 million prior to the fee, the analysis assumes consumers pay all of those costs. If a fee is levied that reduces bag demand and retailer bag costs to \$150 million, and generates \$100 million of fees that are kept by the retailer, the retailer would only need to push \$150 - \$100 = \$50 million of costs forward to final consumers. Consumers pay the \$100 million fee and also the \$50 million in retailer net costs pushed forward. In this manner, the retailer is not helped or harmed by the fee. Overall costs fall because fewer bags are used since some consumers leave the market (i.e., bring own bags or do not use bags) or retailers provide a more efficient allocation of bags. However, if fee revenues flow to the government or retailers retain some portion of the fee as net profits, then outcomes would be different. Those outcomes are discussed further in Section 6.

## Implementation and Compliance

It is the responsibility of the retailer to implement and comply with new regulations on LWPBs. An IFO questionnaire to retailers revealed anticipated costs of implementation including: training on new checkout procedures, additional staffing, reporting requirements and technology and infrastructure upgrades related to self-checkout and point-of-sale prompts.

Retailers note congestion and slowdown at checkout as customers and staff adapt to LWPB policies. Taylor (2020) studies the impact of LWPB policies implemented in California and finds the regulations increase checkout time by roughly 3.6 seconds per customer. The study applies this to the average number of annual shopping trips by California consumers to quantify a time cost for consumers.<sup>50</sup> When this methodology is applied to Pennsylvania, it takes an estimated 650,000 additional hours at the checkout per year across all households. When this is applied to half the state median hourly wage, the statewide time cost is estimated to be at least \$6 million per year.<sup>51</sup>

Finally, the effectiveness of any regulation relies on retailer compliance. Under each policy scenario retailers are subject to fines due to non-compliance with any LWPB regulation. Seattle examined business compliance for its retail bag policy which became effective in 2012. In 2019 the city noted a full compliance rate of 85 percent up from 64 percent in 2016.<sup>52,53</sup> The 2018 and 2019 annual bag ban compliance reports identified two primary factors that contributed to non-compliance: (1) businesses were unaware of the ordinance and/or specifics and (2) language barriers leading to 40 percent of “ethnic grocery and produce stores” being out of compliance. The reports described continued retailer education efforts to overcome the language barrier and increase compliance across all retailers.

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<sup>50</sup> Taylor, “A Mixed Bag: The Hidden Time Costs of Regulating Consumer Behavior,” (2020).

<sup>51</sup> This calculation follows the methodology in the Taylor (2020) study. It applies 3.6 additional seconds at checkout to an estimated 130 shopping trips per household per year for Pennsylvania’s 5.03 million households. It then applies half the 2019 median hourly wage in Pennsylvania (\$18.99/2) as published by the U.S. Bureau of Labor Statistics to the additional 650,000 hours spent at the store checkout by households each year. This estimate is likely to be conservative as it does not include additional congestion costs cited in the Taylor (2020) study.

<sup>52</sup> Mami Hara, “2018 Report on Seattle Bag Ban Compliance,” Seattle Public Utilities (2018).

<sup>53</sup> Mami Hara, “2019 Report on Seattle Bag Ban Compliance,” Seattle Public Utilities (2019).



## Section 5: Manufacturers

A statewide regulation on LWPBs will impact demand for retail bag manufacturers that operate in Pennsylvania. The direct economic impact on bag manufacturers will depend on (1) the share of retail bags that are imported from out-of-state and (2) the extent to which alternative bags are produced in the state. Other factors such as the retail bag production processes (i.e., economies of scale), the ability to retool operations and possible supply constraints also impact the economic effects from any LWPB regulation.

### Retail Bag Manufacturing Employment and Production

This analysis considers the direct economic impacts to plastic and paper bag manufacturers. Reusable stitched bag manufacturers are excluded because approximately 95 percent of those products are imported from foreign countries due to the labor-intensive stitching process and relative U.S. labor costs.<sup>54</sup> **Table 5.1** illustrates recent trends for plastic and paper bag manufacturers.

**Table 5.1 - Overview of Pennsylvania Bag Manufacturing Industry**

	# of Establishments			# of Jobs			Average Annual Pay		
	2014	2019	AAGR	2014	2019	AAGR	2014	2019	AAGR
Plastic Bag	12	17	7.2%	1,656	1,801	1.7%	\$48,360	\$55,058	2.6%
Paper Bag	<u>60</u>	<u>53</u>	<u>-2.5</u>	<u>3,455</u>	<u>2,537</u>	<u>-6.0</u>	<u>64,780</u>	<u>70,763</u>	<u>1.8</u>
<b>Total</b>	<b>72</b>	<b>70</b>	<b>-0.6</b>	<b>5,111</b>	<b>4,338</b>	<b>-3.2</b>	<b>56,570</b>	<b>61,357</b>	<b>1.6</b>

Note: AAGR is average annual growth rate. Data for 2019 are preliminary. Manufacturers include: Plastic Bag and Pouch Manufacturing (NAIC 326111) and Paper Bag and Coated and Treated Paper Manufacturing (NAIC 322220). These six-digit NAIC cannot be refined further and it is noted that both subsectors include manufacturers that do not manufacture bags for use by retailers and vendors.

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

In 2019, plastic and paper bag manufacturers employed 4,338 workers in Pennsylvania.<sup>55</sup> Of these manufacturers, 17 establishments and 1,801 jobs were classified as plastic bag and pouch manufacturing, and 53 establishments and 2,537 jobs were classified as coated and treated paper manufacturing. The North American Industry Classification System (NAICS) classifies manufacturing firms and employment by the primary type of manufacturing occurring at a facility. This includes firms that produce products other than retail bags, and may not include firms that produce retail bags as a small part of their product line.

Production data from the U.S. Census Bureau's 2012 Economic Census and data from the IMPLAN input-output model suggest that approximately one-quarter to one-third of employment in the plastic bag and pouch manufacturing sector is directly related to the manufacture of plastic retail bags and trash bin liners.<sup>56</sup>

<sup>54</sup> As reported by various industry representatives in the plastics and paper industry.

<sup>55</sup> In 2019, Pennsylvania private employment across all industries was 5.25 million. These data were retrieved from the U.S. Bureau of Labor Statistics' Quarterly Census of Employment and Wages.

<sup>56</sup> The plastic bag and pouch manufacturing sector (NAIC 326111) and paper bag and coated and treated paper manufacturing sector (NAIC 322220) include production that is not related to retail bags or trash bin liners. Therefore, U.S. product level statistics from the U.S. Census Bureau's 2012 Economic Census were used to inform the employment estimate for Pennsylvania. Product statistics for the U.S. and states in the 2017 Economic Census will be released

Most other production is related to bag types such as food storage, frozen food bags and business to business sales, that would not be impacted by any LWPB regulation.

These same data suggest that roughly 10 percent of Pennsylvania employment in the coated and treated paper manufacturing sector is related to paper retail bag manufacturing. The sector also includes production unrelated to retail bags such as cardboard for shipping applications, book paper, packaging and shipping paper, giftwrap, adhesive tapes and wallpaper. Representatives of the paper industry noted that limited paper retail bag production occurs in the state, and that most paper retail bag demand is imported from other states.

## Manufacturer Response to Regulations

In most jurisdictions, retailers typically have six to 12 months to respond to regulations before enforcement begins. Plastic and paper bag manufacturers have limited ability to respond to changing retailer demand in this short timeframe. Consumers will demand fewer retail bags in all three scenarios. In the two scenarios that eliminate all LWPBs, alternative bags must replace two-thirds of retail bag demand previously supplied by LWPBs. Hence, an important consideration for an economic analysis is the ability of manufacturers to meet the new demand for alternatives created by each ban scenario.

If displaced demand for LWPBs was entirely met by paper bags, it would require an increase in current production of 160 percent under the ban scenario and 100 percent under the ban-plus-fee scenario.<sup>57</sup> Industry representatives noted that the national paper bag manufacturing industry does not have the capacity to meet the new demand that would be created by LWPB regulations. Paper bags often are the first choice as an alternative to LWPBs, so the analysis must determine any supply constraints faced by this industry.

For the U.S., paper bag manufacturers operate at 89 percent average capacity. In 2019, total kraft bag and sack production was approximately 1.2 million tons, growing at an average rate of 8.3 percent per annum since 2014 when California first adopted a statewide ban of LWPBs.<sup>58</sup> A recent presentation from Novolex, the leading U.S. producer of plastic and paper retail bags, on the impact of New York's bag ban noted that a typical paper bag manufacturing facility has 5 to 10 percent of reserve production capacity available to meet new demand and that total North American excess production capacity is an estimated 0.8 billion bags.<sup>59</sup> A separate New York market assessment report produced by Freedonia Custom Research estimated that new paper bag production facilities require three to five years to reach full capacity.<sup>60</sup> While an existing facility may be able to scale-up operations more quickly, few are located in the state. Based on these assessments and recent industry growth, the analysis assumes that paper bag manufacturers could

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November 2020 and were not available at the time of this publication. These data were supplemented by conversations with various industry stakeholders in the plastics and paper industries.

<sup>57</sup> In both scenarios, LWPBs are banned removing 3.0 billion retail bags from the market. After accounting for consumers who leave the market by bringing their own bag or using no bag, this is the demand met by alternative bag types, such as paper bags.

<sup>58</sup> Information supplied by representatives of the paper industry. In 2014, California became the first state to enact a statewide plastic bag ban at large retail stores. Before implementation, a push for a referendum placed the question on the ballot as Proposition 67 in November 2016. Upon passage, California's statewide policy became effective.

<sup>59</sup> Phil Rozenski, "Implementation of New York Statewide Paper Bag Standard," presentation from paper bag manufacturer, Novolex (2019).

<sup>60</sup> "New York Retail Bags Market Assessment," Freedonia Custom Research (2020). This report was prepared on behalf of the plastics industry.

scale-up by 20 percent in the short-term to meet additional Pennsylvania retail bag demand.<sup>61</sup>

The remaining demand for retail bags that cannot be met by the paper bag industry must be filled by HWPBs or reusable stitched bags. With sufficient lead time and significant investment, LWPB manufacturers have the ability to start or increase production of HWPBs assuming regulations do not limit the production process by which a bag qualifies as a reusable alternative. This switch can occur because the production process, blown film extrusion, is the same for LWPBs and HWPBs. The two bag types can be manufactured using the same **molds**; the primary difference is that HWPBs require more **plastic resin** to produce a thicker bag.

Regulations that require changes in the production processes or new plastic bag molds significantly limit the ability of plastics manufacturers to respond to regulations.<sup>62</sup> For example, the plastic bag ban ordinance enacted in Philadelphia bans any plastic bag “that is less than 2.25 mils thick or made through a blown film extrusion process.”<sup>63</sup> This language prohibits demand for LWPBs to be met with HWPBs, which are also manufactured using blown film extrusion. In this case, displaced demand for LWPBs is required to be met by paper and reusable stitched alternatives and a larger share of retail bag spending would flow out of state.<sup>64</sup>

For the three policy options, the analysis assumes that paper manufacturers replace any shifted demand up to their supply constraints and that 80 percent of those bags are imported from other states. For any residual bag demand, the analysis assumes it is fulfilled with HWPBs. Despite the significant increase in demand for those bags, the analysis assumes that Pennsylvania manufacturers are able to satisfy the same share of Pennsylvania retailer demand and that in-state manufacturers can retool to shift production from LWPB to HWPB.

## Petrochemical and Plastics Manufacturing from Natural Gas

The regulation of single-use plastics could also have indirect implications for the prospective clustering of **petrochemical manufacturing** facilities in the state. Pennsylvania is the second-largest producer of natural gas in the U.S. and the state’s capacity for natural gas production and proximity to major markets make it an attractive location for new petrochemical facilities.<sup>65</sup> This subsection provides a brief overview of the petrochemical industry in the state and Appalachia region generally.

Natural gas and materials derived from natural gas processing (i.e., **natural gas liquids**) are key raw materials used in the production of plastics. In general, plastics are produced from feedstock (e.g., ethane and propane) derived from the processing of fossil fuels such as natural gas. This feedstock is removed from the natural gas stream and then transported to a **cracker plant**, where it is heated and “cracked” into ethylene. This ethylene is then converted to usable products, the most common of which is **polyethylene**.<sup>66</sup> This process leads to the production of a wide range of plastic products. Ethane is also a prominent

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<sup>61</sup> This analysis assumes that no new paper bag manufacturing facilities move into the state within one year of this regulation.

<sup>62</sup> New plastic molds are a large capital investment and are primarily imported from other countries. Information supplied by the plastics industry suggested it would cost over \$1 million and require over nine months of lead time to replace one piece of machinery.

<sup>63</sup> [Bill No. 1906010-A02](#), Signed December 30, 2019.

<sup>64</sup> Information supplied by representatives of the plastics industry.

<sup>65</sup> “Natural Gas Gross Withdrawals and Production,” U.S. Energy Information Administration, (2020).

<sup>66</sup> Daniel Brockett, “How Plastic is Made from Natural Gas,” Penn State Extension (2017).

liquid that can be found in Pennsylvania’s “wet” natural gas. These natural gas liquids are abundant in the Marcellus and Utica Shale formations, which cover nearly two-thirds of Pennsylvania.

In 2016, Shell Chemical Corporation began construction on a large ethane cracker plant in Beaver County, Pennsylvania. In 2019, construction of the site employed over 5,000 workers on a temporary basis. The plant will eventually employ 600 permanent positions. IHS Markit estimates that natural gas production from the Marcellus and Utica Shale formations could support up to four additional petrochemical manufacturing facilities in the region.<sup>67</sup> Currently, the majority of such facilities are clustered in the Gulf Coast region and the new Shell plant will be the first of its scale outside that region.

