Expanded Polystyrene (EPS) Reduction in Carroll County: Single-Use Food Service Ware and Loose Fill Packaging Products

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What is the background & purpose of this report?

In October 2017, Commissioner Frazier expressed interest in considering options to reduce the usage of single-use expanded polystyrene (EPS) food service ware and loose fill packaging products in Carroll County. At the joint meeting of the Board of County Commissioners and the Environmental Advisory Council (EAC) on February 8, 2018, the Board concurred with requesting the EAC to research single-use EPS food service ware and loose fill packaging products and options available to Carroll County to reduce its usage.

The EAC researched and identified potential options, their pros and cons and other considerations, as well as possible next steps if the Board decides to continue to move forward with a reduction initiative. On August 13, 2018, the Sierra Club (Sydney Jacobs), Dart Corporation (Paul Poe), Montgomery County (Eileen Kao), and the University of Maryland Environmental Finance Center (Mike Hunninghake) presented to the EAC various perspectives and data related to implementing an EPS ban to help inform the EAC's efforts. The EAC prepared this report of its findings to present to the Board.

Photo courtesy of http://www.intcorecycling.com/take-out-foam-containers-recycling-can-prevent-the-use-ban.html

What is expanded polystyrene (EPS)?

"Expanded polystyrene (EPS) is supplied in the form of small beads containing a chemical blowing agent. The beads are pre-expanded with steam to establish the density of the finished product and then steam-check-molded into lightweight products such as coffee cups, cooler chests, and protective packing inserts…" (Berins, 1991). EPS products include single-use hot and cold beverage cups, bowls, plates, trays, egg cartons, coolers, to-go clamshell containers – both those used by businesses as well as residents at home – plus foam packaging material.

EPS food service products are often mistakenly referred to as Styrofoam. However, Styrofoam™ brand foam is actually made from *extruded* polystyrene, which uses a different process to create the end product and tends to be more rigid. Extruded polystyrene is commonly used for building products, primarily in construction for wall, floor, and roof insulation, as well as crafts items, such as balls, spheres, cones, and other shapes.

In addition to food takeout cups and containers, EPS is also commonly used in loose fill packaging in the form of "foam peanuts" for shopping/packing material (note that biodegradable packing peanuts are made from starch rather than foam). These uses are considered single-use products, and are recyclable as plastic #6, but must be clean to be recycled. Clean EPS can be recycled by densifying and pelletizing the material and then incorporating it into the manufacture of picture frames, surfboards, baseboard, crown molding, foam insulation, and foam packaging (Home for Foam, 2017).

Nationwide, the amount of EPS being recycled averaged 18 percent until spiking to 38 percent in 2016 (Packaging Digest, 2017). In that year, 118.7 million pounds of material were recycled, with 63 million pounds coming from post-consumer and post-commercial streams, and 55.7 million pounds coming from post-industrial operations.

How are EPS food service and loose fill packaging products currently used and recycled in Carroll County?

EPS Users

EPS food service products are used by many food service establishments in the county, including several large institutions and employers with food service facilities, such as Carroll County Public Schools (CCPS) and Carroll Hospital Center. EPS products are used by many smaller local restaurants, and at large events, such as carnivals. Individual residents also account for a significant amount of EPS usage.

- The Carroll County Health Department (CCHD) issues roughly 650 food service licenses for restaurants, special events, and excluded organizations, such as non-profits. Many of those establishments use EPS for beverages, salads, plates, and to-go containers.

- CCPS uses roughly 1.4 million disposable EPS trays annually in its cafeterias for before-school and lunch programs for students. Those trays cannot be recycled due to food contamination. To reduce operational costs, five years ago, CCPS switched to EPS trays from reusable food ware that had to be washed.
- Carroll Hospital, a subsidiary of LifeBridge Health, uses single-use EPS food service products in its cafeteria, the Overlook Café, which is open to visitors and the public. The hospital uses washable food ware for serving patients. However, officials at the hospital indicated that plans are in the works to eliminate the use of single-use EPS products in their food service operations. That move is in response to a growing trend toward governmental restrictions on EPS use and environmental concerns.

Recycling

Since July 2011, Carroll County has offered free drop-off collection of post-consumer polystyrene foam #6 at the Northern Landfill, including the acceptance of *clean* food service containers and shaped molded foam packaging. The County operates the program, in cooperation with the Dart Container Corporation, as a service to residents. Dart Container also offers a drop-off collection facility at its distribution warehouse in Hampstead. The polystyrene must be clean to be accepted; otherwise, it is routed into the solid waste stream.

In 2017, the Northern Landfill collection site received 11,249 pounds of recyclable polystyrene foam, made up mostly of packaging material (Myers, 2018). Dart's drop-off site in Hampstead collected an additional 134 pounds for recycling. The diverted material from both sites was taken to Dart's plant near Lancaster, Pennsylvania, for reprocessing into other consumer products.

No exact figures are available detailing the percentage of EPS being recycled in the county and how much enters the Northern Landfill. A 2016 waste characterization study conducted for the Maryland Department of the Environment (MDE) found that EPS accounted for less than 1 percent of the material by weight in Maryland landfills. The study, which included the Northern Landfill, estimated that 31,046 tons of EPS was accepted at landfills and transfer stations in the state, of which 14,469 tons was strictly residential (Northeast Maryland Waste Disposal Authority, 2017). However, EPS is very light weight; the volume is proportionally greater than the corresponding volume of municipal waste overall. A waste conversion table from the U.S. Environmental Protection Agency (EPA) calculates that 1 cubic yard of EPS packaging weighs 32 pounds, compared to 1 cubic yard of overall municipal waste, which weighs 138 pounds (EPA, 2016).

Dart Container Corporation is one of the nation's leading manufacturers of single-use food service products. The Michigan-based company manufactures and distributes more than 4,000 types of products, including cups, plates, cutlery, containers, lids, and straws. Those items are made from materials such as expanded polystyrene foam, solid polystyrene, polypropylene, polyethylene terephthalate (PET), paper, and sugar cane. Dart is a major producer of expanded polystyrene cups and takeout food containers. It also sells products made with post-consumer recycled PET and a line of compostable products made from sugar cane.

Dart has made a significant effort to collect and recycle polystyrene foam #6, operating programs for large and small businesses and more than 40 drop-off facilities for the public, including one at its warehouse distribution facility in Hampstead. Dart employs roughly 150 people at that Hampstead distribution site, plus roughly 500 at a manufacturing plant in Federalsburg, Maryland.

(Dart, About Us, 2018)

Since Carroll County transports much of its residential waste to Pennsylvania for disposal, the volume of polystyrene included in residential trash transport is cost prohibitive by weight.

What is the importance of considering measures to reduce use in Carroll County?

EPS is very popular because of its ability to act as a great thermal insulator (heat cannot travel through EPS easily), its affordability, the sanitary benefits of single-use disposal, and its durability compared to paper. However, there are growing concerns over the impacts of EPS in the waste stream and the effects on human and animal health and the environment.

Waste Stream

Approximately 31,046 tons of EPS was accepted at Maryland landfills in 2016 (Northeast Maryland Waste Disposal Authority, 2017). By volume, 31,046 tons of EPS represents an equivalent of 1,940,375 cubic yards (32 lbs. per yard) or 52,390,125 cubic feet. Generally speaking, EPS requires approximately 4.31 times more space than the equivalent amount of other waste deposited to landfills. This same ratio applies to transportation of EPS compared to other waste products, as EPS must be condensed for transport to recycling centers. Densifiers, or compactors, that are able to compact 40,000 pounds of foam into a 48-foot trailer, make recycling more viable (Home for Foam, 2017, Recycling Equipment).

Calculations of EPS per Landfill

- 2,000 lbs * 31,046 tons = 62,092,000 pounds of EPS in 2016
- 62,092,000 / 32 (pounds in 1 cubic yard) = 1,940,375 cubic yards of EPS in 2016
- 1,940,375 * 27 (feet in a cubic yard) = 52,390,125 cubic feet of EPS in 2016

Furthermore, the ratio of 1 cubic yard of EPS = 32 pounds and 1 cubic yard of other waste = 138 lbs can be expressed as follows: 1 cubic yard of EPS takes up as much space as an equivalent 4.31 cubic yards, or 594.78 pounds of other waste.

(Northeast Maryland Waste Disposal Authority, 2017)

Carroll County proactively moved to reduce EPS in the waste stream through recycling. However, only clean EPS products can be accepted for recycling. This means that a significant amount of EPS still makes it into the waste stream, particularly those used for food products. Consumers purchasing take-out food often do not have the ability to clean it before disposing of it. Others simply do not know it needs to be cleaned or want to clean it. Eliminating EPS food and beverage containers from the waste stream would help to recover future volume at the landfill and on each trash truck run.

Environment

EPS's durability means that the material does not biodegrade in the environment or landfills. EPS poses a particular risk in the environment, where it easily breaks into smaller pieces and is carried by wind and rain into storm drains and waterways. EPS degrades into increasingly smaller bits known as microplastics (less than 5 mm) that absorb contaminants, such as oil and toxics, including PCBs and hydrocarbons.

EPS and other forms of plastics have become both a local and global problem in the environment, damaging wildlife, marine life, and economies. Ingestion of EPS has been recorded in birds, whales, turtles, and other marine animals (National Aquarium, 2017). Worldwide there is an estimated 8 million metric tons of plastic marine debris entering the oceans each year (National Aquarium, 2017). The amount of EPS used annually worldwide is staggering; the United States alone uses 25 billion foam cups every year.

The International Coastal Cleanup data for cleanups conducted across Maryland in 2016 revealed that 24% of all the **debris collected in Maryland** was from foam pieces (National Aquarium, 2017).

It should be noted that Carroll County has not identified a significant trash problem along streams in the county. In addition, most of the watersheds on the eastern side of the county do not contribute to trash pollution in the Bay or the Baltimore Harbor. These watersheds drain to drinking water reservoirs, where the dams restrict passage of litter downstream. However, in many areas of the state, microplastics contribute to the trash pollution in our waterways.

Health

Studies and experts for and against the use of EPS cite various other studies and express professional opinions about how harmful EPS is to humans, the plants/animals we consume, and the environment. While the Food and Drug Administration (FDA) has not banned the use of EPS in food services, it also has not endorsed the use of EPS. The effects of EPS are still being studied.

- Although the National Research Council endorsed earlier reports that styrene is "reasonably anticipated to be a human carcinogen," the health effects from exposure to manufactured expanded polystyrene are still being debated (NAS, 2014).
- Although many believe only very trace amounts of styrene leach out of EPS food service containers under heat and exposure to fats, oils, acids, and alcohol, research has shown that styrene accumulates at the cellular level within a body (bio-accumulates). Chronic long-term exposure to styrene in humans can affect the central nervous system, causing headaches, fatigue, weakness and depression, according to the EPA (EPA, 2000).
- EPS is referred to as a persistent organic chemical because it breaks down into small pieces, but does not completely biodegrade ("Pollution and Toxins: General," n.d.). Therefore, health concerns extend to animals that consume EPS that remains on the soil surface or water. A 2016 study conducted for the Chesapeake Bay Program noted that plastic debris generally accumulates chemical contaminants, including persistent organic pollutants, algal toxins, and metals (Wardrop, et. al., 2016). Microplastics are ingested by animals that humans consume as food, including bivalves (oysters and mussels) and fish.
- The Environmental Working Group reported that significant levels of styrene have been found in 40 percent of Americans (Walker, et. al., 2016). However, it should be noted that "[m]ost people are exposed to styrene every day in tiny amounts that may be present in the air, primarily from automobile exhaust and cigarette smoke, or that occur naturally in food such as cinnamon, beef, coffee beans, peanuts, wheat, and strawberries. These generally are trace amounts…" (Dart, The Truth…, 2018).
- A variety of studies also have demonstrated a wide range of adverse physiologic and neurologic effects to workers in the EPS industry.

What steps have been taken by the state and other Maryland jurisdictions to reduce EPS food service and loose fill packaging product usage?

Maryland Legislation

In 2017, legislation was introduced in the Maryland General Assembly that would have banned EPS food service products and packing peanuts in Maryland. House Bill (HB) 229 and Senate Bill (SB) 186 would have prohibited the sale and distribution of EPS food service and loose fill packing materials beginning in 2018. Neither bill passed in 2017.

In 2018, another attempt was made to pass State legislation to ban EPS. HB 538 and SB 651 were cross-filed bills that proposed to prohibit the sale or use of food service EPS products at certain food service businesses and schools. Neither bill passed in the 2018 session.

Other Jurisdictions

More than 100 jurisdictions, mostly counties and cities, across the country have enacted some form of polystyrene ban over the past several years. Within Maryland, Prince George's and Montgomery counties and the cities of Gaithersburg, Rockville, Takoma Park, and Baltimore have adopted a ban on EPS usage. All of these jurisdictions provide information for the public on their websites and/or have public outreach materials available, including information on alternatives to EPS. The following table provides general information on the status and applicability of these jurisdictions' ban.

Y=Yes, N=No, U=Unspecified Jurisdictions / Provisions	Montgomery County	Prince George's County	Baltimore City	Gaithersburg	Rockville	Takoma Park
Year Adopted/Effective	**2016**	**2015**	**2018**	**2016**	**2017**	**2015**
Prohibit use at food service businesses?	Y	Y	Y	Y	Y	Y
Prohibit sale of loose fill packaging?	Y	Y	N	Y	Y	N
Require food service businesses to use recyclable or compostable products?	Y	N	N	Y	Y	N
Apply to food service operated on behalf of county/muni?	Y	Y	N	Y	Y	Y
Apply to non-profits?	Y	U	U	Y	Y	U
Apply to all retailers?	Y	U	U	Y	Y	U
Apply to food & beverage filled and sealed in foam containers prior to receipt by a local food service business?	N	N	N	N	N	N
Apply to foam packaging for raw, uncooked or butchered meat, fish, poultry, or seafood for off-premises consumption?	N	N	N	N	N	N

All of these jurisdictions included a phase-in period in their legislation to allow those affected by the restrictions to use up existing stocks of EPS and provide a period for public and business educational outreach. Enforcement of those restrictions varies by jurisdiction. Prince George's and Montgomery counties handle information and enforcement through their respective environmental departments, and

both counties report successful compliance. Takoma Park's code enforcement officer investigates on a complaint-driven basis.

How does the cost of EPS food service and loose fill packaging products compare to compostable and/or recyclable alternatives?

Food ware manufactured from expanded polystyrene generally is less expensive than compostable and some recyclable products, but can vary depending on product and supplier. The City of Takoma Park's website includes a unit cost analysis comparing polystyrene products and alternative food service ware. It showed an average cost change of $2.04 per 100 units for seven examined products for sale at Costco, including compostable forks and cups. Paper-lined 8-ounce cups, for instance, were $0.02 more expensive per unit than foam cups (Takoma Park, 2015).

A comparison of products available on Amazon showed that a 1,000-unit case of Dart 16-ounce Cafe foam cups sells for $71.40, while an Eco-Products 16-ounce compostable cold cup sells for $103.94 per 1,000 units. The difference breaks down to $32.54 or $0.03 per unit. There is a larger price difference for takeout containers. A case of 200 Dart 80HT3R carryout foam food containers (8 x 7 ½-inch) lists for $43.83, compared to 200 Houseables takeout containers (8 x 8-inch) for $79.98, a $0.36 difference per unit.

Foam packing peanuts cost roughly 59 percent less than biodegradable starch peanuts. Air pillows and bubble wrap that you inflate are slightly higher in cost than foam peanuts, but both also require an air filling machine. Pre-filled bubble wrap is almost double the cost of foam peanuts. Paper/newsprint is roughly the same cost (Fabregas, 2017).

According to Parcel Industry (Parcel, 2018), "[at] $50 per 500-bag roll, inflatable packing with [certain air-filling machines] costs roughly $1 per cubic foot of fill compared to $1.30 to $1.90 per cubic foot for retail-priced peanuts." Prices for an air-filling machine appear to vary widely, but it was $475 for the system referenced on this webpage, and ranged from $1,500 to $4,000 in the FitSmallBusiness.com article (Fabregas, 2017).

What are the general benefits/opportunities and disadvantages/challenges of implementing measures to reduce EPS food service and loose fill packaging product usage in Carroll County?