**Table 5.2 - Chemical Manufacturing Activity in Appalachia**

Industry	Region Revenue (billions)	% of U.S. Total	Region Employment	% of U.S. Total	Region Establishments	% of U.S. Total
<b>Appalachia Total</b>	<b>\$308.8</b>	<b>30%</b>	<b>942,737</b>	<b>32%</b>	<b>7,690</b>	<b>31%</b>
<b>Gulf Coast Total</b>	<b>171.1</b>	<b>17</b>	<b>333,220</b>	<b>11</b>	<b>2,543</b>	<b>10</b>
<u>Select Appalachia Detail</u>						
Plastic Products Misc.	\$68.3	34%	250,974	25%	2,092	57%
Organic Chemical	60.1	48	100,310	34	380	19
Paint	45.0	74	153,648	74	382	22
Plastics and Resin	38.6	13	101,839	22	501	25
Plastic Film	8.6	24	33,110	25	341	29
Petrochemical	1.8	15	5,522	21	465	19

Note: Appalachia is defined as within 300 miles of Pittsburgh. 300 miles generally represents the range of same-day or one-day delivery by truck.

Source: United States Department of Energy (2018).

The supply of low-cost natural gas and natural gas liquids in the region that can be converted to petrochemical raw materials and downstream plastics presents opportunities for a petrochemical industry cluster. Regarding the potential for a petrochemical industry cluster in the Appalachia region, a 2018 Report to Congress from the U.S. Department of Energy (DOE) notes that “[t]oday, the petrochemical value chain in Appalachia has activity at each end of the chain with little activity in the middle (i.e., converting fossil fuels into base chemicals and intermediates). Upstream from petrochemical manufacturing, natural gas production within the region is experiencing rapid growth. At the other end of the value chain, there are numerous converters and plastics manufacturers in the region.”<sup>68</sup> The report compared chemical manufacturing economic activity (e.g., plastic products, paint, plastics and resins, plastic film) in the Appalachia region (area within a 300 mile radius of Pittsburgh) to the Gulf Coast region (Texas and Louisiana). The comparison (see **Table 5.2**) found that the Appalachia region accounts for 30 percent of national revenues, 31 percent

<sup>67</sup> IHS Markit estimates that 73 percent of U.S. and Canadian polyethylene demand and 67 percent of polypropylene demand falls within a 700-mile region of southwestern Pennsylvania. See “Prospects to Enhance Pennsylvania’s Opportunities in Petrochemical Manufacturing,” IHS Markit (2017).

<sup>68</sup> “Ethane Storage and Distribution in the United States,” U.S. Department of Energy (2018).

of employment and 32 percent of establishments. In contrast, the Gulf Coast region accounts for 17 percent of revenues, 11 percent of employment and 10 percent of establishments.

Despite the Appalachia region containing a larger share of chemical manufacturing economic activity, Texas and Louisiana dominate the production of ethylene due to investments in infrastructure and transportation facilities over time. In 2017, the two states accounted for 95 percent of nationwide capacity. The DOE report projects that through 2025, nationwide ethylene production and capacity will increase by 51 percent, and the Appalachia region will account for 17 percent of that growth.

Natural gas production in the Appalachia region, specifically in Pennsylvania, Ohio and West Virginia, nearly equals the production in the Gulf Coast region (Texas and Louisiana). In 2019, Pennsylvania, Ohio and West Virginia accounted for 29 percent of U.S. natural gas production, whereas Texas and Louisiana accounted for 33 percent. Moreover, the combined production of Pennsylvania, Ohio and West Virginia grew by 13.2 percent per annum from 2015 to 2019 while Texas and Louisiana production grew by 5.9 percent per annum.<sup>69</sup> These trends, combined with the chemical manufacturing activity already present in the region, suggest that Pennsylvania and nearby states are well-positioned to supply the materials necessary for a petrochemical industry cluster similar to that of the Gulf Coast. Currently, the Appalachia region lacks the infrastructure to convert natural gas liquids into base materials and intermediates for plastics production. Industry representatives noted that single-use plastics regulation could make the state a less viable option for prospective petrochemical and plastics manufacturers.

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<sup>69</sup> "Natural Gas Gross Withdrawals and Production," U.S. Energy Information Administration (2020).

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## Section 6: Net Economic Impacts

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The economic analysis uses results from prior sections to quantify the potential impacts for the state economy. It also compares outcomes for the three policy options and how consumer response to bans or fees change the composition of retail bag usage and the average cost to provide those services. The analysis begins with the case where (1) retailers pass all bag costs forward to consumers (through higher prices), (2) retailers also pass any cost savings from lower bag costs forward and (3) retailers return any net savings from bag fees to consumers if fees more than offset their bag costs. Under these assumptions, retailers are largely indifferent to the fee and simply function as a “middleman” that is reimbursed for the net cost of the good or service provided. This treatment allows the analysis to keep the impact of the fee separate to focus on other dynamics, such as the average consumer cost for bags provided. However, for the economic impact analysis, that assumption is relaxed and retailers are assumed to retain 10 percent (1 cent per bag) of the fee as net profits. In the fee scenario, the fee more than compensates retailers for their average bag costs, so retailers push most (but not all) net bag savings forward to consumers. It is noted that actual outcomes could differ and the 10 percent retention assumption is one plausible outcome among many.<sup>70</sup> Finally, if retailers remit fee revenues to a government entity, consumers are assumed to bear the entire burden of the fee, and that case is discussed later in this section.

### Consumption and Spending on Retail Bags

**Table 6.1** displays total bag costs, the change in number of bags used and the average cost per unit of LWPB demand for the three policy scenarios. The changing composition of bags demanded alters consumer spending on bags and the average cost per unit of demand. The bottom of Table 6.1 (line 18) lists total revenues from the 10-cent fee levied on all disposable bags. For the purpose of this table, fee revenues are held separate from all other computations.

Baseline annual spending on retail bags is \$272 million (line 6) which represents a per capita cost of \$21.30 (line 13) across all state residents. Total LWPB-equivalent demand is 5.7 billion bags (line 14) and the average consumer unit cost to meet that demand is 4.8 cents (line 15). From the retailers’ view, they supply 4.6 billion LWPBs, HWPBs and paper bags (line 16) and the average cost to supply them is 5.6 cents (line 17) per bag (the retailer computation is based on number of actual bags and does not control for carrying capacity across bag types).

**Scenario 1 (ban)** increases annual spending on retail bags by \$72 million (line 12) to \$26.90 per capita. LWPBs are eliminated while demand for all other bag types increases, including new demand for trash bin liners. The number of retail bags demanded falls by 1.6 billion, a reduction of 34 percent (line 11). However, average consumer costs increase under a ban scenario due to the assumed shift to more expensive HWPB and paper alternatives. In this scenario, demand for 275 million LWPBs are eliminated as consumers bring their own bag or forego a bag (see Table 3.9).<sup>71</sup> Including those consumers who now satisfy their retail

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<sup>70</sup> Up until this point, the analysis assumes a perfectly competitive environment to facilitate a clear comparison amongst the three scenarios. Under that assumption, retailers pass all costs or savings forward to final consumers. However, for the purpose of the economic analysis, the assumption of perfect competition is relaxed and retailers are assumed to retain 10 percent of the fee.

<sup>71</sup> These consumers are assumed to “leave the market” and do not purchase or use new disposable or reusable bags. Note that this group of consumers includes those who may already own stitched, reusable bags and elect to use them

bag needs in other ways, the average cost per unit to meet the 5.7 billion LWPB-equivalent demand increases to 6.0 cents (line 15). From the retailer's perspective, the average cost of the 3.0 billion bags provided increases to 10.5 cents per bag (line 17).

**Table 6.1 - Total, Average and Per Capita Costs**

	Baseline	Ban	Fee	Ban + Fee
<b><u>Total Consumer Costs (millions)</u></b>				
1 LWPB	\$71	\$0	\$39	\$0
2 Paper	169	203	93	203
3 HWPB	18	112	27	41
4 Reusable Stitched	14	16	22	23
5 Replacement Trash Bin Liners	<u>n.a.</u>	<u>13</u>	<u>9</u>	<u>20</u>
6 <b>Total</b>	<b>272</b>	<b>345</b>	<b>190</b>	<b>286</b>
<b><u>Change in Number of Bags Consumed</u></b>				
7 LWPB	--	-3,035	-1,358	-3,035
8 Paper	--	263	-588	263
9 HWPB	--	1,204	116	287
10 Reusable Stitched	--	<u>1</u>	<u>5</u>	<u>6</u>
11 <b>Total (millions)</b>	--	<b>-1,567</b>	<b>-1,825</b>	<b>-2,480</b>
12 Change in Bag Costs (millions)	--	\$72	-\$82	\$14
13 Per Capita Consumer Cost	\$21.30	\$26.90	\$14.90	\$22.40
14 LWPB Units of Demand (millions)	5,719	5,719	5,719	5,719
15 Avg Consumer Cost Per Unit (cents)	4.8	6.0	3.3	5.0
16 Actual Retailer Bags Supplied	4,578	3,010	2,748	2,093
17 Avg Retailer Cost Per Unit (cents)	5.6	10.5	5.8	11.6
18 Total Fee Revenues (millions)	--	--	\$275	\$209

**Scenario 2 (fee)** reduces annual spending on bags by \$82 million to \$14.90 per capita. Both LWPB and paper bag demand falls, while HWPB and reusable stitched bags increase. The total number of retail bags demanded falls by 1.8 billion, a 40 percent reduction. The fee results in the most efficient outcome because it motivates consumers unwilling to pay the fee to reduce their bag consumption, but retailers are not forced to wholly abandon their lowest cost option. In this scenario, the average consumer cost per unit of LWPB demand is 3.3 cents, compared to 4.8 cents in the baseline scenario, and 1.2 billion units of LWPB-equivalent demand is met by consumers bringing their own bag or using no bag. From the retailer's perspective, average costs to supply bags is 5.8 cents. As noted, any fee revenues that might be retained to offset retailer costs unrelated to bags are excluded from these computations.

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due to the ban. This group could also include consumers who purchase one or two items and retailers no longer voluntarily offer them a bag.



**Scenario 3 (ban-plus-fee)** increases annual spending on bags by \$14 million to \$22.40 per capita. The number of retail bags demanded falls by 2.5 billion, a reduction of 54 percent. The average consumer cost to meet 5.7 billion units of LWPB demand is 5.0 cents per unit. The average cost increases relative to the baseline scenario (4.8 cents) even though the number of LWPBs demanded falls by 3.0 billion. This result occurs because consumers bear the cost of switching to the much more expensive HWPB and paper bag alternatives. From the retailer's perspective, the average cost to supply bags provided increases to 11.6 cents.

## Impact on Employment and Earnings

**Table 6.2** details the net economic impact of each policy option on statewide employment and labor earnings. Critical assumptions include: (1) 40 to 50 percent of disposable plastic bags (including trash bin liners) used by vendors (or purchased by consumers) is produced in state, (2) 20 percent of paper bags is produced in state, (3) retailers retain 10 percent of any fee revenues they collect as net profits (i.e., they do not return all net bag savings to consumers) and (4) no reusable stitched bags are produced in state. In general, the net economic impact will be driven by (1) whether consumers spend more or less on bags, (2) the composition of retail bag demand in the baseline scenario versus the policy scenario and (3) the amount of redirected spending that remains in state (e.g., most new spending on paper bags flows out of state).

**Table 6.2 - Net Economic Impacts**

	Change from Baseline		
	Ban	Fee	Ban + Fee
Spending on Other Goods and Services	-\$69	\$50	-\$34
Flows to In-State Bag Manufacturers	\$14	-\$24	-\$12
Employment (Full-Time Equivalent)	-507	260	-363
Labor Earnings	-\$22	\$10	-\$17

Notes: Dollar in millions. The change in employment includes manufacturing sector (direct effects) and other jobs throughout the state economy (indirect and induced effects). Data for supply chain networks and spending that remains in state were informed by the IMPLAN input-output model. Earnings include wages and salaries, employer contributions to pension and healthcare plans, and income of sole proprietors, independent contractors and partners.

This analysis considers the direct impacts of the policy to Pennsylvania manufacturers, as well as indirect and induced economic impacts. Indirect impacts are changes in demand for industries that supply inputs to the directly-impacted industry and induced impacts are changes in household spending from workers in the directly-affected industry. The net changes to earnings and employment are calculated using Pennsylvania-specific multipliers published by the Regional Input-Output Modeling Systems II (RIMS II) from the U.S. Bureau of Economic Analysis and confirmed based on simulations from the IMPLAN input-output model.

The top line of Table 6.2 shows the total change in consumer spending on other goods and services caused by changes in spending on retail bags, trash bin liners and any fee revenues retained by retailers. Consumers spend more on retail bags under the ban and ban-plus-fee scenarios, but less under the fee scenario, largely because retailers can still use their lowest cost option (LWPBs). That change in household spending

changes spending on other goods and services on a dollar for dollar basis, and the model uses standard economic multipliers to determine employment and earnings impacts.

The second line shows the estimated impact on demand for Pennsylvania manufacturers. In all scenarios, one-half or less of the change in consumer spending flows back to a manufacturer because production data suggest that most bags are imported. This is especially true for paper bags. Moreover, HWPBs require significantly more raw materials, and most of those inputs are currently imported. Having determined the amounts that remain in state and the share of manufacturer inputs that are locally sourced, the model then applies standard economic multipliers to determine employment and earnings impacts.

### Scenario 1 (Ban)

A ban on LWPBs eliminates spending on LWPBs, but that is more than offset by new spending on HWPBs and trash bin liners. The analysis assumes there is one-year of lead time for in-state plastic bag manufacturers to shift from LWPB to HWPB production. Under the ban scenario, demand for HWPBs increases by 520 percent, and it is unclear whether plastic bag manufacturers could scale up to meet new demand. The analysis assumes they can do so, but if they could not then more bags would be imported from out-of-state. The analysis also assumes that 40 percent of trash bin liner production is from in-state manufacturers. Under this scenario, final demand for in-state manufacturers increases, but much of the spending is attributable to the higher costs of raw materials needed to produce HWPBs, and those materials are largely imported. Consumers spend more on retail bags and trash bin liners and \$69 million less on other goods. Because much of the redirected consumer spending flows out of the state, the net impact is an employment reduction of 507 jobs and \$22 million in earnings.<sup>72</sup> The net tax revenue impact for the state could range from -\$1 to -\$2 million.