No matter what the benefits or opportunities, policy decisions often come with tradeoffs and may have unintended consequences. Therefore, it is important to carefully consider the benefits and challenges to help inform policy decisions and minimize undesired trade-offs that may result.

Benefits/Opportunities

Reduction of EPS food service and loose fill packaging product usage could reduce the volume of the solid waste stream, lessen potential negative effects on public health, and decrease impacts on the environment.

Restaurants, retail establishments, and institutions that serve food and drinks would be most directly impacted by a ban.

- Restaurants nationally are trending toward replacing EPS food ware with alternatives. Several large restaurant chains have already eliminated or announced plans to eliminate EPS.
- Reducing EPS food service ware and loose fill packaging product usage in the county, and possibly requiring the use of recyclable, biodegradable, or compostable products as alternatives, could help prevent litter and reduce microplastic pollution in the natural environment. Compostable products contaminated with food could still be composted along with food scraps if a composting facility is available.
- An indirect benefit of requiring recyclable or compostable materials for single-use food ware instead of EPS is the potential to create additional demand for these recyclable/compostable products, which would drive the cost down over time.

McDonalds phased out foam cups for hot beverages in 2012 and plans to eliminate the use of foam packaging globally by the end of 2018 (Recycling Today, 2018). Dunkin Donuts announced in February that it would eliminate polystyrene foam cups in its global supply chain beginning in the spring of 2018. The chain restaurant plans to eliminate foam cups altogether by 2020, replacing them with double-walled paper cups (Sanicola, 2018).

> "The properties and processability of biodegradable polymers have improved, allowing the use of these materials in a broader range of applications, but legislation is the single most important demand driver for these plastics"… biodegradable polymer use has grown more slowly or stagnated in places that lack mandates. "Growing consumer awareness and activism regarding environmental issues could certainly increase the market for biodegradable plastic." (Hackett, Masuda, & Zeng, 2018).

- EPS foam peanuts tend to take more storage space than many of the alternatives. The peanuts also tend to be difficult to decompose. Biodegradable packing peanuts, however, are starch-based. They dissolve in water and do not have an electrostatic charge (so they don't stick to things as easily). They can be composted after a single use (Fabregas, 2017).

Disadvantages/Challenges

- Despite the decreasing prices of compostable or recyclable EPS single-use food ware alternatives, switching from EPS single-use food ware for CCPS and other allied agencies may increase costs until the demand drives the price down farther.
- Mid-Atlantic Go Foam, an affiliate of Dart Container Corporation, states that EPS saves schools, businesses, consumers, and governments millions of dollars each year. The organization says food-grade EPS containers are two to three times less expensive than alternative containers. (Mid-Atlantic Go Foam, n.d.)
- Based on stream corridor assessments conducted on Carroll County streams by the Bureau of Resource Management staff, litter is not currently a significant issue for Carroll County streams, and, therefore, may not support using local stream litter as a basis.

- Depending on perspective and the aspect of environmental concern, EPS may have less environmental impact than some of its alternatives.

  > …paper is sometimes assumed to be environmentally preferable to plastic because it is made of renewable resources and is readily recyclable in curbside programs. However, a paper bag has over three times the global warming potential of a conventional plastic bag. Over its lifecycle, paper requires several times more energy, fossil fuel and water use, causes more greenhouse gas emissions, and results in more solid waste than thin plastic film. If reuse of a plastic bag is factored in, the lifecycle difference between plastic and paper grows even wider. When a plastic bag is reused for shopping or as a trash can liner its footprint is cut in half by lessening the need for new bags. And when a sturdier reusable plastic bag is reused multiple times, it environmentally outperforms both paper and plastic—even though it requires more resources to produce initially. Yet, using a reusable bag just once and then letting it sit in a closet significantly undermines its potential benefit over a single-use bag. (Minnesota Pollution Control Agency, 2016)

- EPS peanuts use less energy and resources to manufacture than the paper alternatives. In addition, biodegradable packing peanuts weigh more than foam peanuts. Because they dissolve in water, they may also lose volume in damp environments.
- Compostable alternatives cannot be recycled. "To truly capture the benefits of these biodegradable polymers, however, you need to have the collection and composting infrastructure to support their use…" (Hackett et. al. 2018). Without a composting facility, most compostable alternatives would still be part of the waste stream. While these materials do break down more quickly than EPS, most still take a while to do so outside of an industrial composting facility.

What options are there for Carroll County to reduce EPS food service and loose fill packaging product usage?

Several options for reducing EPS usage are available for consideration by the Board of County Commissioners. A ban is not the only option. The options range from voluntary measures and public outreach to adopting a ban and/or providing additional facilities for handling EPS. The Board could choose to pursue any or all of these options. The general advantages indicated above are the primary reasons to pursue reduction of EPS in Carroll County. The primary challenge for most of these options overall is capital and implementation costs to the County, potential costs to businesses and consumers for alterative products, and lack of a market for recycled EPS. In addition to the specific advantages or challenges discussed above, individual options could result in tradeoffs or unintended consequences without full consideration of potential benefits and impacts.

It should be noted that costs and feasibility details vary widely even among the same option and are beyond the scope and experience of the EAC. More detailed cost and feasibility studies, either from DPW staff or a consultant, would likely be needed to compare and pursue these options, as there are many variables to consider.

In addition to County agencies and CCPS, the businesses most likely to be impacted, depending on the extent of the ban, include, but are not limited to:

- Cafés and delicatessens
- Cafeterias
- Coffee shops
- Convenience stores
- Discount stores
- Dollar stores
- Fast food restaurants
- Food carts or trucks
- Full and limited-service restaurants
- Pack and ship stores
- Shippers
- Retailers and wholesalers selling disposable dishware, storage containers, packing materials, and polystyrene products
- Supermarkets and grocery stores
- Non-profits and fundraising groups

To determine the extent of foam usage by Carroll County businesses and the potential impact of a ban, a survey of restaurants and food service businesses, and/or businesses that ship products with packing materials, could be administered. Prior to passing legislation in Prince George's County, the Sierra Club surveyed 186 eateries in that county and found that 75 percent had at least one EPS item in use. However, the survey found businesses were also using other types of single-use containers that were of recyclable plastic, paper, or aluminum. Only 3 percent were exclusively using EPS containers. Martha Ainsworth of Maryland Sierra Club offered Sierra Club's survey as a tool or model for a local survey effort.

Public Outreach to Promote Voluntary Reduction

Whether consumers and businesses are free to choose EPS or an alternative product, or a ban is enacted, efforts could be made to reach out to the public to encourage voluntary reduction in EPS usage. Whether implemented as a standalone measure or in conjunction with other reduction measures, public outreach to reduce EPS usage can promote an environmentally friendly community perception. Voluntary programs can be implemented more quickly, do not require enforcement, and allow more flexibility for businesses (Heverly, et. al., 2017).

Residents:

A. Develop public outreach materials for Carroll County residents. Materials should address what EPS is, why it is important to reduce its use, and what each person can do at home and through the course of their daily lives to reduce use. Information should include how to properly clean and recycle EPS, including where to recycle it. As businesses shift to compostable materials, outreach to residents should include composting information.

B. Encourage Carroll County residents to urge their local eateries and restaurants to discontinue the use of EPS food service products in their everyday take out and food service prep. Many customers prefer to support businesses that do not use EPS food service products.

C. Encourage Carroll County residents to use non-EPS packaging materials when shipping items or to request them when using packing/shipping services.

Businesses:

D. Materials similar to residential outreach materials could be developed, but geared more toward the commercial application. A guide to alternative products could be developed as an additional resource for affected food establishments and/or businesses that use packaging materials.

E. A voluntary polystyrene reduction could be promoted through the creation of an informational sharing network, promotion, and perhaps assistance with a co-operative purchasing program for alternative

food service products. As part of its legislation to restrict use of EPS, Montgomery County maintains an up-to-date website of companies offering EPS alternatives, which Carroll County could offer as well.

F. Recognition awards for restaurants and retail establishments and/or businesses that use packaging materials and that reduce waste and provide green alternatives could be offered. These businesses also could be nominated for the EAC's Environmental Awareness Awards.

G. County businesses, particularly food service establishments and/or businesses that use packaging materials, could be surveyed to gather information about the use, expenditures, disposal practices, and impacts of EPS food container use in the county, and possibly the level of willingness to switch to alternative products.