### Scenario 2 (Fee)

A fee option reduces total consumer spending on retail bags (\$50 million) and frees up resources that can be spent on other goods. Lower demand for retail bags reduces the monies flowing to in-state manufacturers by -\$24 million leading to job losses in this sector. Overall employment levels increase by 260 and earnings by \$10 million. The gains are attributable to the significant reduction in consumption of disposable bags, consumer savings from using own bags, and a much lower average cost of bags used per unit of demand. Moreover, a much larger share of consumer spending on non-bag items remains in the state compared to the (implicit) consumer spending on retail bags. As noted, these estimates assume that retailers retain 10 percent of fee revenues. The net tax revenue impact for the state could range from \$1 to \$2 million.

The analysis finds that the fee option is the most efficient option because consumers are motivated to adjust their bag consumption, but not forced to switch to more expensive alternatives. The fee option also allows retailers to continue to meet significant demand with LWPBs, the lowest cost option. However, the economic impact of the fee hinges on the recipient of fee revenues and how they are used, which is discussed later in this section.

### Scenario 3 (Ban-Plus-Fee)

A ban-plus-fee option requires consumers to purchase more expensive alternative bag types, but response to the bag fee leads to reduced demand for retail bags. Total consumer spending on retail bags (including

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<sup>72</sup> Earnings include wages and salaries, income of sole proprietors, independent contractors and partnerships, and supplements to wages and salaries such as employer contributions to healthcare and pension plans.

trash bin liners) increases by \$34 million, but roughly one-third of this demand flows to an in-state manufacturer (\$12 million). Part of that result is attributable to the fact that paper bags (which are mostly imported) are used by retailers much more intensively than the baseline scenario. That outcome is reflected in Table 6.1 as it shows the average cost to retailers to provide bags is the highest of the three options and much higher than the baseline scenario. Based on these flows, the analysis finds an employment reduction of 363 jobs and \$17 million reduced earnings. Lower earnings could reduce state tax revenues by roughly \$1 to \$2 million.

## Treatment of Fee Revenues

This section concludes by relaxing two simplifying assumptions that were made in this analysis.

**Assumption 1:** Retailers pass all net bag costs and savings forward to consumers through final prices.

This assumption facilitates the comparison of impacts on consumers across each policy scenario by allowing changes in retailer input costs to fully flow through to final prices and total consumer spending (as displayed in Table 6.1). In practice, retailers may absorb some portion of the higher alternative bag costs to avoid raising prices under Scenario 1 (ban), or retain some portion of fees to generate “profits” from the provision of retail bags in Scenarios 2 (fee) and 3 (ban-plus-fee). For the economic impact only, the analysis did allow retailers to retain 10 percent of fee revenues as net profits, which has a commensurate impact on consumer spending. The net economic impact of this tradeoff (i.e., firm profits versus consumer prices) is very difficult to quantify because large multistate retailers comprise a significant share of total retail bag demand. It is unclear whether a relatively modest change in their profit margin would be reinvested locally or would flow out of state.

**Assumption 2:** Government entities do not receive any portion of the fees.

The fee beneficiary is a policy decision in the two fee scenarios that can alter net economic impacts. If retailers remit fees to a government entity, the fee is essentially a new tax on certain consumers that choose to use bags at checkout (at least \$21.50 per capita under the fee scenario). This outcome would reduce consumer spending by the amount of fee revenues, and any net economic benefits would depend on the type of programs for which the fee monies are used. The fee would reduce total consumer spending on groceries, clothing, leisure activities and other discretionary items, but government entities could use those revenues for environmental programs or even general spending on education or healthcare programs. The net economic impact to the state would depend on how the relevant multipliers for consumer spending compare to government spending.

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## Section 7: Local and State Government

For this section, the analysis discusses or quantifies potential fiscal impacts to local and state governments from regulations at the statewide level. While Act 20 of 2019 requires the IFO to “evaluate the economic impact to the Commonwealth” from any regulation that impacts single-use plastics, this analysis also includes fiscal impacts and litter impacts because both may have indirect economic consequences. For example, litter reduction could reduce urban blight and improve property values. Local and state government agencies could realize savings (or incur costs) due to new regulations. Municipal savings could free up resources to be used for other purposes that could stimulate local economies. Therefore, the analysis uses a broad perspective in regards to the potential impact of regulations on local and state governments.

In Pennsylvania, local governments have primary responsibility to address litter abatement and prevention, waste management and recycling. The three policy scenarios would have direct fiscal impacts due to changes in litter pick-up and waste disposal and indirect impacts on recycling costs. Although the analysis assumes that regulatory policies are implemented statewide, the policies could be adopted at the state or municipal level.

The three sub-sections that follow (1) discuss the local litter abatement process, (2) estimate the local costs from disposal of plastic bags and (3) estimate changes in local costs from policy options. **Table 7.1** displays the estimated impact on municipal costs related to litter and waste (**tipping fees**). The three scenarios reduce litter abatement costs because all three scenarios reduce plastic bag consumption. Scenarios 1 (ban) and 3 (ban-plus-fee) increase tipping fees because the ban increases the use of alternative bags (HWPBs and paper bags), which are significantly heavier than LWPBs, and tipping fees are paid based on weight. Although there is a significant reduction in LWPBs disposed in those scenarios, the increase in weight associated with the alternative bags has a greater impact on tipping fees. Scenario 2 (fee) reduces tipping fees due to the associated reduction in paper and plastic bags. In addition to the cost impacts presented in Table 7.1, municipal recycling costs could also be reduced due to the reduction in LWPBs that improperly enter the recycling stream.

**Table 7.1 - Impact on Municipal Costs**

	Ban	Fee	Ban + Fee
Litter Abatement	-\$5,400	-\$4,900	-\$7,200
Waste (Tipping Fees)	<u>900</u>	<u>-1,600</u>	<u>100</u>
<b>Total</b>	<b>-4,500</b>	<b>-6,500</b>	<b>-7,100</b>

Note: Dollars in thousands.

At the state level, the fiscal impact from litter abatement, recycling and disposal would be relatively minor. The Pennsylvania Department of Transportation (PennDOT) spends approximately \$13 million annually on roadside litter abatement, which could be reduced as a result of regulations on plastic bags. Also, any change in tipping fees paid by municipalities would also change funds received by the Department of Environmental Protection (DEP) that are disbursed to support local recycling and waste programs.

## Litter Abatement

Most programs to prevent and reduce litter are administered by municipalities. A FY 2018-19 study commissioned by Keep Pennsylvania Beautiful (KPAB) found that the nine largest cities in Pennsylvania spent a total of \$47 million on litter abatement.<sup>73</sup> Based on population estimates of the nine cities, the total per capita spending on litter abatement (pick-up) was \$19. The nine cities represent 20 percent of the statewide population. In order to estimate litter abatement expenditures for the rest of the state, the IFO conducted a survey that requested litter abatement expenditures from a sample of medium and smaller-sized municipalities. These municipalities reported minimal expenditures on litter abatement, and some noted that if any abatement took place, it was handled by volunteer groups and other residents. Based on the results of this survey, the IFO estimates that the nine cities included in the KPAB study account for 80 percent of statewide municipal litter abatement expenditures. Therefore, the analysis estimates that statewide municipal expenditures for litter abatement are approximately \$58 million (see **Table 7.2**).

**Table 7.2 - Local Litter Abatement Expenditures in Pennsylvania**

Region	Population	Litter Abatement Expenditures	Plastic Bag Share	Plastic Bag Litter Costs
Philadelphia	1,584	\$36.31	15%	\$5.45
Pittsburgh	301	2.71	15	0.41
Allentown	121	2.19	15	0.33
Reading	88	1.44	15	0.22
Lancaster	59	1.39	15	0.21
Harrisburg	49	1.24	15	0.19
Erie	96	1.00	15	0.15
Altoona	44	0.26	15	0.04
Scranton	77	0.14	15	0.02
Remainder of PA	<u>10,381</u>	<u>11.67</u>	<u>10</u>	<u>1.17</u>
<b>Statewide</b>	<b>12,802</b>	<b>58.36</b>	<b>14</b>	<b>8.17</b>

Note: Population in thousands. Expenditures in millions.

Sources: Pennsylvania Litter Research Study, IFO survey of municipalities.

While a separate KPAB survey of litter composition found that plastic bags comprise less than 0.5 percent of roadway litter pieces, the composition of litter on roadways likely differs significantly from litter composition in more urban areas such as cities and commercial corridor regions.<sup>74</sup> For example:

- Philadelphia conducted a litter index study for 2018 that found plastic bags were the fifth-most common form of litter in the city.<sup>75</sup> Specifically, plastic bags were found at approximately 13 percent of sites surveyed in Philadelphia. This result suggests that the plastic bag share of litter in cities is notably higher than 0.5 percent of pieces of litter found on roadways.

<sup>73</sup> Burns and McDonnell, "The Cost of Litter & Illegal Dumping in Pennsylvania: A Study of Nine Cities Across the Commonwealth," Keep Pennsylvania Beautiful (2020).

<sup>74</sup> Burns and McDonnell, "Pennsylvania Litter Research Study," Keep Pennsylvania Beautiful (2020).

<sup>75</sup> "2019 Litter Index Report," City of Philadelphia Zero Waste and Litter Cabinet (2019).

- A neighborhood litter survey in San Jose, California found that 5.1 percent of litter found was single-use plastic bags.<sup>76</sup> The survey also found that 8.2 percent of total creek and river litter was single-use plastic bags.
- For Pennsylvania, several responses to the targeted IFO survey of municipalities suggest that the (perceived) plastic bag share of litter in those with litter abatement programs is significantly higher than 0.5 percent of roadway litter.

Based on these data, the analysis assumes that plastic bags comprise 15 percent of litter in the nine cities shown in Table 7.2. For other municipalities, it is assumed that 10 percent of litter is comprised of plastic bags. These assumptions imply plastic bag-related municipal litter abatement expenditures of \$8.2 million.<sup>77</sup> All three policy scenarios would reduce bag litter, but the impact of litter reduction would likely materialize as efficiency gains or cost avoidance, as opposed to actual cost savings. The potential reduction in litter abatement costs for municipalities resulting from each policy scenario is as follows: \$5.4 million (ban), \$4.9 million (fee) and \$7.2 million (ban-plus-fee).<sup>78</sup>

In addition to municipal litter abatement programs, PennDOT annually spends \$13 million on the clean-up of litter along the state's roadways.<sup>79</sup> The litter study by KPAB found that there were approximately 502.5 million pieces of roadside litter across the state. As shown in the report, plastics (which includes plastic food wrappers, bottles and more) comprise nearly one-third (30.4 percent) of the estimated litter on roadways. Because plastic bags constitute a small share of plastic litter overall, it is estimated that less than 0.5 percent of the pieces of statewide roadside litter are the types of plastic bags (LWPBs and HWPBs) that would be impacted by these regulations. Given the minimal share of roadside litter that these items represent, PennDOT litter abatement cost savings resulting from each scenario would not be material.

Beyond these potential impacts, other litter externalities could also be affected by regulations. Specifically, highly visible litter might have a negative impact on property values and business attraction and retention. The Pennsylvania Litter Research Study by KPAB provides insight into perceptions of plastic bag litter. The study conducted a survey of state residents to gauge the public attitude toward litter. One of the questions asked was, "Based on your observation, what is the main type of litter in Pennsylvania?" Of the 482 survey respondents, 16.2 percent said that "plastic bags such as grocery bags or garbage bags" was the main type of litter. The only group of materials that respondents indicated was more prevalent were "fast food packaging such as cups, wrappers and bags." Therefore, survey respondents perceived plastic bags to be the second-most prevalent type of litter, while the Philadelphia Litter Index found they are actually the fifth-most common form of litter. This discrepancy illustrates the high visibility of plastic bag litter and the perception of its relative importance.

## Waste Management

The vast majority of plastic products are disposed in landfills or combusted in a resource recovery facility. According to data from the U.S. Environmental Protection Agency (EPA), 75.8 percent of plastic municipal waste generated by weight is landfilled, 15.8 percent is combusted (waste-to-energy) and 8.4 percent is

<sup>76</sup> Kerrie Romanow, "Bring Your Own Bag Ordinance Implementation Results and Actions to Reduce EPS Foam Food Ware," City of San Jose (2012).

<sup>77</sup> The estimate assumes a proportional relation between litter composition and litter abatement costs.

<sup>78</sup> The impact in each scenario is estimated by calculating the net change in litter of the three major bag types affected by the regulations: LWPBs, HWPBs and paper bags. All three scenarios assume a decrease in LWPB litter and an increase in HWPB litter. Scenarios 1 and 3 assume an increase in paper bag litter, while Scenario 2 assumes a decrease in paper bag litter.

<sup>79</sup> "Enforcing Litter Laws," Pennsylvania Department of Transportation (2020).

recycled.<sup>80</sup> These shares refer to all plastic products, not just plastic bags. Other EPA data regarding materials in the waste stream reveal that just 6.1 percent of light-weight plastic “bags, sacks and wraps” were recycled.<sup>81</sup> Therefore, it is assumed that the vast majority of plastic bags are not recycled and are instead landfilled or combusted for resource recovery.

In 2019, 15.5 million tons of in-state solid waste were disposed in Pennsylvania’s landfills and resource recovery centers. Of that amount, 9.3 million tons (60 percent) were from municipal sources, which include residential, commercial and institutional establishments. The Commonwealth currently requires municipal waste haulers to pay tipping fees on municipal waste and certain types of residual waste disposed at landfills and recovery facilities. Current fees include four parts: (1) \$4 per ton Disposal Fee (Act 90 of 2002), (2) \$2 per ton Recycling Fee (Act 101 of 1988), (3) \$1 per ton Local Host Fee and (4) \$0.25 per ton Environmental Stewardship Fee (Act 68 of 1999).

Both the \$4 per ton Disposal Fee and the \$0.25 per ton Environmental Stewardship Fee support the Environmental Stewardship Fund (ESF). The \$2 per ton Recycling Fee supports municipal recycling programs via the Recycling Fund (RF). The \$1 per ton Local Host Fee on waste managed at municipal landfills goes to the host municipality. In 2019, total tipping fees paid for in-state **municipal solid waste** (MSW) were \$43.4 million. **Table 7.3** displays the amount of in-state waste (total and MSW) disposed statewide over the last 5 years, the average tipping fee paid per ton and tipping fees paid for MSW.

**Table 7.3 - In-State Waste Disposed and Fees Paid**

Calendar Year	2015	2016	2017	2018	2019
Total waste (million tons)	14.31	13.90	14.85	15.45	15.54
Municipal solid waste (million tons)	8.62	8.71	8.85	9.29	9.34
Per ton tipping fee <sup>1</sup>	\$4.47	\$4.56	\$4.53	\$4.54	\$4.64
In-state MSW fees (\$ millions)	\$38.6	\$39.7	\$40.0	\$42.2	\$43.4

1 The average total fees paid per ton of MSW by landfills and resource recovery facilities after accounting for discounts and exemptions.

Source: Waste and tipping fee amounts were provided by the Pennsylvania Department of Environmental Protection.

The tonnage of total waste that is comprised of plastic bags must be estimated in order to evaluate the impact on waste disposal and fees from the three policy scenarios. A 2003 Waste Characterization Study in Pennsylvania determined that 5.0 percent of statewide MSW is **film plastics**. In that study, film plastics is defined as “[a]ny film plastic including garbage bags, retail bags, cereal bags, sheet plastic, shrink wrap, tarping, and other non-rigid plastic.”<sup>82, 83</sup> This definition suggests the share of waste that is plastic bags by weight is significantly less than 5.0 percent. EPA data for 2010 show that plastic “bags and sacks” accounted for 0.4 percent of nationwide MSW.<sup>84</sup> Finally, a 2017 Waste Characterization Study performed by the New

<sup>80</sup> “Plastics: Material Specific Data,” U.S. Environmental Protection Agency (2019).

<sup>81</sup> “Characterization of Municipal Solid Waste by Weight,” U.S. Environmental Protection Agency (2009). This group of materials includes other forms of plastic film, not just plastic bags.

<sup>82</sup> An updated Waste Characterization Study for Pennsylvania is expected to be released within the next year.

<sup>83</sup> “Statewide Waste Composition Study,” Pennsylvania Department of Environmental Protection (2003).

<sup>84</sup> “Advancing Sustainable Materials Management: 2016 and 2017 Tables and Figures,” U.S. Environmental Protection Agency (2019).



York City Department of Sanitation found that 1.9 percent of the city's MSW was "plastic shopping bags."<sup>85</sup> Based on these findings, this analysis assumes that 1.0 percent of MSW tonnage in Pennsylvania is plastic bags as an upper bound.

The estimated change in Pennsylvania MSW tipping fees associated with each scenario are as follows: \$0.9 million (ban), -\$1.6 million (fee) and \$0.1 million (ban-plus-fee).<sup>86</sup> The ban increases tipping fees, as consumers would respond by switching to paper and HWPBs, both of which are significantly heavier than the typical LWPB and heavier bags would increase those fees. The fee reduces statewide tipping fees, largely due to a reduction in paper bags disposed. The ban-plus-fee increases tipping fees, albeit less than the ban, due to a smaller increase in HWPB use.

## Recycling

Recycling programs in Pennsylvania are managed by local governments. Among the 2,568 municipalities in Pennsylvania, 440 have mandated curbside recycling, 617 have voluntary curbside recycling and 873 have access to a drop-off location only. Overall, approximately 79 percent of state residents have access to curbside recycling and 94 percent (1,930 municipalities) have access to some form of recycling program.<sup>87</sup> Local recycling programs receive funding from the \$2 per ton recycling fee on all materials (except ash) disposed or collected in Pennsylvania landfills or resource recovery facilities. These fees are then disbursed to municipalities through grants administered by DEP.

Recycled materials are sent to **Material Recovery Facilities** (MRFs) located throughout the state. These facilities sort and separate the materials, and prepare them for marketing to end-use manufacturers. A common form of recycling is known as "single-stream" or "commingled" recycling. Single-stream is a system in which all paper fibers, plastics, metals and other containers are mixed upon collection rather than being sorted by the depositor. Not all MRF facilities are equipped to process single-stream materials. There are 74 MRFs in Pennsylvania, and 32 of them currently accept single-stream or commingled recycling.<sup>88</sup>

Research and conversations with stakeholders indicate that film plastics and film plastic bags (LWPBs and HWPBs) are significant problems for MRFs because when film plastic bags are recycled with single-stream and/or commingled materials, they get caught in sorting machines. As a result, MRF employees must devote time and resources to suspend operations and manually remove these materials. Furthermore, film plastics and film plastic bags that are sent to single-stream MRFs are often just disposed in the facilities' garbage once they are manually removed from the machines, due to the lack of a market for these materials. Input from single-stream MRF operators across Pennsylvania suggest that an average facility's expenditures to address these issues equates to \$10.50 per ton of all materials processed in the facility, or up to \$500,000 per year for a mid-sized MRF. These costs include sortation labor, downtime, parts retooling, parts replacement and material disposal costs where the film plastic is rendered unrecoverable. Assuming that \$10.50 per ton can be used as average expenditure for all single-stream and commingled recycled materials statewide, the cost of MRF downtime due to film plastics is estimated at up to \$12 million per year.<sup>89</sup> This

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<sup>85</sup> "NYC Residential, School, and NYCHA Waste Characterization Study," New York City Department of Sanitation (2018).

<sup>86</sup> Tipping fee changes were calculated using the following weights: LWPB (6 grams), HWPB (36 grams), Paper Bag (54 grams). Bag weights according to "Life Cycle Assessment of Grocery Bags in Common Use in the United States," Clemson University (2014).

<sup>87</sup> "Recycling in Pennsylvania," Pennsylvania Department of Environmental Protection (2020).

<sup>88</sup> "Material Recovery Facilities in Pennsylvania," Department of Environmental Protection (2017).

<sup>89</sup> Information supplied by Pennsylvania Recycling Markets Center through conversations with several MRFs across Pennsylvania.

estimate is based on statewide recycling tonnage data provided by DEP and the input provided by MRF operators. It is noted that, the estimated \$12 million cost to MRFs includes downtime resulting from all recycled film plastics, of which plastic bags comprise an unknown share. If the industry is competitive, then most of the cost savings from the reduction of plastic bags would be passed forward to customers (privately-owned) or taxpayers (publicly-owned).

## Section 8: Extension to Polystyrene Foam

Act 20 of 2019 does not restrict the analysis to the economic impact from regulation of retail plastic bags but instead uses an open-ended definition of single-use plastics. This definition could include a number of goods including plastic straws, plastic utensils and expanded polystyrene foam (EPS) products. The IFO looked to other states to assess which policies had been enacted and the regions impacted. **Table 8.1** shows that six states have recently enacted regulations: three banned plastic straws (except upon request or for disabled individuals) and four banned EPS foam food containers.

**Table 8.1 - State Regulatory Policies for Other Single-Use Plastics**

State	Year Effective	Items Banned
California	2019	Plastic Straws
Maryland	2020	Expanded Polystyrene Food Containers
Oregon	2020	Plastic Straws
Vermont	2020	Plastic Straws & Stirrers; Expanded Polystyrene Food Containers
Maine	2021	Expanded Polystyrene Food Containers
New York	2022	Expanded Polystyrene Food Containers

In conversations with industry and environmental groups, the expansion of regulations to reduce the use of EPS foam food containers was the most pressing topic. Additionally, four of the states that enacted an EPS foam product ban are in the Northeast or Mid-Atlantic region and two other states in those regions (Connecticut and New Jersey) had EPS foam legislation passed out of at least one legislative chamber. In the Commonwealth, House Bill 627 and Senate Bill 803 were introduced in 2019 that would prohibit the use of foam and solid polystyrene foodservice products in Pennsylvania.

Given these recent policies, this section considers a single scenario in which EPS foam foodservice products are banned. These items generally include cups, trays, plates, bowls and clamshell containers. In their stead, retailers and other foodservice providers would be obligated to switch to products made from alternative materials. Medical, construction and transportation foam products would be excluded from the ban, as well as food packaging items used in non-prepared food service, including foam egg cartons and meat trays. The subsections that follow examine the effects on stakeholders (retailers, consumers, manufacturers, state and local governments, and non-profit entities).

### Pennsylvania Demand for EPS Foodservice Products

In order to assess the general economic and fiscal implications from a ban, demand for EPS products in the Commonwealth must be established. The IFO reviewed research published by mb Public Affairs, Inc. related to the possible implementation of similar policies in Maryland (2017) and Connecticut (2019) to inform EPS consumption estimates for Pennsylvania.<sup>90,91</sup> Results from the Connecticut report were used because it is more recent. Researchers used national market data from the Freedonia Group (2017) to estimate EPS foam purchases for Connecticut at \$46.5 million in 2017. This analysis assumes the same per

<sup>90</sup> Michael Kahoe, "Fiscal Impacts of Prohibiting Expanded Polystyrene Food Service Products in Maryland," (2017).

<sup>91</sup> Michael Kahoe, "Fiscal Impacts, Proposed Connecticut Ban on Polystyrene Foam Food Service Products," (2019).

capita spending for Pennsylvania and, adjusted for inflation, that results in **\$184.1 million** (\$14.38 per capita) of projected EPS foam purchases in 2020. This value will be used later in this section to estimate expenditures that shift to alternative industries and the estimated economic impact to the Commonwealth.

### Disposable Foodservice Product Material Profiles

With the implementation of a ban, stakeholders would be required to purchase alternative products made of various materials. Product materials affect vendor costs, the entire supply chain (i.e., raw materials, manufacturing and wholesaler) and product performance. The bullets that follow provide brief descriptions of EPS foam and the materials that are viable alternatives.

- **Expanded Polystyrene (EPS) Foam:** This product is commonly known under the trademarked brand “Styrofoam.” EPS foam food products are sturdier and more heat-resistant than paper and plastic alternatives, and do not lose their shape when holding hot beverages or food products. It is a light-weight, sturdy product that can be stacked and stored easily.
- **Other Plastics:** Like foam products, products in this category are made from plastics but are not put through an expansion process and have a more defined structure so that they are often referred to as “rigid.” Other plastic products do not insulate as effectively as EPS products, leading to decreased heat retention and performance.
- **Paper:** Both paper fiber and paperboard products are included in this category. An alternative to foam and plastic, paper is often marketed as more eco-friendly. Much like paper bags, many paper foodservice products on the market are made from recycled materials. Some paper products, especially cups, can come with an interior lined with plastic (also known as poly-lined) in order to increase heat resistance and rely less on double-cupping. For this report, the paper category also contains products made from plant fibers that are not considered compostable.
- **Compostable:** These products are made from a variety of plastic and paper materials that will biodegrade at a faster rate than traditional plastic and paper products. Compostable products cost more on average than foam containers and have inferior steam control, leading to a potential loss in food quality. To ensure proper composting, they must be delivered to a commercial composting site. Products in the U.S. are certified by the Biodegradable Products Institute which tests all materials of which the product is composed.
- **Aluminum:** This product line is smaller because these products are generally limited in availability to one- or two-piece containers, and not as plates, classic trays or cups. While aluminum can be used for oven-safe cooking, it is not microwavable and lacks exterior insulation. Additionally, sharp edges on the products makes it more problematic to use as a typical carry container.

Overall, alternative products have reduced performance and higher prices when compared to EPS foam. For this reason, EPS disposable foodservice containers are the most commonly used products by vendors in the foodservice industry. If EPS products were banned, vendors must switch to other materials because the foodservice product requires some form of temporary storage unit. A study by Keybridge Research (2009) obtained data from a **disposable foodservice product** manufacturer to estimate retailer’s potential demand for alternative materials and products under an EPS foam ban.<sup>92</sup> **Table 8.2** displays the distribution across alternatives and the analysis uses that distribution to inform vendor response.

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<sup>92</sup> Robert Wescott, et al., “Quantifying the Potential Economic Impacts of a Ban on Polystyrene Foam Foodservice Products in California,” (2009).

**Table 8.2 - Projected Demand Distribution for Alternative Materials**

Product Category	Other Plastics	Paper/Fiber	Compostables	Aluminum
Cups	20%	70%	10%	0%
Plates/Bowls	10	80	10	0
Clam Shells	30	60	10	0
Trays	0	60	40	0
Other	40	40	10	10

Source: Robert Wescott, et al., "Quantifying the Potential Economic Impacts of a Ban on Polystyrene Foam Foodservice Products in California," Keybridge Research LLC, p. 10 (2009).

### Price Comparisons for Alternative Products

If a ban eliminated the demand for all EPS foam foodservice products in Pennsylvania, the switch to alternatives would result in higher costs for all parties. In order to establish prices for alternative products, the IFO used data from the two state studies published by mb Public Affairs, Inc. In those reports, the firm used national procurement data (including from the Pennsylvania Department of General Services (DGS)) to establish cost estimates for polystyrene foam products and their projected replacements. For this report, DGS FY 2018-19 procurement data are used as a basis to create a use-profile for the Commonwealth and current price data for foam products from disposable foodservice contracts are used as the basis for EPS foam product costs for stakeholders in the Commonwealth.<sup>93</sup> Price data from the Connecticut report are used to inform the average cost of alternative products. This methodology should result in a lower-bound cost estimate for an EPS foam ban because the state uses its size to leverage lower-than-average price points.

**Table 8.3** displays the current and lowest alternative prices for all foam foodservice products currently procured by the state. The data suggest a weighted average price increase of 86 percent across all products. It is noted that price points are only shown for products found in the foodservice contracts, and the analysis did not consider products not currently procured by the Commonwealth.

<sup>93</sup> Pennsylvania Department of General Services contracts #4400015922 and #4400015923 (Food Service Items).