Facilitate Additional Recycling Collection & Facilities

H. ***Promote Recyclable EPS Collection at Grocery Stores, Superstores, and/or Restaurants***: As grocery stores and large retailers, such as Target and Walmart, do now for plastic bags, collection facilities could be set up at grocery stores. This may have to be done with business incentives for those establishments that are willing to take on the burden of collecting the EPS and in conjunction with Dart.

I. ***Establish Modern EPS Collection Facility at Resource Recovery Park (Northern Landfill)***: This would include cleaning facilities for EPS so that more of it can be recycled and kept out of the landfill itself, which require additional water use. This option would involve a capital investment and need to be coordinated with an outreach program to increase EPS food ware and foam packing peanuts drop-off. Most of the EPS dropped off at the Resource Recovery Park now is packaging, which does not require cleaning. Currently, the single-stream recyclable materials collected at the Resource Recovery Park are transferred to trucks and taken to a Materials Recovery Facility (MRF) where the recyclable materials are separated and sent to various markets for sale. EPS is not currently accepted in the single-stream recycling program. Unfortunately, recycling of EPS as a County initiative is probably not economically feasible at this time as there is currently a "lack of demand for recycled EPS, which is hard to turn into new products" (Heverly, et. al., 2017).

J. ***Allow EPS in the Single-Stream Recycling Collection***: EPS could be incorporated to the single-stream curbside recycling collection. This approach would be the one most likely to encourage the greatest amount of EPS recycling. However, it may also be even more difficult to control the cleanliness of the product that enters the recycling stream. Recyclables contaminated with food product lower the value of the recyclable materials and may cause an entire bale of recyclables to be rejected and sent to a landfill (Green Mountain Compost, 2018). Curbside collection may also be problematic because the light weight of EPS makes it easy for even a slight breeze to blow material out of the containers, particularly with foam packing peanuts. All of the considerations and costs in Option I above to establish a collection facility would apply here, as this would be an extension of that option.

K. ***Explore Concurrent Installation of Composting Facility for Compostable EPS Alternatives***: In conjunction with reduction of EPS food service and loose fill packaging product usage and public outreach to encourage recycling of clean containers, the County could explore installation of a composting facility to accommodate compostable alternatives as the use increases with the concurrent decrease in EPS use. Many jurisdictions offer food scrap composting along with the compostable

alternative food ware products. Most compostable products need the environment of an industrial composting facility to decompose, although a few types may decompose in backyard compost bins.

Compostable food service ware is "made from renewable resources such as corn, sugar cane, grasses, palm leaves, and wood instead of petroleum-derived plastic polymers… Compostable products sent to a landfill (thrown in the trash) will not degrade to an acceptable degree" (CSWD, 2015). "When burned in an incinerator or placed in a landfill, compostable products generally do not offer an environmental benefit over other plastics or paper. In a landfill, they will emit methane, a potent GHG [greenhouse gas], to the extent that they decompose at all. Landfills, with lack of air circulation, are designed to hold waste, not to allow things to breakdown, and most certainly do not facilitate composting... Switches to compostable products are beneficial only if there are prevalent organics collections programs in place" (MCPA, 2016). "To date, most certified compostable products require commercial composting conditions in order to be composted in a reasonable time frame" (CSWD, 2015). Products need to be made entirely from uncoated paper or other plant fiber to be composted in a backyard system (CSWD, 2015).

Installing a composting facility at the Resource Recovery Park would involve a capital outlay and additional staff resources. Currently, no regional composting facilities are available in Maryland, and the few other counties that have them generally do not accept compost materials from other jurisdictions.

Establish & Implement Policy to Reduce Use at Carroll County Government & Allied Partner Facilities

L. The Board of County Commissioners and its allied partners – such as CCPS, Carroll County Public Libraries, and the County Sheriff's Office and Detention Facility – could implement a policy to shift from using EPS food service products to using other EPS alternatives at these facilities. This option could be implemented individually or in conjunction with other options and with or without the allied agencies. Instituting this policy at County-funded facilities would demonstrate leadership and environmental stewardship. Options for pool purchasing of alternative products with other jurisdictions that have approved restrictions on EPS use can be explored to mitigate the likely increased costs of alternatives.

- As an example, CCPS saved roughly $100,000 annually by switching from reusable food ware to EPS single-use food ware five years ago. According to Karen Sarno, CCPS Supervisor of Food Services, CCPS saved $164,000 annually in labor costs associated with cleaning trays and other food ware. That savings does not include reduced use of detergent, maintenance costs, and the energy saved by not using dishwashing equipment. CCPS also was facing the imminent replacement of several dishwashing machines, which costs roughly $25,000 each (Sarno, 2018). Replacing EPS single-use food ware with compostable compartment trays would increase material costs for CCPS by roughly $40,000 annually, from $0.0306 to $0.065 per tray as priced by CCPS in the spring of 2017 (Sarno, 2018). Prices for single-use EPS trays have decreased over the past 5 years from $0.075 to $0.065. Costs are expected to continue to decrease over time.

Additional measures, which can be implemented with or without a formal policy, can be explored to reduce costs or help make the transition to alternatives from EPS.

M. A portion of the additional costs for alternative food ware could be offset by joining with other county school systems to bulk purchase alternative food ware. Montgomery County, which eliminated EPS trays in 2015, has stated a willingness to allow other school districts to ride on its purchasing orders (McCarron, 2018).

N. Various programs can be explored to transition to alternative food ware in schools and other allied agencies. For example, schools and colleges across the country have implemented "Trayless Tuesdays," where trays are eliminated for the day. While this movement is partially intended to reduce the amount of food waste and cleaning of food ware, non-greasy food items are also often served in "paper boats" rather than EPS on these days. (http://www.cafeteriaculture.org/trayless-tuesdays.html)

O. Potential compost collection agreements with local farms or businesses, such as Veteran Compost, could be explored. Veteran Compost is a veteran-owned company in Maryland that turns food scraps into high-quality compost. (https://www.veterancompost.com/)

Pass Local Legislation to Curb EPS Food Service and/or Loose Fill Packaging Product Usage

The Board of County Commissioners could adopt local legislation to ban the use of EPS at Carroll County food service establishments, County and allied partner facilities, and other major users of EPS food service and/or loose fill packaging products in Carroll County. Local legislation could be modeled after the recent bills submitted in the General Assembly or those passed by other county and city governments in the state. The details of how the legislation's provisions would be structured and how it would be enforced should be determined during the staff process to draft an ordinance for the Board's review. Costs to businesses to implement a ban could potentially be offset by organizing bulk purchasing or a cooperative agreement.

Food Service Industry

P. A full or partial ban applied to the food service industry could ban the usage of EPS as follows:

- Prohibit food service businesses from using EPS, such as foam containers, bowls, plates, trays, cartons, cups, egg cartons, etc., including carry-out and take-home containers, and/or
- Require all other food service businesses to use compostable or recyclable disposable food service ware.

A partial ban could also *exempt* food and beverages filled and sealed in foam containers prior to receipt by the food service business or foam packaging for raw, uncooked or butchered meat, fish, poultry or seafood for off-premises consumption.

Q. Some jurisdictions, such as Washington D.C. and San Jose, instituted a concurrent charge on alternative products that was meant to discourage an increase in certain alternative products as a result. Some jurisdictions return a portion or all of this charge to the business charging the fee to help offset increased costs (MCPA, 2016).

Other

A ban could be extended beyond the food service industry to include non-food related packaging and/or County agencies and facilities, which would:

R. Prohibit the sale of polystyrene loose fill packaging (also known as packing peanuts) products.

S. Require all County agencies, contractors, lessees, and allied partners to use compostable or recyclable food service ware and loose fill packaging materials.

Other considerations if a ban is contemplated include:

- The legislation and experience of other Maryland jurisdictions can be used to craft local legislation with the desired provisions.
- According to the Fiscal & Policy Note for HB 538 in the 2018 legislative session (MLS, 2018), the proposed ban was not anticipated to materially affect local government expenditures and have minimal effect overall on small businesses.
- If a ban was enacted, business owners would be responsible for phasing out and bearing the costs of switching from EPS to alternative products. Specific costs would depend on the extent of current usage by any individual business. These costs would most likely either be absorbed by the business or passed on to customers. Based on the Takoma Park price comparison (Takoma Park, 2015), or the Amazon comparison discussed previously, the cost passed on to customers could be between $0.02 and less than $0.50 per food ware item.
- The Carroll County Chamber of Commerce (CCCC) opposed efforts at the state level to enact a ban on food service EPS. CCCC indicated that prohibiting polystyrene products statewide creates significant cost increases and job loss, and "would do nothing but harm businesses" (CCCC, 2018). No cost impact estimates were provided.
- Compliance, enforcement, and informational outreach may be additional costs to the County.
- A ban may decrease demand for EPS products manufactured by Dart Container Corporation, which has a local distribution facility. In addition, Dart may no longer offer EPS recycling collection. Dart's entire facility in Hampstead currently employs roughly 80 FTE people.
- To achieve the goals of implementing a ban may require investment in new or expanded facilities as well. A ban or program that drives a shift to more compostable cups and food ware and/or packing materials may still result in material entering the solid waste stream unless there are alternative outlets for disposal, such as an industrial composting facility. Many of these compostable products only decompose within an industrial composting facility. A shift to alternative products may also drive the need for an expanded recycling facility.
- Consumer education and a phased-in approach may help mitigate the impacts of a ban and create a smoother transition, as well as identification of available alternative replacement products.

Create Incentives Intended to Promote Reduced EPS Usage

Small businesses could be incentivized to stop using food service foam and/or foam packing peanuts. Incentives are intended to promote a desired outcome by providing otherwise unavailable benefits to engaging in that activity. Examples of possible incentives include, but are not limited to:

T. A small tax break,
U. Reimbursing businesses the difference between the EPS food ware and an alternative product, and/or
V. Creating a rewards program for businesses that replace EPS food service and/or loose fill packaging product usage with other alternatives.

With these options, the County must consider its ability to provide sufficient financial incentives in lieu of or in combination with other measures that might need to be put in place.

Explore Possibility of Facilities Elsewhere to Dispose of EPS

W. ***Incineration:*** In conjunction with efforts to reduce EPS usage, EPS could be transported from the landfill to an incinerator facility that would accept EPS and is within a reasonable driving distance from Carroll County, such as the waste-to-energy facility in Baltimore. This would give the County an alternative to disposing of EPS in the landfill at the Resource Recovery Park, but would still involve transportation costs to haul the EPS.

What are additional considerations and/or possible next steps before the Board moves forward with measures to reduce EPS food service ware and/or loose fill packaging product usage in Carroll County?

This report provides general information and options to help the Board determine whether to investigate further or to move forward with some action to help reduce EPS usage. Some actions can be implemented more easily and sooner than other options, and are not necessarily contingent on decision regarding or implementation of other options, such as public outreach. Some actions may be exclusive of others, while some actions, such as public outreach, may be able to be implemented by themselves *or* along with other options.

1. For a guide to questions policy makers should consider in making a decision on a product ban, review the document at the Appendix entitled *Product Bans and Restrictions: A guide for local government policy makers*.
2. Clearly identify the goal of reducing EPS usage, priorities for outcomes, and the types of EPS products to be addressed. Determine if the reason for the reduction would be due to its environmental impact, solid waste reduction, litter, health/toxicity, or a combination thereof. This may help determine or prioritize measures to move forward.
3. More thoroughly research the costs to the County of implementing a mandatory reduction in EPS usage. A cost-benefit analysis should include, but is not limited to, the potential need for new or expanded facilities, additional staff resources, transportation and hauling costs, etc.
4. More thoroughly research costs for food service product alternatives to EPS items, including products made from recyclable plastic and paper and/or compostable plastics and plant fibers. This will help identify costs associated with transition to alternative products at County/partner facilities and businesses. This could include a survey of local businesses and allied partner agencies.
5. More thoroughly research costs for loose fill packaging product alternatives to EPS items.
6. Research or conduct a life cycle assessment of EPS and alternative packaging. A life cycle assessment provides information about a product from raw materials to manufacturing to transportation to end of use and disposal ("cradle-to-grave") and would help to provide a more complete picture of the potential trade-offs that the Board may be willing to make if a reduction in EPS was promoted or an EPS ban was enacted.

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Appendix

Product Bans and Restrictions: A guide for local government policy makers by Minnesota Pollution Control Agency, February 2016.

Product Bans and Restrictions:

A guide for local government policy makers

Minnesota Pollution Control Agency

February 2016

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Prologue: The City Council Meeting

The scenario: Molly Marten and one of her fellow city council members are leaving the meeting room.

"*That* was an interesting meeting," he said. "I wouldn't have thought that a discussion about bags would get so heated."

Molly paused to think. "I'm glad we decided to continue the discussion at our next meeting. The neighborhood representatives and the grocer made good points, but I'm not sure what we should do. We've got the neighborhood saying we should ban plastic bags because they can't go in the curbside recycling..."

Her colleague turned towards her. "I agree with the neighborhood about the bags being an eyesore. Just the other day I saw one drifting across a parking lot like a tumbleweed…but I don't know that banning the bags will eliminate the plastic bag litter out there."

Molly added, "True, and the grocer's information about how plastic bags are better for the environment than paper bags surprised me. I've never heard that before."

"It's great to hear that the grocer is willing to collect and recycle plastic bags."

"Sure, but I don't know if that will eliminate plastic bags litter either. I've read about other cities banning plastic and paper bags, but I don't know if they've been successful. I have a lot of questions to answer before the next meeting," Molly said thoughtfully.

What's next? This document will point Molly to information she and her fellow council members need as they decide what to do.

What's important to know about product bans and restrictions?

This document provides answers to questions such as:

- Why do communities decide to restrict or ban products?
- How can communities look at these issues from an environmental perspective?
- How can communities use all of this information?
- Which communities have enacted product restrictions or bans?

What should local government policy makers consider?

This document offers questions policymakers should ask themselves as they consider whether to ban or restrict a specific product, including:

- What problem are we trying to solve?
- As we're deciding whether to ban or restrict use of a particular product, have we thought about the product's lifecycle?
- What trade-offs in outcomes are likely and are we willing to make?
- Which environmental outcomes are most important to our community—total environmental impacts or solid waste generation?
- Would restricting or banning a specific product increase the use of other products that are worse from an environmental perspective?
- What other portions of the waste stream would have a greater environmental impact than the product we are considering?

Overview

Over the last few years, many local, state and international governments have enacted ordinances and laws to restrict the sale, distribution or use of some consumer products. The most common product restrictions (including fees and bans) to date are directed at single-use shopping bags, polystyrene containers and bottled water. Some local governments in Minnesota have sought guidance as they consider whether to restrict these types of products at all, and if they do, how to craft the most effective policy.

The Minnesota Pollution Control Agency (MPCA) prepared this document as a resource for local governments during their decision making processes. The MPCA has no plans to promote a specific policy at the state level. However, agency comments about specific single-use product policy can be found on page 19 of this document and MPCA staff are able to provide additional technical information and assistance to cities and counties.

Local government actions could include voluntary educational efforts or projects to foster increased reuse or recycling behavior or infrastructure, or regulatory fees, bonuses/refunds, or outright bans.

This guide primarily examines impacts of bonuses, fees or bans on sale or distribution from an environmental perspective. It does not examine disposal bans that restrict placing specific items in the trash nor does it review educational campaigns. When considering a product restriction or ban, policy makers weigh the potential positive and negative impacts of their decisions on various constituent groups, the potential for a policy to actually address an identified problem or issue, and the values held by the community.

Many times actions that seem evident, popular or “the right thing to do” can result in unintended consequences—good or bad.

This document provides information that may be useful to policy makers as they consider whether to adopt product restrictions or bans. It also identifies key questions that may help contribute to policy discussions.

Why and how do communities restrict products?

At the heart of decisions about whether to restrict or ban a product is a set of values, a specific goal, or a problem. Once the goal is clear, then the question becomes how to craft a policy that reaches that goal. Common reasons for restricting products include:

- **Environmental impact**: Is there a desire to decrease greenhouse gas emissions, energy or natural resource use, air or water pollution?
- **Solid waste reduction**: Is there a desire to meet a comprehensive solid waste plan goal or become a “zero waste to disposal” city?
- **Litter**: Does the product have a documented adverse impact on local aesthetics or cause potential harm to ecosystems and wildlife?
- **Health/toxicity**: Does the production, use or disposal of the product release chemicals that negatively affect living organisms?
- **Social or environmental justice**: Is the production, use or disposal of the product adversely affecting a specific group of people?