**Table 8.3 - Projected Pricing Change (in Cents) for EPS Foodservice Products**

Product	Current Unit Price	Lowest Alt. Unit Price	Price Change (%)
<b><u>Trays, Plates, &amp; Bowls</u></b>			
3 Compartment Clamshell	6.9	20.1	193%
5 Compartment Disposable Tray	3.5	7.7	121
6 Compartment Disposable Tray	4.4	12.7	185
No Compartment Plate (6") <sup>1</sup>	1.1	2.1	98
No Compartment Plate (9")	2.0	5.3	161
3 Compartment Plate (9")	2.1	5.3	154
Bowl (5-6 oz.) <sup>2</sup>	1.2	2.4	100
Bowl (8 oz.) <sup>2</sup>	3.7	2.4	-34
Bowl (10-12 oz.)	1.5	2.4	60
<b><u>Cups</u></b>			
Cup (6 oz.) <sup>3</sup>	1.8	2.1	15%
Cup (8 oz.)	2.0	2.1	2
Cup (10 oz.) <sup>4</sup>	2.7	3.2	19
Cup (12 oz.)	2.9	3.2	10
Cup (16 oz.)	4.2	4.3	2
Cup, Med. Squat (16 oz.)	5.2	4.3	-17
<b>Average Increase</b>			<b>86</b>

1 No data for 6" plate; 7" plate price point used.

2 No data for 5-6 or 8 oz. bowls; 12 oz. bowl price point used.

3 No data for 6 oz. cup; 8 oz. cup price point used.

4 No data for 10 oz. cup; 12 oz. cup price point used.

Source: Lowest-cost alternative data from mb Public Affairs, "Fiscal Impacts, Proposed Connecticut Ban on Polystyrene Foam Food Service Products," adjusted by the U.S. Bureau of Labor Statistics Producer Price Index (2017-2019). Products and current unit costs are from Department of General Services contracts for disposable foodservice products.

## Impacts on Vendors and Consumers

Based on the Connecticut report, the private sector comprises 75 percent of demand for EPS foam products. The other 25 percent is purchased by governments, non-profits, and other non-commercial entities. For 2019, a 75 percent share implies that \$138.1 million in EPS foam products were purchased by the private sector in Pennsylvania. If an average price increase of 86 percent is applied, then private sector costs would increase by \$118.8 million due to the switch to alternative products. Cost increases would be greatest for limited-service restaurants due to their heavy use of disposable foodservice products. Full-service restaurants, specialty grocery stores (e.g., bakeries) and convenience stores would also be impacted.

Because of the highly competitive environment and relatively small profit margins of the affected industries, the analysis assumes that vendors pass all higher input costs forward to final consumers. To provide context, the value of total output or final purchases (i.e., gross domestic product for that industry) for the Pennsylvania foodservices and drinking sector was approximately \$14.7 billion for 2019. If higher costs were completely passed forward to consumers, final prices would increase by 0.8 percent. For state tax revenues, the main impact is through sales tax to final consumers. If prepared foodservice prices increased by \$118.8 million, then the state would collect an additional \$7.1 million in sales tax, bringing the total consumer burden to \$126.0 million. However, the sales tax gain would be partially offset because consumers would reduce spending on other goods and services, some of which are also subject to sales tax.

## Impact on Manufacturers

The stakeholder group most impacted by an EPS ban would be manufacturers. In 2019, the polystyrene foam manufacturing industry employed 2,653 workers in Pennsylvania, according to the U.S. Bureau of Labor Statistics. While all of those positions are not be related to EPS foodservice products (some could produce construction, packaging or other EPS products), EPS foodservice manufacturers do have a significant presence in the state. Pennsylvania is generally recognized as a regional supplier for Mid-Atlantic and Northeast states.

To calculate the net economic impact on the Commonwealth, the analysis must establish total spending on alternative products. **Table 8.4** uses the assumptions from Table 8.2, along with the projected 86 percent price increase to the initial \$184.1 million to compute higher spending for affected industries.

	Estimated	Industries			
	Value	Other Plastics	Paper/Fiber	Compostables	Aluminum
Cups	\$94.1	\$18.8	\$65.8	\$9.4	\$0.0
Plates/Bowls	25.3	2.5	20.2	2.5	0.0
Clam Shells	184.4	55.3	110.6	18.4	0.0
Trays	37.1	0.0	22.3	14.8	0.0
Other	<u>1.7</u>	<u>0.7</u>	<u>0.7</u>	<u>0.2</u>	<u>0.2</u>
<b>Total</b>	<b>342.6</b>	<b>77.3</b>	<b>219.7</b>	<b>45.4</b>	<b>0.2</b>

Note: Dollar figures in millions.

The computations in Table 8.4 represent total spending on alternative products, which may or may not be produced in Pennsylvania. Through conversations with EPS industry representatives and review of Pennsylvania industry activity data from the IMPLAN input-output model and the 2012 U.S. Economic Census, a significant amount of spending on alternative products would flow out of the state. Specifically, paper, compostable and aluminum products are generally produced outside the state, and most of the \$265.3 million in increased spending for those products would not ultimately be produced by Pennsylvania manufacturers. Alternative plastics products have a greater manufacturing presence in the state (although less than EPS foam manufacturers) and more of that increased spending (\$77.3 million) would remain in the state.

## Net Economic Impact

A ban on EPS foam foodservice products will impact consumers, retailers, manufacturers and other firms in the supply chain. The net economic impact is driven by the \$159 million higher consumer costs due to more expensive alternative products and the reduced demand for EPS foam foodservice products. Using the RIMS II multipliers from the Bureau of Economic Analysis and the IMPLAN input-output simulation model, the analysis finds these impacts:

- A reduction of approximately **1,800 net jobs** in the EPS manufacturing sector (direct effects) and throughout the state economy (indirect and induced effects).
- A **labor earnings reduction of \$76 million**. Earnings include wages and salaries, employer provided healthcare and pension benefits and income of sole proprietors, independent contractors and partners.

## Impacts on Governments and Non-Profits

The non-commercial sector accounts for an estimated 25 percent (\$46 million) of the current demand for foam foodservice products within the Commonwealth. This sector includes state and local governments, non-profits and other institutions. The analysis assumes that these entities continue to demand the same volume of products due to the nature of the services they provide (e.g., schools still need to provide meals to students, correctional facilities to inmates, etc.). A ban of EPS foodservice products, would require these organizations to spend an additional \$40 million on alternatives.

**State Revenues.** The downstream effect of projected economic shifts, and price increases on products will affect the state's revenue sources. State General Fund tax revenues increase by \$2 to \$3 million, assuming that higher prices of alternative products are passed forward in the taxable sales of foodservice vendors.

**State Agencies.** The Commonwealth is a large purchaser of EPS foam products and will incur higher costs under a ban. Table 8.3 displayed projected price increases, based on DGS data, by product type. Using additional data related to DGS procurement contracts, **Table 8.5** shows the projected direct impact to state agencies.

**Table 8.5 - Projected State Government Costs**

Product	Units Purchased	Expenditures	Annual Cost	Direct Cost Increase
Clamshells	2,944.2	\$195.6	\$592.7	\$397.1
Trays	617.5	40.9	119.2	78.3
Plates	263.3	14.3	36.7	22.4
Bowls	1,845.0	33.9	44.7	10.7
Cups	<u>12,455.5</u>	<u>277.4</u>	<u>307.9</u>	<u>30.5</u>
<b>Total</b>	<b>18,125.5</b>	<b>562.2</b>	<b>1,101.2</b>	<b>539.0</b>
			<b>% Increase</b>	<b>96%</b>

Note: Figures in thousands.

Source: Units purchased and FY 2018-19 expenditures based on DGS procurement data.



Due to the ban, state agency costs would increase by roughly \$0.5 million over FY 2018-19 costs to procure alternatives to EPS foodservice products. Over a dozen agencies would be affected, but the most significant impact would be realized by the Department of Corrections, which would bear nearly 94 percent of the costs.

**Local School Districts.** For public schools, the IFO used data from the Maryland study conducted by mb Public Affairs, Inc. to calculate a per capita cost, adjusted for inflation, for EPS foam products used for school meal services in the Commonwealth.

As shown in **Table 8.6**, using the general cost of goods increase of 86 percent, school spending would increase by approximately \$5.6 million annually. It should be noted that a large number of school districts likely contract out for food services, and it is unknown if costs for foam products would be included in those contracts or procured separately. In either case, it is likely that costs are passed on to the school districts eventually, but it is unknown how quickly that would occur.

**Table 8.6 - EPS Foodservice Product Ban Impact on Public Schools**

State	Total Costs	Students <sup>1</sup>	Per Capita	Increase (%)	New Cost	Increase (\$)
Maryland	\$3,181	865	\$3.7	--	--	--
Pennsylvania	\$6,492	1,766	3.7	86%	\$12,080	\$5,588

Note: Figures in thousands, except for per capita cost figures.

1 Maryland data from Maryland State Data Center, reflects public school enrollment (2018). Represents 2018-19 Pennsylvania K-12 school population.

**Other Entities.** Higher costs due to the ban would also impact many other entities, such as higher education institutions, county jails and non-profit organizations including charities and churches. All of these entities provide purchased or free meals to groups and make extensive use of EPS foam products. Under a ban, these entities would also face higher costs that cannot be quantified.

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# Appendices

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## Appendix A: Glossary

**Blown Film Extrusion:** Most common production method to make plastic films. The process involves extruding a tube of molten polymer through a die and inflating it to several times its initial diameter to form a thin film bubble. This bubble is then collapsed and used as a lay-flat film or can be made into bags.

**Compostable:** A product that is capable of disintegrating into natural elements when disposed of into an aerobic composting facility. This typically must occur in 90 days.

**Cracker Plant:** A facility that takes fossil fuel liquid and breaks it into smaller molecules to create ethylene, which is used in plastics manufacturing.

**Disposable Bags:** Includes bags that are intended for a single use, such as light-weight plastic bags (LWPBs) and paper bags.

**Disposable Foodservice Products:** Foodservice products made of plastic, paper or other materials that are intended for a single-use (e.g., straws, utensils, trays, cups, bowls or clam shell containers).

**Expanded Polystyrene Foam:** Raw polystyrene beads are expanded using steam to create puff beads. These puff beads can be molded into a variety of products and are particularly common in food service, packaging and construction.

**Film Plastic:** A thin, continuous polymeric material, used in materials such as packaging, plastic bags and photographic film.

**Kraft Paper:** Paper or paperboard produced from chemical pulp using the kraft process, which involves the conversion of wood into cellulose fibers, the main component of paper.

**Material Recovery Facility (MRF):** Facilities that receive recycled materials, sort and separate the materials, and prepare them for marketing to end-use manufacturers.

**Mils:** One mil is one thousandth of an inch. Used as a measure of bag thickness.

**Mold (Plastics):** Machinery used for fabricating plastic material into a variety of durable, reinforced components.

**Natural Gas Liquids:** Liquids, such as ethane and propane, that can be found in “wet” natural gas.

**Nonwoven Polypropylene:** A plastic material in which plastic film is extruded, drawn into filaments, and then bonded together, rather than woven together. The material is made to look woven by having a cross thatched pattern pressed onto the material.

**Petrochemical Manufacturing:** The production of plastic resins from fossil fuel liquids.

**Plastic Resin:** The base material of all plastics.

**Polypropylene:** A thermoplastic polymer that is one of the most common types of plastic in use today. It is used for a variety of consumer applications, including in the automotive industry, hinges on bottle lids and textiles.

**Polyethylene:** The most common plastic in use today. Made from ethane, a byproduct of natural gas, it has several applications including packaging films, retail bags, bottles, etc.

**Reusable Bag:** Includes bags that are intended for more than one use before disposal such as HWPBs and stitched reusable bags.

**Single-Use Plastic Bag:** Light-weight plastic bag made from film, generally less than one mil in thickness.

**Tipping Fee:** Fees paid by municipal waste haulers to dispose of waste in landfills.

**Woven Polypropylene:** A plastic material in which plastic film is extruded, drawn into filaments and then woven into large sheets.

## Appendix B: Lion Poll Methodology and Bag Use Calculation

In order to gauge the demand for plastic bags in Pennsylvania, the IFO included questions in the Spring 2020 Lion Poll conducted by the Center for Survey Research (CSR) at Penn State Harrisburg. The Lion Poll is an omnibus survey conducted by the CSR. The poll included 1,051 self-administered web surveys completed by adult Pennsylvanians between February 24 and April 7, 2020. The questions included were:

1. About how many disposable plastic shopping bags does your household receive from stores in a typical week? Please think about all members of your household, including children. Consider all trips to restaurants; grocery, retail, and convenience stores; and anywhere else where you may get plastic bags. If you are unsure, please provide your best estimate.
2. If plastic shopping bags are not provided free of charge, what is the maximum amount you would be willing to pay to use those bags provided by a restaurant, grocery, retail, or convenience store?

The first question allowed for an open-ended response. The responses to this question ranged from zero to 60 bags per week. All weekly bag use responses were multiplied by 52 to arrive at an annual bag-use count for each household. Each respondent also provided the number of members in each household. A statewide per person bag use estimate was calculated based on the sum of all respondents' annual household bag use divided by the sum of all individuals in the household. The per person estimate of 210 was then multiplied by the 2019 population of Pennsylvania (12.8 million) to arrive at the statewide bag use figure of 2.7 billion. Once these figures were deduced, the IFO adjusted each respondents' bag usage upward by 15 percent to arrive at a final bag-use estimate accounting for various factors.

This adjustment was made to account for additional research that suggested total bag usage may be higher than 2.7 billion. These data and research include (1) estimating Pennsylvania's bag usage based on other published national estimates and (2) using waste disposal and recycling data reported by DEP and EPA. Therefore, the analysis uses 3.0 billion as the estimate for Pennsylvania LWPB use, or 237 bags per person. This estimate accounts for business purchases that may not be reflected in the household survey. The IFO also removed respondents from the results that reported outlying bag usage or number of people present in the household. The Lion Poll respondents are representative of Pennsylvania across various characteristics including age, sex and region, so the analysis assumes that the per person estimate can be applied to the statewide population.

The second question provided six options for respondents to select in order to gauge Pennsylvanians' overall willingness to pay for a plastic bag. The options were as follows:

1. I would not be willing to pay to use plastic bags/would bring my own reusable bag or use no bag
2. 5 cents per bag or less
3. 6 to 10 cents per bag
4. 11 to 15 cents per bag
5. 16 to 25 cents per bag
6. More than 25 cents per bag

These responses were used to inform the share of respondents who would (1) not be willing to pay a fee for a plastic bag or (2) would be willing to pay varying levels of a fee for the product. Although the percentage who responded unwilling to pay for a bag (70.3 percent) was not explicitly used as the demand reduction resulting from a fee, it helped to gauge consumers' potential response to such a regulation.