Different goals require different policies

It is laudable for communities to draw attention to behaviors and products that have environmentally beneficial impacts. The key is for this intention to be translated into well-crafted policies to achieve specifically defined environmental outcomes rather than a general, less-specific outcome of "environmentally friendly." Why? Because in this arena of consumer products, there can be contradictory trade-offs in impacts that make defining "environmentally friendly" complex.

Potential trade-offs in policy impacts

Historically, single attributes like "recyclability" or "made from renewable materials" were the primary factors used to evaluate products from an environmental perspective. Now, tools like life cycle assessment (LCA) allow policy professionals to have a more complete environmental picture.[1] A life cycle assessment details all environmental impacts of a product throughout all stages of the product's life. It takes into account the amount of resources that go into the product and the emissions, waste, and pollution that result from the manufacture, distribution, use and disposal of a product. An LCA may also detail outcomes like ecosystem toxicity and human health impacts caused throughout a product's life cycle.

For single-use disposable products, *making* the product usually causes the large majority of the environmental impact. Discard choices, whether an item is recycled, incinerated or landfilled matters, once the product is created.

For bottled water, life cycle analysis shows that recycling the bottle reduces energy consumption and greenhouse gas emissions (GHG) by about 20% compared to disposing of it. Tap water in a reusable bottle however, can result in about 80-90% reductions of GHG and other impacts.[2] Why? Because most of the environmental impact occurs prior to discarding the bottle, during making of the disposable bottle, and bottling and transporting the water.

Some of the facts about a product's lifecycle may be counterintuitive. For example, paper is sometimes assumed to be environmentally preferable to plastic because it is made of renewable resources and is readily recyclable in curbside programs. However, a paper bag has over three times the global warming potential of a conventional plastic bag.[3] Over its lifecycle, paper requires several times more energy, fossil fuel and water use, causes more greenhouse gas emissions, and results in more solid waste than thin plastic film.

If reuse of a plastic bag is factored in, the lifecycle difference between plastic and paper grows even wider.[4] When a plastic bag is reused for shopping or as a trash can liner its footprint is cut in half by lessening the need for new bags. And when a sturdier reusable plastic bag is reused multiple times, it

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[1] For example, see Environmental Protection Agency's LCA examples. http://www.epa.gov/saferchoice/design-environment-life-cycle-assessments Accessed 1/20/16.

[2] Oregon Department of Environmental Quality. *Comparing Prevention, Recycling, and Disposal: a supplement to DEQ's 'Life Cycle Assessment of Drinking Water Delivery Systems'*. DEQ 09-LQ-103, http://www.deq.state.or.us/lq/pubs/docs/sw/LifeCycleAssessmentDrinkingWaterSupplement.pdf Accessed 11/23/15.

[3] Edwards, C. and Meyhoff Fry, J. *Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006*. Environment Agency Report SC030148, February 2011, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291023/scho0711buan-e-e.pdf

[4] Mattila, T., Kujanpää, M., Dahlbo, H., Soukka, R. and Myllymaa, T. Uncertainty and Sensitivity in the Carbon Footprint of Shopping Bags. *Journal of Industrial Ecology* 15(2011):217–227. doi:10.1111/j.1530-9290.2010.00326.x

environmentally outperforms both paper and plastic—even though it requires more resources to produce initially.[5] Yet, using a reusable bag just once and then letting it sit in a closet significantly undermines its potential benefit over a single-use bag.

Table 1 compares the environmental impacts of single-use plastic, single-use paper and reusable polypropylene bags in different reuse scenarios. It reveals that reuse is a critical consideration for otherwise short lived, single-use products.

Table 1: Environmental impacts of HDPE, paper, and reusable polypropylene (PP) bags under different reuse scenarios.

Impact Category	HDPE bag (used once)*	HDPE bag (as used currently; 40.3% reused as bin liners)	Paper (used once)	Paper (used 2 times)	Reusable PP bag (used once)*	Reusable PP bag (reused 14 times)	Reusable PP bag (reused 50 times)*
Global warming potential (kg CO2 eq)	2.2	1.6	5.5	2.8	21.5	1.5	0.4
Human toxicity (kg 1,4-Dichlorobenzene (DB) equivalent)	0.3	0.2	3.2	1.6	3.0	0.2	0.1
Fresh water aquatic ecotoxicity (g 1,4-DB eq)	93.8	66.9	150.2	75.1	467.7	33.4	9.4
Marine aquatic ecotoxicity (kg 1,4-DB eq)	177.4	126.5	244.7	122.3	1411.3	100.8	28.2
Terrestreial ecotoxicity (g 1,4-DB eq)	2.4	1.7	24.7	12.4	50.8	3.6	1.0

*This column based on MPCA extrapolation of Edwards & Fry, 2011 data.
Source: Edwards, Chris and Fry, Jonna Meyhoff (2011). *Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006*. The Environment Agency; Tables 5.1, 5.4, 5.6.

For polystyrene, the California Integrated Waste Management Board found similar trade-offs, noting that polystyrene used less energy and chemical inputs and resulted in fewer emissions than other packaging types (e.g. paper), but caused more solid waste by volume.[6] In terms of toxics, styrene, from which polystyrene is made, is a likely carcinogen;[7] on the other hand, most types of packaging plastics leach

[5] Edwards and Fry (2011)
[6] California Integrated Waste Management Board (2004). *Use and disposal of polystyrene in California: a report to the California legislature*. www.calrecycle.ca.gov/publications/Documents/Plastics%5C43204003.doc Accessed 11/29/15.
[7] National Research Council (2014). *Review of the Styrene Assessment in the National Toxicology Program's 12th Report on Carcinogens*. http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=18725

chemicals that can interfere with human hormone activity.[8] A switch to paper or to other plastics may increase energy or chemical use, but raise recycling or composting rates.

In short, it's complicated. Policies will have trade-offs. There may be trade-offs in environmental impacts because of the relative impacts of different product materials or because of how a policy affects citizen behaviors.

Examples of possible environmental impact trade-offs or unintended consequences:

- If a policy causes a reduction in plastic bags, but drives an increase in paper bag use, that may increase recycling rates (because paper is more recovered and heavier), but also increase net greenhouse gas emissions.
- A policy that increases use of reusable shopping bags, but *also* drives more purchases of new trash can liner bags, may not result in less plastic or fewer emissions overall.[9]
- A policy that eliminates bottled water may find increased sales of less nutritional, more environmentally intensive soda (i.e. sugar production).
- A policy that bans polystyrene to reduce marine litter, may find that other types of plastics increase and there is no net change in marine litter.

Who has enacted a product restriction or ban?

Minnesota

A handful of Minnesota cities have considered product restrictions or bans. Recent passage of ordinances in Minneapolis and St. Louis Park restrict the use of takeout food containers that are not reusable, recyclable or compostable. Macalester College and College of St. Benedict have banned on-campus sales of bottled water. The state of Minnesota does not routinely offer single-use bottled water on state contract and Executive Order 11-13 sets a goal for agencies to reduce their use of bulk bottled water coolers.

Other Cities, Counties, States and Countries

Disposable shopping bags

There are currently no statewide bans or bag fees in the United States. California's law banning plastic bags state-wise is not yet in force, and is facing a referendum vote in November 2016[10]. However, many cities have bans, fees or combinations of these restrictions that apply to plastic or to both plastic and paper single-use shopping bags. In some cases, policies have been changed after implementation data are gathered (San Jose, CA) or repealed under political pressure (Dallas, TX). Some countries have banned or restricted the use of plastic bags, including China, France, Germany, India and Ireland.

Bottled water

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[8] Yang, C. Z., Yaniger, S. I., Jordan, V. C., Klein, D. J., & Bittner, G. D. (2011). Most plastic products release estrogenic chemicals: A potential health problem that can be solved. *Environmental Health Perspectives*, *119*(7), 989–996. http://doi.org/10.1289/ehp.1003220

[9] Frisman, Paul. *Effect of Plastic Bag Taxes and Bans on Garbage Bag Sales*. Connecticut General Assembly, Office of Legislative Research, Report 2008-R-0685, December 17, 2008. http//www.cga.ct.gov/2008/rpt/2008-R-0685.htm Accessed 6/16/15.