## Appendix C: Scope Letter to the Senate Majority Leader's Office



### INDEPENDENT FISCAL OFFICE

August 30, 2019

Ms. Anna Fitzsimmons  
Director of Budgetary Affairs  
Office of the Senate Majority Leader  
350 Main Capitol  
Harrisburg, PA 17120

Dear Ms. Fitzsimmons:

Act 20 of 2019 requires the Independent Fiscal Office (IFO) to "evaluate the economic impact to the Commonwealth, its industry partners and consumers for any regulation impacting single-use plastics, reusable plastics, auxiliary containers, wrappings or polystyrene containers and submit a full report of its findings to the General Assembly no later than July 1, 2020."

The technical language of the act is broad, and the IFO met with legislative staff on August 6 to obtain further guidance regarding the purpose and intent of the report, and the analysis the IFO could provide to fulfill its statutory obligations under the act. Based on that conversation, the IFO intends to transmit an economic impact report that contains or omits the following elements:

- The report will focus on three types of regulation: (1) a ban or elimination, (2) an excise tax (or fee) and (3) a ban plus fee.
- Although the act cites a broad array of products, the report will focus on retail and grocery stores' use of plastic bags to transport merchandise purchased by consumers.
- The analysis for plastic bags will be extended in a general manner to other types of single-use plastic products that could be affected by regulations such as containers, cups and bottles.
- The report will attempt to provide a general economic overview of the industry. This review will likely be caveated due to the broad range of products that could be impacted.
- The report will provide a discussion of taxes, fees or bans in other jurisdictions, and if possible, review the economic impact of those policy initiatives.
- To the extent possible, the report will provide the potential impact on employment, income and economic activity from the policy options noted above.
- The report will discuss alternatives to the use of plastic bags, and the potential economic implications.
- The report will only examine the direct economic implications. It will not attempt to estimate the monetary value of externalities such as reduced pollution.

Rachel Carson State Office Building, 400 Market Street, Harrisburg PA 17105  
[www.ifo.state.pa.us](http://www.ifo.state.pa.us) | (717) 230-8293 | [contact@ifo.state.pa.us](mailto:contact@ifo.state.pa.us)

- The report will not contain recommendations because the ultimate goals or outcomes have not been defined. Therefore, it is not possible to recommend the best methods to achieve goals and outcomes.

If these bullets do not address the intent of the legislation, please do not hesitate to contact me regarding the mandated report (717-230-8293).

Sincerely,



Matthew J. Knittel  
Director, Independent Fiscal Office

cc:

Scott Sikorski- Legislative Director  
Patricia Berger- Executive Director, LBFC

## Appendix D: Stakeholder Meetings and Submissions

Listed below are the stakeholders that contributed to the background and research for this report. Interested stakeholders were invited to submit a one-page statement. The statements are listed alphabetically in the pages that follow. For stakeholder submissions that exceeded one page, only the first page was included in this report. Full stakeholder submissions are available upon request.

1. American Chemistry Council
2. American Forest and Paper Association
3. American Recyclable Plastic Bag Alliance
4. Borough of West Chester
5. City of Philadelphia Managing Director's Office
6. Clean Air Council
7. Dart Container Corporation
8. Dolco Packaging a Tekni-Plex Business
9. International Paper
10. Keep Pennsylvania Beautiful
11. Nova Chemicals
12. Novipax
13. PennEnvironment
14. Pennsylvania Chamber of Commerce
15. Pennsylvania Chemical Industry Council
16. Pennsylvania Food Merchants Association
17. Pennsylvania Manufacturers Association
18. Pennsylvania Municipal League
19. Pennsylvania Recycling Markets Center
20. Pennsylvania Restaurant and Lodging Association
21. Sierra Club Pennsylvania

## Paper Bag Facts & Supply

Pennsylvania is the birthplace of American papermaking with the first ever papermill built in Philadelphia in 1690. It's no surprise that our industry has a substantial presence in the Commonwealth, providing significant economic benefits.

In Pennsylvania, the forest products industry contributes over 53,000 jobs to the commonwealth's economy, more than \$2.9 billion in payroll annually and \$196 million in state and local taxes.

### Paper Bag Facts

- The U.S. paper recovery rate reached **66.2 percent in 2019** — meeting or exceeding 63 percent for over a decade.
- All paper-based packaging is made from **renewable resources** (trees) and **recycled fiber**.
- Paper bags are ideal containers to use for composting residential yard and food waste; and are **compostable** themselves.
- The U.S. grows more trees than it harvests; in fact, there are **20 percent more trees in the U.S.** now than there was on the first Earth Day in 1970.

### Paper Bag Supply

Questions have been raised related to the availability of paper bags and whether that should impact legislation governing the product. This is a red herring to distract policymakers with questions centered around supply. The real question should be whether there should be a government mandated fee on paper bags which are recyclable, compostable, reusable and come from a renewable resource.

Retailers and grocers are free to charge for bags, or not offer them at all. AF&PA does not make marketplace predictions on the availability of paper products as this is an individual company decision, just as it is each retailer or grocer's decision whether to give out paper bags and whether to charge a fee for them.

For more information contact Fara Sonderling, Manager of Government Affairs at [fara\\_sonderling@afandpa.org](mailto:fara_sonderling@afandpa.org).

*The American Forest & Paper Association (AF&PA) serves to advance a sustainable U.S. pulp, paper, packaging, tissue and wood products manufacturing industry through fact-based public policy and marketplace advocacy.*



**Paper bags are recyclable and made of recycled material.**

Paper bags are the only grocery bag widely accepted for recycling in curbside bins. They are also compostable, reusable, and produced by companies that support thousands of family wage, union jobs.



Grocery stores are already free to charge single use bags or not distribute them at all.

**But a statewide ban or fee would create additional revenue for retailers at the expense of taxpayers.**



April 14, 2020

Independent Fiscal Office  
2nd Floor, Rachel Carson State Office Building  
400 Market Street  
Harrisburg, PA 17105

RE: Single-use plastic regulations in Pennsylvania

On behalf of the American Recyclable Plastic Bag Alliance, thank you for the opportunity to provide feedback on single-use plastic regulations in Pennsylvania. We appreciate you taking the time to consider the perspective of the ARPBA and its members, who manufacture and recycle plastic retail bags in the United States.

Single-use products have always provided a value to society, but during the current pandemic, they have become especially important. In recent weeks, states, localities, and grocery and retail stores all over the country have banned the use of reusable shopping bags due to COVID-19. In Pennsylvania, Giant Eagle, Redner's, and Weis Markets are prohibiting the use of reusable bags in their stores for the duration of the pandemic. In addition, chains such as Starbucks and Dunkin' Donuts are prohibiting the use of reusable cups and mugs.

Peer-reviewed scientific research has found that reusable bags are rarely washed, can harbor bacteria and viruses, and spread pathogens around a grocery store. In addition to grocery bags, COVID-19 has made other single-use products essential in keeping restaurants afloat. Many of these businesses have switched over to delivery and takeout models, which requires to-go containers and bags to safely package and transport food and drink. While the industry would never advocate for the banning of reusable products, there is no doubt that single-use products, such as plastic bags, provide immense value to society. And if regulations such as Philadelphia's plastic bag ban take effect, it will result in stores having to choose between violating the law and the safety of their workers during an ongoing pandemic.

Plastic retail bags are 100% recyclable and can be dropped off at many major grocery stores and retail chains. In addition, many other types of plastic film can be recycled alongside plastic bags, including dry cleaning bags, bread bags, produce bags, zipper sandwich bags, newspaper bags, and much more. It is important to note that a regulation on single-use plastic bags would threaten this recycling infrastructure. Without the infrastructure of store takeback programs (which our members pioneered), all of the aforementioned items will essentially cease to be recyclable.

The plastics industry as a whole is vitally important to the Pennsylvania economy. In the Keystone State alone, the industry directly employs over 41,000 people. While many times it is assumed that single-use plastic products, such as grocery bags and takeout containers, are made overseas, the vast majority of them are made here in the United States. For example, there are 166 workers at Hilex Poly in Milesburg manufacturing plastic retail bags; nearly 500 employees at Trinity Plastics in Lewistown manufacturing various types of plastic bags, including retail bags; and 2,000 employees in Leola and Lancaster making polystyrene foam containers and other plastic food service ware.

Plastic bag regulations, while well intentioned, can cause unintended consequences. Plastic retail bags are low cost, sanitary, highly reused, and the preferred option for many consumers and retailers. Switching to paper or reusable bags is costly for retailers, especially small businesses and grocery stores who operate on razor-thin profit margins. Due to market disruptions resulting in significant increases in paper bag prices as well as plastic bag bans being implemented around the country, it's safe to assume that in 2020 and beyond, retail stores will be faced with even greater costs when switching to paper and reusable bags. Inevitably, these costs get passed down to consumers in the form of higher prices, which impacts low-income communities the most.

Not all plastic bag regulations are created equal. Bag taxes and various thresholds of plastic bag bans can all have different impacts on the Pennsylvania economy. We look forward to continuing to work with stakeholders on the best solution for the Keystone State, and we remain available to answer any questions and provide additional resources.

Sincerely,



Matt Seaholm  
Executive Director, American Recyclable Plastic Bag Alliance





**Borough of West Chester**  
401 East Gay Street ▪ West Chester, Pennsylvania 19380  
[www.west-chester.com](http://www.west-chester.com)  
Telephone: 610-692-7574 ▪ Facsimile: 610-436-0009

**Borough Council**

Michael R. Galey, Esq., President  
W. Donald Braceland, Vice President  
Bernard J. Flynn  
Michael Stefano  
Denise Polk, Ph.D.  
William J. Scott, Esq.  
Nick Allen

**Mayor**

Dianne Herrin

**Borough Manager**

Michael A. Perrone,  
C.B.O.

April 15 2020

Due to concerns outlined below, Borough Council approved a single-use plastic ban applicable to plastic bags and straws effective July 2nd 2020, following the anticipated release of IFO's economic impact study on the issue. The ordinance was approved only after careful consideration for the economic and environmental impacts of the policy in our community, with particular concern for business establishments, low-income residents, and broader community and local government impacts.

We strongly believe that a thoughtfully-designed single-use ban will have zero economic impacts on consumers, and a small but measurable economic benefit to establishments and local governments. West Chester's ordinance is premised on the following economic considerations:

**Economic considerations for consumers:**

- Consumers may bring any kind of bag into an establishment, including plastic bags, without incurring a fee
- Reusable bags can be purchased at any major grocery store for \$1 per bag or less
- Compliant Bags (consisting of recycled material and recyclable curbside in the Borough) dispensed by establishments for \$.10 are reusable as well, but unlike today where the price of bags are added to our purchase, moving forward the cost of the bag will be disclosed on a sales receipt, providing new transparency to consumers
- The Borough is purchasing a large quantity of reusable bags and distributing them to low-income communities

**Economic considerations for business establishments:**

- Establishments that no longer plastic provide straws will save approximately one cent per drink served, which will save a large bar or restaurant several dollars per day and thousands of dollars per year. Establishments will also see a small reduction in solid waste generated, which they pay to dispose of by weight
- No establishment's costs will increase due to the ordinance's ban on plastic bags. Establishments currently spend 2-3 cents per single-use plastic bag, so customers who reject an unnecessary bag or bring their own will save the business 2-3 cents per bag they would have otherwise provided
- The Borough's ordinance also includes a \$.10 fee for establishment-provided Compliant Bags, in order to encourage consumers to bring their own or skip a bag. The fee will cover additional costs of businesses procuring a Compliant Bag versus a cheap, plastic alternative
- The Borough's ordinance includes an 11 month implementation timeline, so that establishments can draw down existing inventories of single-use plastic supplies covered by the ordinance
- A 2018 survey found a large majority of local businesses were supportive of an ordinance addressing single-use waste, though hesitant to proactively change their practices in absence of a relevant law. Anecdotally we learned that businesses prefer rules be set community-wide and objectively enforced by a government entity, so that all businesses are on the same, level playing field.

**Economic considerations for local government and the broader West Chester community:**

- Borough residents discard approximately six million plastic bags per year. At a weight of 6 grams per bag this equates to 39 tons of solid waste annually, which the Borough collects and pays about \$95/ton to collect, transport, and tip at a landfill. Therefore eliminating just plastic bags could save Borough taxpayers approximately \$3,705 per year, though we also acknowledge that many bags are not disposed of properly
- Single-use items are not recyclable curbside but nonetheless end up improperly recycled, where they become a leading source of recycling contamination. This contamination devalues post-consumer recycling materials, directly leading to increased costs that are today undermining recycling programs in every municipality in Pennsylvania. These added costs must be passed along to taxpayers
- The cost of improperly disposed of bags and single-use waste is real though difficult to quantify, and include the following:
  - Litter cleanup throughout our community - completed by volunteers, government employees, offenders completing court-ordered community service, etc. However these collection efforts are insufficient, as evidenced by the ongoing presence of single-use litter in the community
    - This litter negative impacts local neighborhoods through depressed property values, especially low-income neighborhoods which tend to have more litter than more affluent areas
    - If only 1% of single-use plastics turn into litter that equates to 60,000 plastic bags in our streets, streams and public spaces that are cleaned up by community service volunteers.
  - Added maintenance costs to wastewater treatment and recycling sorting facilities due to improperly recycled plastic materials
  - Impacts to open space, watersheds, and wildlife, all of which are critical natural resources that contribute to the unique economic vitality and beauty of the region

We hope the IFO finds these considerations helpful in assessing the economic impacts of single-use bans in the Commonwealth.

Respectfully,  
West Chester Borough Sustainability Advisory Committee



MANAGING DIRECTOR'S OFFICE  
1401 JFK. Blvd. 14<sup>th</sup> Floor  
Philadelphia, PA 19102-1685

### **City of Philadelphia Statement for the PA Independent Fiscal Office's Single Use Plastic Impact Study**

Plastic pollution is a global problem that cities, states, and countries are grappling with, but you don't have to look beyond Philadelphia city streets to see the negative impact of single use plastic bags in Philadelphia. For this reason and others, the 2017 Zero Waste and Litter Action Plan recommended the banning of plastic bags as a major strategy to reduce the amount of litter in Philadelphia.

In December 2019, Philadelphia City Council passed Bill No. 190610 banning single use plastic bags, which the Mayor signed into law on December 28, 2019. This law bans all single use plastic bags as determined through ASTM International standards as well as any plastic bag made through the blown film extrusion process. This law applies to all retail stores throughout Philadelphia regardless of size or revenues. There are certain exemptions for dry cleaner bags and grocer bags containing meat or vegetables sold within the store. This law does not require any fees on other types of bags and allows for the use of paper bags; it encourages the use of reusable bags by consumers. The original ordinance also proposes a study to evaluate the impact on behavior and litter and waste outcomes.

The sheer magnitude of single use plastic bags used in this region is astonishing. The Clean Air Council estimates that Philadelphians use over 1 Billion plastic bags, annually. Although industry groups claim that these bags are industrially recycled, statistics from Waste Management show that only 1-3% of these bags are actually recycled.

So where do the rest of the plastic bags end up? The latest City-Wide Litter Index from 2018 revealed that single use plastic bags were the 5th most littered item in Philadelphia behind other single use plastics like beverage bottles and take out containers. The Philadelphia Water Department removed over 8,000 tons of single use plastics from our streams and green storm water infrastructure in 2018, with plastic bags accounting for over 17% of this waste.

The abundance of these single use plastic bags being littered has significant consequences for our residents and our City operations. In fact, businesses with littered storefronts are 50% less likely to be patronized than storefronts that are not littered according to industry reports. And our former recycling processor, ReCommunity, reported that plastic bags getting stuck in recycling processing machinery at the recycling plant accounted for over 10,000 hours of lost staff time as the facility needed to be shut down to clean the plastic bags out of the equipment, thus making our recycling systems much more expensive and less efficient. Banning plastic bags will make our recycling systems more efficient and reduce costs for the City.

It is undeniable that the quantity of plastic bags distributed in Philadelphia is one of the largest polluters and drains our city resources and economy when it comes to the cost of cleaning them up from our littered streets and processing them through our waste management systems.

Today, bans are widely accepted as effective policy to address litter and waste and more than 200 municipalities throughout the US have done so, including Chicago, New York City, Washington, D.C. and Boston. Moreover, entire states and territories in the United States, from California to Puerto Rico have enacted legislation that bans plastic bags and/or sets fees on other types of bags. There are major supermarket chains like Kroger that look to phase out plastic bags by 2021 from their stores. Save-A-Lot and Aldi, which happen to operate in low to middle income parts of our city, have their own policies on limiting plastic bag usage.

The Kenney Administration contends that this is a commonsense and measured law that will reduce litter and ensure cleaner, thriving neighborhoods without putting too much of a burden on businesses or our residents. This law will keep us in step with the progress other cities and states are making to address the plastic pollution crisis.



Dart Container Corporation respectfully submits information on the fiscal impact a ban on polystyrene would have in Pennsylvania. Dart Container is a global manufacturer of foodservice containers including products made from a range of plastics including both foamed and rigid polystyrene, paper, and compostable materials. In Pennsylvania we have two manufacturing facilities located in Leola and Lancaster. In addition, we have a sales team that lives and works within the state.

#### **Potential Job Loss throughout the State**

Dart has over 1,900 employees in the state of Pennsylvania. Leola is home to our largest manufacturing plant and a main product produced at both Leola and our Lancaster plants is polystyrene foodservice ware. Needless to say a ban on polystyrene foodservice containers would negatively affect our Pennsylvania based employees. With a ban throughout the state, we would need to shift polystyrene production to other states where we operate that welcome our presence and we will need to look at ways to reduce costs which could result in job loss and tax revenue for Pennsylvania.

#### **A Ban on Polystyrene Foodservice Would Increase Costs to Restaurants and Consumers**

If a ban in the state of Pennsylvania were to pass, restaurants would be forced to switch to higher priced containers such as paper or compostable products. This cost would be either absorbed by the restaurant owner or passed down to the consumer that frequents these restaurants. With restaurants working on such tight margins of profit, they are unable to add to their costs for higher priced items. Some consumers are willing to pay more for items if they feel like they are being composted or recycled. The alternative to polystyrene foodservice are not currently recycled or composted throughout the state. A ban would just increase the cost to the consumer without achieving diversion of waste from a landfill.

#### **Misinformation on Polystyrene**

It has been falsely stated that polystyrene foam takes up 30% by volume of the landfill. Studies have shown that foam foodservice only comprises less than 1% by weight and volume of municipal landfills. Polystyrene is also a recycled material. Since 1990, Dart has been not only collecting polystyrene foodservice material but also other shaped molded packaging for recycling including a drop off center at our Leola facility and a partnership with the City of Philadelphia. Recycling polystyrene is possible and there are several markets for the material including crown molding, picture frames and office products.

Instead of placing a ban on polystyrene material that would negatively impact the state with no environmental benefit, Dart recommends looking into a comprehensive recycling effort for all foodservice items. Dart would like to be a partner in this effort and work with the state to accomplish this goal.

Thank you,

Christine Cassidy  
Recycling Manager  
Dart Container  
315-382-0605  
christine.cassidy@dart.biz

*Dart sets the Industry Standard of Excellence by safely and efficiently providing high-quality food and beverage packaging solutions and exceptionally reliable service to each and every one of our customers.*



A TEKNI-PLEX BUSINESS

## Impact Statement – Regulation of Single Use Plastics – Egg Cartons and Meat Trays

It is concerning when municipalities create legislation to ban polystyrene. Such legislation raises issues that should be considered at the state level to promote a consistent legislative approach. This document illustrates some of the key points for consideration.

### ***Litter***

The proper disposal of solid waste and the environmental impacts of litter are important issues facing municipalities and states. Polystyrene foam egg cartons and trays for various types of raw eggs and meat are not normally found in litter. Take out containers and single use cups are carelessly thrown into waterways and roadways; egg cartons and meat trays are brought home and disposed of properly. Generally, municipalities do not consider this nuance.

### ***Supply Chain***

Raw eggs, raw meat, and raw produce have a more complex supply chain as they move to the supermarket shelf than takeout containers. A takeout container is filled on site and handed across the counter to the customer. Raw eggs and raw meat products are often packed in centralized facilities, for reasons of cost and food safety, with equipment and processes dedicated to the type of packaging that they are using. The products are then shipped to the point of retail, which could be across state lines. Changing to an alternative package is complicated, expensive, and logistically very difficult. Municipal governments may not have a full understanding of the consequences of broadly worded product bans. Additionally, adherence to interstate commerce regulations can cause different rules for in state and out of state centralized facilities and farmers. These differences can lead to in state farmers and/or packers being put at a disadvantage.

### ***Alternatives***

Before banning one material, the alternative packaging should be understood and considered in the decision. A study by Trucost in 2016 finds “The environmental cost of plastic in consumer goods is 3.8 times less than the alternatives materials that would be needed to replace plastic.” Life cycle analysis is a process of studying all environmental aspects of a product rather than just the end of life and should be considered when making decisions regarding the environment.

PS foam bans filed at the state level are rigorously debated. Through this process, the stakeholders learn some of the differences and as a consequence, the polystyrene foam bills are most often modified to exclude meat trays and egg cartons. This is not always the case with municipal ordinances which generally pass as written.

For these reasons, we support a statewide limitation on regulation of single use plastics at the municipal level.

Dolco Packaging  
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**TEKNI-PLEX**<sup>®</sup>  
Global strength. Superior solutions.





**NOVA Chemicals Inc.**  
U.S. Commercial Center  
1555 Coraopolis Heights Road  
Moon Township, Pennsylvania  
USA 15108  
tel 412.490.4000  
novachemicals.com

Kathleen Hall  
Revenue Analyst II  
Pennsylvania Independent Fiscal Office  
400 Market Street  
Harrisburg, PA 17105

March 30, 2020

Ms. Hall,

Thank you for reaching out to the American Chemistry Council and welcoming feedback from plastic industry contacts. We welcome the opportunity to comment on plastics in the Pennsylvania economy and the effects that a statewide regulation on single-use plastics and/or a ban could have on companies operating in the Commonwealth.

NOVA Chemicals is a manufacturer of polyethylene (PE) and expandable polystyrene (EPS). Here at NOVA Chemicals, we know that plastics add great value to society and have many environmental benefits. But we also know that plastic waste does not belong in our environment and we are engaged in finding sustainable solutions to create a circular plastic economy that includes better mechanical recycling and advanced (chemical) recycling that is economically and environmentally viable.

We would like to highlight a few key points and research for consideration as you evaluate the direct implications of single-use plastic regulation in Pennsylvania:

**Jobs / Employment / Opportunities:**

- According to the Bureau of Labor Statistics, in 2018, plastic products manufacturers employed over 35,000 people in Pennsylvania<sup>1</sup>
- Plastic bags specifically help sustain 30,900 American jobs<sup>2</sup>
- NOVA Chemicals has two locations located in Pennsylvania: our U.S. Commercial Center is in Pittsburgh PA and our Beaver Valley plant is in Monaca, PA. We employ approximately 400 individuals at our two PA locations, and we all actively support and engage with our local communities.
- Materials Recovery for the Future (MRFF) research program has partnered with PA-based J.P. Mascaro & Sons to pilot single-stream curbside recycling of flexible plastic packaging. The pilot facility, TotalRecycle is located in Exeter Township, Berks County, PA, and designated as a one-stop recycling operation.<sup>3</sup>

---

<sup>1</sup> [www.bls.gov/cew](http://www.bls.gov/cew)

<sup>2</sup> <https://www.thisisplastics.com/how-plastic-bag-bans-impact-the-economy>

<sup>3</sup> [http://www.ipmascaro.com/news/ip-mascaro-sons-to-participate-in-mrff-pilot-nwmft\\_115.aspx](http://www.ipmascaro.com/news/ip-mascaro-sons-to-participate-in-mrff-pilot-nwmft_115.aspx);  
<http://www.ipmascaro.com/our-facilities/total-recycle.aspx>





March 31, 2020

Katie Hall  
Revenue Analyst II  
Pennsylvania Independent Fiscal Office  
400 Market Street  
Harrisburg, PA 17105

Dear Ms. Hall,

Novipax is a provider of polystyrene meat trays and absorbent pads for the food industry. Two of our facilities are in Pennsylvania. Circling back on your request regarding the fiscal impact of a plastics ban in the state, Novipax is a proud corporate citizen with a goal to be a positive and proactive partner with our employees and neighbors.

- Our Paxinos, PA facility was purchased in 1983 and employs 40 people.
- Our Reading, PA site was built in 1966 and employs 306 people in the state.
- Novipax's tax base to the state is \$24 million.
- We manufactured over 33 million lbs. of finished goods in the state that were sold into local grocery store chains, distribution facilities and processors for packaging raw, unprepared meat, poultry and seafood.
- Novipax has 27 direct customers in the state with an annual revenue of \$16.7 million in Pennsylvania.
- Our products have been regarded as a safe, affordable product for packaging raw proteins for over 70 years. There are no readily available alternatives, and requiring a change to the packaging format, would ultimately utilize 5-10 x the amount of plastic raw material at a significantly higher price which will be passed on to the consumer.

In Pennsylvania, the ban would affect every household across the state and cost the consumer. Because of the harm a ban would cause our employees and their families, as well as the health and environmental consequences of polystyrene alternatives, we would welcome a conversation to discuss the unintentional consequences a ban would have.

Novipax shares the public's concern about protecting our environment and conserving natural resources. However, the polystyrene ban will not address the true target of the legislation, litter. Several studies have been conducted which conclude banning polystyrene has no measurable impact on decreasing litter, only changing the type of litter. Because our product is manufactured specifically to handle unprepared food in a safe, healthy, and economical way, banning it would increase raw material utilization and could interfere with health and safety aspects of the food packaging.

Our company, alongside partners, are working on innovative technologies to increase the reuse and recycling of polystyrene.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Lindsay Riehle".

Lindsay Riehle  
Director of New Product Development and Government Policy  
Novipax



PennEnvironment  
1429 Walnut St, Ste 1100  
Philadelphia, PA 19102  
(215) 732-5897

April 15, 2020

Members of the Pennsylvania Independent Fiscal Office,

PennEnvironment respectfully submits the following statement regarding the Commonwealth's 2019 legislation to prohibit municipalities from implementing fees or bans on plastic bags or other single-use plastics in Pennsylvania. We believe that this policy is an overreach of state officials and puts our environment at risk.

The growing threat that plastic poses to our environment is clear: 40% of the plastic consumed globally is plastic packaging that's used only one time and then thrown away.<sup>1</sup> Only, there is no "away": this waste piles up in our landfills, is burnt in Pennsylvania incinerators, or worse yet: ends up littering our streets, open spaces, and waterways where it poses a threat to our wildlife, our infrastructure, and our health.

Besides the environmental harm caused by single-use plastic, they are also an economic burden on local governments and taxpayers, with millions of dollars in hidden, externalized costs. These include:

- **Utility ratepayer costs.** Studies have shown that local water departments are spending heavily to pull litter out of sewer drains and other stormwater infrastructure<sup>2</sup>. For example, the Philadelphia Water Department estimates that plastic pollution is *doubling* the maintenance costs of their green stormwater infrastructure projects, making it more expensive for the city to comply with U.S. EPA's 2012 consent decree.<sup>3</sup>
- **Taxpayer costs.** The more waste we create, the more we have to pay to clean it up. A recent study by Keep Pennsylvania Beautiful estimated Pennsylvania spends \$48 million a year to clean up litter. The report included an estimate that PennDOT spends approximately \$13 million annually in roadside litter cleanup and that SEPTA spends an additional \$8 million for litter cleanup, much of which is plastic pollution.<sup>4</sup>
- **Increased cost of recycling.** Single-use plastic bags are the number one contaminant found at recycling facilities<sup>5</sup>, clogging machinery and decreasing the efficiency of recycling programs in Pennsylvania that are often already struggling. Eureka Recycling estimates that plastic bags included in curbside recycling cost their company \$75,000 annually in lost work and wages when they had to turn off equipment and remove plastic bags stuck in their equipment.
- **Increased costs to waste-haulers.** Expanded polystyrene foam (EPS) - commonly known as Styrofoam - is very light weight, taking up over 4 times as much volume by weight as standard municipal waste overall, making it expensive for waste-haulers.<sup>6</sup>

Pennsylvania municipalities and taxpayers bear the indirect cost of plastic waste a number of ways, and therefore should have the ability to implement policies that will protect their local environment and reduce the external costs and inefficiencies brought on by the proliferation of single-use plastic.