[10] McGreevey, P. California's plastic-bag ban put on hold by ballot referendum. *Los Angeles Times*, February 24, 2015. http://www.latimes.com/local/political/la-me-pc-california-plastic-bag-ban-20150223-story.html

Some colleges and universities in the United States have taken action to end the sales of bottled water on their campuses. A few municipalities and federal agencies have also banned bottled water sales in government facilities.

Polystyrene foam containers

There are some 65 city or county ordinances in California that ban the use of polystyrene food containers for food vendors, restaurants and at government facilities.[11] Polystyrene bans are also in place at the local level in other states including Florida, Maine, Oregon and Massachusetts. Additionally, Haiti has a (poorly enforced) ban on polystyrene containers, and Guyana plans to ban import and use of expanded polystyrene foam in 2016.

Policy Examples

The MPCA asked Minnesota local governments what information would be helpful when considering product restrictions or bans. Many asked for information about how other governments have approached this issue. Table 2 presents samples of policies addressing single-use shopping bags, polystyrene and bottled water. The examples illustrate different strategies communities have taken to meet identified needs and goals. The table is not comprehensive, but is intended to give an overview of policy approaches, stated goals, and outcomes (if any). Detailed citations are provided in footnotes for information about policy outcomes.

The table and referenced ordinances suggest that policies are often enacted with broad and varied sets of goals, and that policies are rarely evaluated. When policy evaluations are undertaken they often reveal unintended consequences.

For policy makers, the first step is to clearly identify the goal of a potential product restriction or ban. Knowing why community action is desired and for which specific outcomes grounds any policy development. The next step is to consider whether a restriction or ban will meet that goal, and what the trade-offs may be.

Questions to consider:

What problem(s) are we trying to solve?
What are our specific goals as we consider this product restriction or ban?
What trade-offs in outcomes are likely and are we willing to make?

[11] Surfrider Foundation, http://www.surfrider.org/pages/polystyrene-ordinances Accessed 1/21/16.

Table 2: Examples of bag, bottle and expanded polystyrene policies.

Disposable shopping bags

City	Ordinance / Policy	Enacted	Rationale	Impact	Ordinance
Austin, TX	Ban on single-use carryout bags. Allowed recycled paper, 4 mil or thicker recyclable plastic, and other reusable bags; promotes reusables.	March 2012	Increase use of reusable bags, reduce taxpayer waste processing costs, plastic bag impact on environment and wildlife, and support zero-waste goal.	• Reduction of plastic bag litter (estimated that plastic bag fraction of litter dropped from 0.12% to 0.03%) • Reduction in single-use plastic bags • No progress towards zero-waste; The thicker reusable plastic bags replaced single-use pound-for-pound in recycling stream and were landfilled as residual contamination[12]	https://www.municode.com/library/tx/austin/codes/code_of_ordinances?nodeId=TIT15UTRE_CH15-6SOWASE_ART7CABA
Portland, OR	Required select stores to only provide recycled paper bags or reusable bags to customers.	July 2011, amended in 2012	Encourage more use of reusable bags.	• Current policy acknowledged to decrease single-use plastic bags, but not necessarily all single-use bags • Among responding businesses, reusable bag use increased 304% • Recycled paper bag use increased 491%[13]	https://www.portlandoregon.gov/bps/article/422527

[12] Waters, Aaron (2015). *Environmental Effects of the Single Use Bag Ordinance in Austin, Texas*. Austin Resource Recovery. http://www.austintexas.gov/edims/document.cfm?id=232679

[13] Bureau of Planning and Sustainability, City of Portland, OR (2012). *Promoting reusable checkout bags in Portland: One-year report*. https://www.portlandoregon.gov/bps/article/419700. Accessed 11/29/15.

City	Ordinance / Policy	Enacted	Rationale	Impact	Ordinance
Washington D.C.	5-cent fee on plastic and paper single-use shopping bags. One cent goes to the business, four cents to a protection fund for the Anacostia River.	January 2010	Reduce the impact of plastic bag litter within the Anacostia River.	• Reduced plastic bag use[14] • Created funding for Anacostia River protection projects and programs[15] • Reduced litter in watershed and DC (estimates range 30-70%)[16]	http://dcregs.dc.gov/Gateway/ChapterHome.aspx?ChapterNumber=21-10
San Francisco, CA	Ban on single-use plastic bags, 10-cent charge on paper and reusable bags. All fee proceeds go to the business charging the fee.	April 2007	Reduce landfill waste and ultimately become a zero waste community.	• Reduction in bag litter from 73% in 2008 to 57% in 2009[17]	http://sf311.org/index.aspx?page=552.
San Jose, CA	Ban on single-use plastic bags, minimum of 10-cent charge for 40% recycled paper bags.	January 2012	Reduce litter.	• Increase from 4% reusable bag use to 62% reusable bag use • 60-70% reduction in plastic bag litter, but not other litter • No reported increase in paper bags • Stores supplying exempt, thicker plastic bags doubled[18]	https://www.sanjoseca.gov/DocumentCenter/View/23916

[14] D.C. Resident and Business Bag Use Surveys, Opinion Works, resident Survey, January 2013; Business Survey, February-April 2013. http://ddoe.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/DDOE%202013%20Bag%20Law%20Survey%20Final%20Report%20%282%29.pdf Accessed 5/28/15.

[15] Elevation DC. *Millions of bags, four stories, one river*. February 19, 2013. http://www.elevationdcmedia.com/features/DCBagFeeAnacostiaRiver_021913.aspx Accessed 5/28/15.

[16] Brittain, A. and Rich, S. (2015). *Is D.C.'s 5-cent fee for plastic bags actually serving its purpose?* The Washington Post. May 9, 2015 https://www.washingtonpost.com/investigations/nickel-by-nickel-is-the-dc-bag-fee-actually-saving-the-anacostia-river/2015/05/09/d63868d2-8a18-11e4-8ff4-fb93129c9c8b_story.html Accessed 12/8/15.

[17] HDR / BVA Engineering. *The City of San Francisco Streets Litter Re-Audit 2009*. Pp. 42. http://www.cawrecycles.org/files/SF2009LitterReportFINAL-Sep15-09.pdf. Accessed 5/25/15.

[18] City of San Jose (2012). *Memorandum: Bring your own bag ordinance implementation results and actions to reduce EPS foam food ware*. http://www3.sanjoseca.gov/clerk/CommitteeAgenda/TE/20121203/TE20121203_d5.pdf. Accessed 5/29/15.

City	Ordinance / Policy	Enacted	Rationale	Impact	Ordinance
Seattle, WA	Ban on single-use plastic bags, at least 5-cent charge for paper; allows 2.25 mil plastic; promotes reusable bags.	July 1, 2012	Reduce use of plastic and paper carrier bags; Help hit waste reduction and recycling goals; conserve resources, GHG, waste, litter, pollution.	• 32.5% of responding businesses said they increased use of paper bags[19] • No evaluation of waste, litter, pollution or GHG impacts available	http://clerk.seattle.gov/~archives/Ordinances/Ord_123775.pdf
Huntington Beach, CA	Ban on single-use plastic bags, 10-cent charge on paper; 2.25 mil and thicker plastic bags considered reusable; fee exemptions for WIC and Supplemental Food program participants.	November 2013	Protect the environment and improve the city's aesthetics.	The ordinance was repealed on May 4, 2015.[20]	http://www.huntingtonbeachca.gov/government/departments/planning/plasticbagbanordinance.cfm

Polystyrene containers

City	Ordinance/ Policy	Enacted	Rationale	Impact	Ordinance
Amherst, MA	Prohibits food establishments and City facility users from dispensing prepared foods in expanded polystyrene	November, 2012 (effective January 1 2014)	Reduce waste that is not recyclable; To protect health, safety of residents from styrene.	Information on the impact of this policy is not readily available	https://www.amherstma.gov/DocumentCenter/View/24818
Seattle ,WA	Ban on polystyrene foam food containers and packing material. The ban applies to all food service businesses, including restaurants, grocery stores, delis, coffee shops and institutional cafeterias.	January 2009	Reduce amount of waste and negative environmental impacts to bird population. Seattle aspires to be a zero waste city, and this ban was part of this policy objective.	Information on the impact of this policy is not readily available	http://clerk.seattle.gov/~scripts/nph-brs.exe?s3=&s4=122751&s5=&s1=&s2=&S6=&Sect4=AND&l=0&Sect2=THESON&Sect3=PLURON&Sect5=CBORY&Sect6=HITOFF&d=ORDF&p=1&u=%2F~public%2Fcbor1.htm&r=1&f=G

[19] City of Seattle Public Utilities (2013). Retail Survey Results Summary. http://www.seattle.gov/util/MyServices/Recycling/ReduceReuse/PlasticBagBan/

[20] Broder, K. (May, 2015). *Huntington Beach Is the First City to Repeal Plastic Bag Ban*. AllGov.com. http://www.allgov.com/usa/ca/news/controversies/huntington-beach-is-the-first-city-to-repeal-plastic-bag-ban-150506?news=856410 Accessed 5/29/15.