Thank you for allowing PennEnvironment to submit this information to the Pennsylvania Independent Fiscal Office as part of its research into the Commonwealth's plastic bag preemption legislation. Please do not hesitate to reach out if you have any questions on our submission, or need more information from our staff.

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<sup>1</sup> Laura Parker, [Fast facts about plastic pollution](#), National Geographic, December 2018

<sup>2</sup> Catalina Jaramillo, ["Looking to cut plastics pollution in the ocean? Start upstream"](#) PlanPhilly, July 2018

<sup>3</sup> Philadelphia Water Department, [Trash and Vandalism](#), 2018

<sup>4</sup> Frank Kummer, ["Philly spends \\$48 million a year to clean up litter. Pa. report find."](#) Philadelphia Inquirer, February 2020.

<sup>5</sup> Cody Marshall and Karen Bandhauer, ["The Heavy Toll of Recycling Contamination."](#) Recycling Today, May 2017

<sup>6</sup> Carroll County Environmental Advisory Council, ["Expanded Polystyrene \(EPS\) Reduction in Carroll County."](#), 2018





May 20, 2020

Pennsylvania Independent Fiscal Office (IFO)  
Rachel Carson State Office Building  
400 Market Street Harrisburg, PA 17105

Pennsylvania Legislative Budget Finance Committee (LBFC)  
Finance Building, Room 400  
613 North Street Harrisburg, PA 17105

**RE: Input Provided to LBFC and IFO for Act 2019-20 Single-Use Container Bans and Fees Study**

The Pennsylvania Chemical Industry Council (PCIC) represents chemical and petrochemical manufacturers and related industries in Pennsylvania. We appreciate the comprehensive review LBFC and IFO have conducted on the effectiveness and unintended impacts of single-use container bans at the request of the General Assembly per the directive laid out in the 2019-20 Pennsylvania State Budget.

The business of chemistry is a \$526 billion enterprise making up approximately 25% of the U.S. gross domestic product. Chemicals provide the building blocks and important additions to the majority of products we use daily. In Pennsylvania, this industry supports more than \$24 billion in economic activity and 80,000 jobs.

Natural gas liquids in the Marcellus and Utica Shales rich in ethane, propane and butane provide key feedstock in the chemical manufacturing process. Ethane is particularly valuable as a building block for a family of petrochemicals that make up the products laid out for review in this report.

Studies show that in a comprehensive review of the environmental impact of the full product life cycle and unintended consequences of regulations to remove customer choice, the products under review best fulfill a need while using the smallest amount of environmental resources for the lowest cost to the consumer.

The global middle class is growing. Access to modern conveniences made possible by plastics is improving living standards, hygiene, nutrition and the quality of life for billions of people worldwide resulting in market growth projections of \$155 billion for 2020-2027.

The U.S. has some of the strictest industry regulations worldwide and with continued investments in state-of-the-art facilities like the Shell Petrochemical Complex, we have the opportunity to meet this global demand while respecting the environment and reaping the sustained economic benefits of a manufacturing hub here in the Commonwealth.

Heavy-handed regulations, such as a ban, do not provide comprehensive solutions or the opportunity for the market to deploy a long-term solution. Fortunately, the challenge of recycling Nos. 3 – 7 post-use plastics represents an emerging market. As companies look for opportunities to improve sustainable practices in support of a circular economy, technological advancements have been made to extend the life cycle of these valuable materials and have proven effective at a commercial scale.

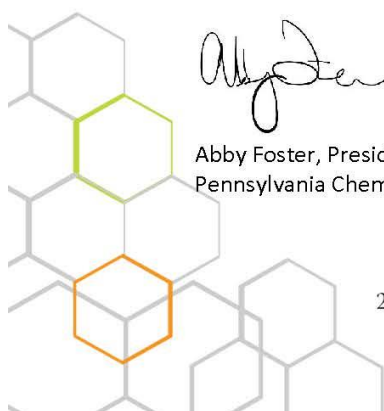
Product bans do not present an effective or viable solution, while the free market has presented long-term and sustainable solutions to address the challenge of post-use plastics, while bringing new jobs and investments to the economy.

Sincerely,

A handwritten signature in black ink, appearing to read 'Abby Foster', is positioned above the name and title.

Abby Foster, President  
Pennsylvania Chemical Industry Council

20 North Market Square • Harrisburg, Pennsylvania 17101 • 717.214.2200 • [pcic.org](http://pcic.org)







**Pennsylvania Manufacturers' Association**

April 1, 2020

To: Matthew Knittel, Director, Independent Fiscal Office  
From: Carl A. Marrara, Vice President of Government Affairs  
RE: *PMA comments to IFO regarding single-use polystyrene and plastic product bans*

The Pennsylvania Manufacturers' Association (PMA) is the nonprofit, statewide trade organization representing the manufacturing sector, 570,000 employees on plant floors, millions of additional jobs in supporting industries, and more than \$93 billion in gross state product in Pennsylvania's public policy process. We appreciate the opportunity to provide comments to the Independent Fiscal Office (IFO) as you develop analysis regarding single-use polystyrene and plastic product bans.

In August of 2018, PMA completed a study, using IMPLAN economic modeling, on the impact of banning polystyrene products in the food service industry in Pennsylvania. As noted in "Appendix A," a ban on polystyrene products in the food service industry has the potential to impact 4,000 jobs, nearly \$240 million in yearly labor income, and over \$1 billion in yearly economic output. A ban on polystyrene food service and single use products has the potential to impact more than 70 percent of the entire sector; a sector that directly employs 2,591, provides \$159.4 million in yearly labor income, and accounts for \$946.2 million in yearly economic output. Those indirect and induced industries that would be most affected includes wholesale trade, logistics, health care, and food service. Furthermore, this analysis only focuses on the manufacturing activity and does not include impacts to the food service, health care, and retail industries paying for more expensive products and higher compliance costs.

Non-polystyrene single use plastic products have the potential for an even greater impact, though the data is not as easily processed because of the NAICS codes associated with these industries. As noted in "Appendix B," plastic product manufacturing employs 32,872 Pennsylvanians, pays \$2.1 billion in employee compensation per year, and generates \$11.5 billion in economic output per year. The multiplier effect of the plastics manufacturing industry is robust and complex. According to IMPLAN economic analysis, removing just 2,000 plastics manufacturing industries results in the additional loss of 2,226 indirect and induced jobs across other sectors. The effects would be felt throughout the entire economy of the commonwealth, but the logistics, health care, and food service industries would be particularly impacted with hundreds of lost jobs and significantly lower economic output. This again does not account for more expensive products and higher compliance costs that would surely arise.

As of this writing, the COVID-19 pandemic illustrates the need for domestic production of single-use polystyrene and plastic products. The logistics chains in these industries are complex and the products are needed across hosts of industries including health care, food service, and life sciences. Drastically altering the supply chain in one of these industries will have profound impacts on others at a time when reliance upon foreign goods has been proven costly and insufficient.

Manufacturers of these products will locate where there is a customer base and access to raw materials. With easy access to the high population density of the Eastern Seaboard and with the newfound abundant and affordable access to natural gas liquids, Pennsylvania is in a unique position to be an industrial leader in these areas. Banning specific manufactured goods will drive investment and prosperity out of our commonwealth and into a competitor state or nation. It is the opinion of the Pennsylvania Manufacturers' Association that single-use plastic and polystyrene product bans are the antithesis of the economic dynamism that our commonwealth ought to be deploying.



Sierra Club Input to the Independent Fiscal Office of Pennsylvania re: Economic Costs of Plastics in PA  
 Plastic trash is increasing at a compound annual growth rate of 8.4%<sup>1</sup>. Costs in boldface. See Appendix for references.

**1) Landfill capacity for plastic waste.** The EPA est. landfill tipping fees in 2017 dollars is \$74.75/ton<sup>2</sup>, which is very similar to local PA fees. PADEP: in 2018, PA landfills received 15,368,631 tons of waste from PA counties<sup>3</sup>. **Cost:** As 26% of landfills are plastic by weight<sup>2</sup>, the annual est. cost of landfill tipping fees in PA: **\$298,689,343 + \$7,991,688** recycling fee (\$2/ton, 1988)) + **\$15,983,376** disposal fee (\$4/ton, 2002) + **\$998,961** Environmental Steward. fee (\$0.25/ton, 1999).

**2) Highway and Landscape Cleanup.** The 2019 PA Statewide Litter Research Study<sup>4</sup> cited **PennDOT spent \$13.9 million/yr** in 2014-2018 picking up litter on roads. The proportion of plastics in litter was >67%. **Total Municipal costs: Allentown** spent over **\$11 million/yr** or at least **\$93 p/person** on their road cleanups in 2018. Using the 2010 census mean population of PA's 124 cities/boroughs of 32,024, the cost in PA is \$369,300,768 / .67 plastic = **> \$247,431,514.**

**3) Waterway Cleanup.** Macro- and microplastics pollute waters including groundwater in PA geology types<sup>5</sup>, and contaminants that fail to mix with water adsorb and attach onto plastics. On shorelines, 50-80% of debris are plastics. **Philadelphia Water Dept. spends \$500,000/yr** removing plastics. Many cities report spending millions of dollars/yr on installing storm drain catchment devices, storm drain cleaning and maintenance, and manual water cleanups<sup>6</sup>. **Total Cost: \$166,530,000/yr in PA** based on EPA's estimated 2012 states' cost of plastic waste removal from water of \$13/person.

**4) Water Treatment Plants** - According to the Am Soc of Civil Engineers, PA's wastewater infrastructure is aging, in need of replacement, and never designed to filter microplastics. All WTP lead to an increase in microplastics in streams and rivers<sup>7</sup>. Installing a bioreactor to filter many microplastics from effluents in 2008 cost Traverse City MI **\$30,000,000**. Bioreactors have a **higher energy cost** compared to traditional filtration methods that do not reduce microplastics<sup>8</sup>.

**5) Impact on terrestrial life.** Environmentl regulations are permissive in the levels of microplastics allowed in effluents of industrial plants and sewage treatment sludge that are sprayed on soils, leading to pervasive microplastic contamination of soils<sup>9</sup>. Landfills leach microplastics to land through accidental loss of particles, improper handling of waste, and generation of contaminated soils and aerosols<sup>10</sup> that cause geochemical changes in soils that will long persist<sup>11</sup>. Microplastics' interaction with terrestrial organisms damage essential ecosystem services: soil dwelling insects, terrestrial fungi, plant-pollinators. **Cost: Potential economic impacts of microplastics on Agriculture will accumulate over time.**

**6) Human Health.** Plastic molecules are too large to pass through the cell wall of animals, but the chemicals added to their production are small enough where they disrupt cellular endocrine and communication signaling needed for the immune sys. Human health problems associated with chemicals used in plastic production: cardiovascular dis, neurological dis, diabetes II, neuropsychiatric dis, neurocognitive problems, disrupted epigenetics affecting development of central nervous sys, reduced IQ, learning disability, hyperactivity, poor executive function, neurodevelopmental & behavioral dis, abnormal sexual behaviors, thyroid function, liver damage, cataracts, kidney damage, skin inflammation, reproductive disruption<sup>12</sup>. **Cost:** The cost of environmental disease in children in PA in 2008, was **\$3.74 billion/yr**<sup>13</sup>. These chemicals in our environment are responsible for rapidly increasing Alzheimer's dis. and Parkinsonism<sup>14</sup>. Elevated health risks for workers producing or working in plastics<sup>15</sup> (neoplasms, cancers, dis. of the circulatory system, severe chronic respiratory cond., genitourinary dis, kidney dis, psychiatric problems). CDC estimates costs of illness include: **Costs of medical resources to treat disease; Costs of non-medical resources to treat disease; Loss in productivity over the life time.**

**7) Recycling Machinery – Cost:** Removing plastic bags and plastic packaging that gum up machinery is the #1 cause of operational time lost. Plastic bags become stuck in sorting machines so badly that the cost of cleaning bags out was **\$60,000/mo. in 2010 in Portland's recycling plant.** SP Recycling cited that though plastic bags were 0.1% of material being recycled, the **bags cost 20-30 % of labor costs.** In 2017, Monroe Cty NY reported closing the machines at least once/day to clean out the bags. Phoenix AZ reported in 2018 that plastic bags cost the city **\$1,000,000/yr** in lost time.

**8) Tourism, 9) Invasive Species, 10) Illegal Dumping in State Parks and Forests.** See our longer submission to the Legislative Budget and Finance Committee for information about impacts.

**11) Fishing. Cost:** There are potential recreational and seafood industries' losses due to public awareness of the health risks from eating fish. A study found 100% of fish in reservoirs contained microplastics<sup>16</sup>. Plastics are common in river food webs<sup>17</sup>. The impacts include inflammatory responses, size-related toxicity of plastic particles, chemical transfer of adsorbed chemical pollutants, and disruption of the gut microbiome<sup>18</sup>.

**12) Plastics Recycling.** An internet search revealed 20 PA companies engaged in recycling of plastics. **Cost:** Recycling industry reported only a very limited number of plastic feedstocks were profitable, and plastic films and bags are not<sup>19</sup>. The recycling industry media reported that we are a long way from making plastics recycling feasible.

**13) Climate Change.** Production of plastics is 90% dependent on virgin fossil fuel feedstock. **Cost:** The cost for environmental degradation is **\$375 million/yr in PA** based on the United Nations estimated \$75 billion globally/yr from the natural capital cost of plastics, environmental degradation from plastics, climate change, and health risks. 18% of virgin plastics are made in North America<sup>20</sup>, and if ½ is produced in the U.S., and PA shipped 5-6% of national plastics in 2018<sup>21</sup>.

**14) Hazardous Materials Disposal. Costs:** Toxic chemicals are required to dissolve plastics from packaging and products, such as dichloromethane, toluene, chloroform, and acetone.