City	Ordinance/ Policy	Enacted	Rationale	Impact	Ordinance
Minneapolis, MN	Requires all takeout food containers to be recyclable, reusable, returnable or compostable (rigid and expanded polystyrene are not included on the list of plastics meeting the requirements). Covered food establishments must have recycling and composting programs.	April 2015	To promote reusable, refillable, recyclable or compostable food and beverage packaging.	Information on the impact of this policy is not readily available	http://www.ci.minneapolis.mn.us/www/groups/public/@health/documents/webcontent/wcms1p-130775.pdf
New York, NY	Ban on single-use expanded polystyrene foam, including packing peanuts.	January 2015	Reduce waste that is not recyclable.	None; ordinance under appeal after judge struck it down, saying that EPS is recyclable.	No ordinance in effect currently.

Bottled water

City	Ordinance/Policy	Enacted	Rationale	Impact	Ordinance/Policy
College of St. Benedict (MN)	On-site bottled water sales ban	August 2011	Values-based stance that water is a fundamental human right, and as an organization declines to profit from its sale; Concerns about the environmental, economic, and social costs of production, transport, and sale of plastic bottled water, as well as the potential health risks from chemicals contained in plastic.	• Information on the impact of this policy is not readily available • Added jug-filler water fountains on campus	http://www.csbsju.edu/documents/csb%20sustainability/csb%20plastic%20water%20bottle%20policy%20final%20jan%202011.pdf
Grand Canyon, AZ	Eliminate the sale of bottled water, install water stations and sell reusable water bottles	January 2012	Reduce trash in the park; reduce GHG.	The initial analysis indicated that the Grand Canyon National Park could eliminate 30% of recycling	http://www.nps.gov/policy/plastic.pdf

City	Ordinance/Policy	Enacted	Rationale	Impact	Ordinance/Policy
				management burden and 20% of the park's overall waste stream[21]	
Concord, MA	Eliminate the sale of bottled water Exemption for emergencies.	February 2011	A citizen group advocated for the ban to reduce waste and fossil fuel use.	Information on the impact of this policy is not readily available	http://www.concordma.gov/pages/ConcordMA_TownClerk/Water%20Bottle%20Bylaw.pdf.
University of Vermont	Banned sale of single-use bottled water on campus	January 2012; Took effect January 2013	Reduce plastic bottle waste.	• Plastic bottles shipped to campus increased by 6%, mostly from increase in less nutritional soft drinks[22] • Secondary actions included addition of more water fountains and disposable cups, addition of water option at soda fountain dispensers.	http://www.uvm.edu/~uvmpr/?Page=news&storyID=13129&category=ucommall

[21] National Park Service. *Grand Canyon National Park Analysis of potential impacts/effects of bottle ban*. http://www.nps.gov/grca/learn/management/upload/2012-01analysis-bottle-ban-redacted.pdf Accessed 5/29/15.

[22] Lindholm, J. (June, 2015). *More plastic bottles entering waste stream since UVM's bottled water ban, study finds*. Vermont Public Radio. http://digital.vpr.net/post/more-plastic-bottles-entering-waste-stream-uvms-bottled-water-ban-study-finds#stream/0

What information will be helpful?

Review of policies from other locales, such as those just presented, is helpful. However, before adopting a policy "as is" from elsewhere, there are several other types of information that local communities may want to consider.

Getting the product's whole environmental picture

As mentioned before, a full understanding of the environmental impacts of a product compared to other products is complicated. Three possible lenses through which to look at environmental impact are **life cycle assessment** (mentioned earlier), the **preferred waste management methods**, and **overall material and waste trends**. Using all of them will help yield a more complete picture.

Life cycle assessment is a helpful analysis approach that yields information otherwise hidden about a product's whole footprint, from mining or growing raw resources to manufacture. A plastic bag may be made from nonrenewable fossil fuel, but it is often the by-products of natural gas production, whereas a paper bag, though manufactured with pulp from renewable trees or recycled paper, are typically produced using *more* fossil resources than the plastic bags contain or use.

Interpreting LCAs is difficult without training or experience. Like any analysis they can be done well or poorly, credibly or with bias. Look for LCAs that have been reviewed by independent reviewers, appear in peer-reviewed journals, and that are conducted according to accepted standards for LCA. It can also help to look for patterns in results of multiple LCAs examining the same type of product. While some industry-sponsored LCAs are quite credible, scrutinize them carefully.

LCAs have some limitations. They often aren't helpful in choosing among different options of the same product type – for example is one manufacturer's polystyrene made more sustainably than another's? LCAs do not account for social or environmental justice considerations. Is visible plastic litter in your community more of a concern than water pollution from paper manufacturing in another country? LCAs also cannot tell you which environmental impacts or program outcomes to value. Is protecting water quality more important than conserving energy? Is maximizing recycling more important than preventing discards in the first place? Which of these is most important is a question of values, and one that communities have to answer for themselves.

Some examples of life cycle assessments can be found on page 22 under **Resources**.

Questions to consider:

What is the overall lifecycle of the product we're considering restricting or banning?

What life cycle assessments reveal about single-use products:

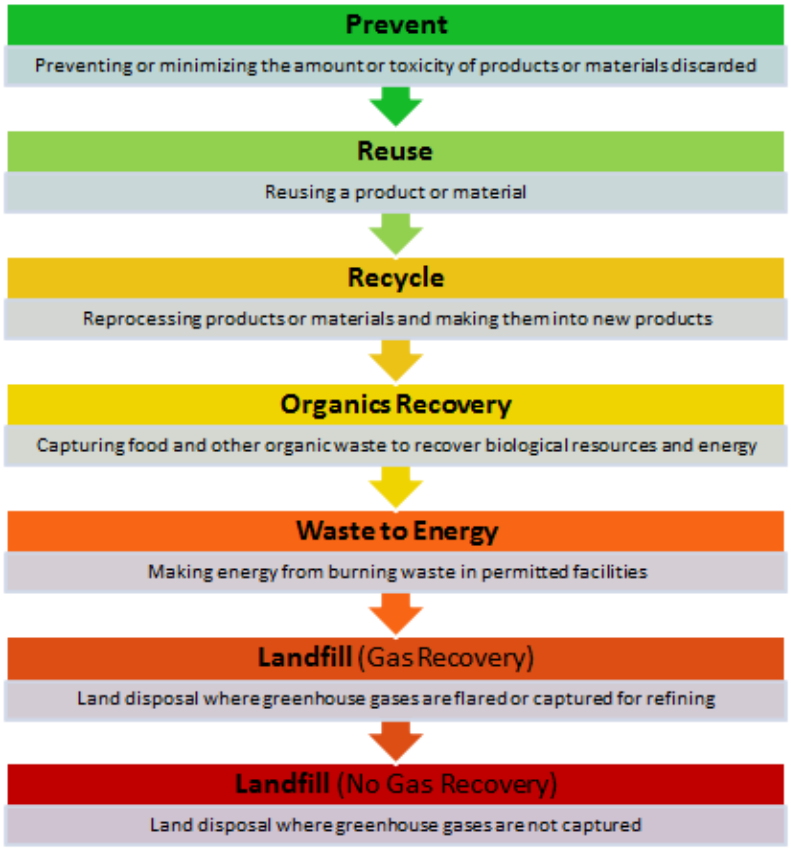
- Generally, the less mass in a product, the less its total impact.
- Consumers don't see all of the pollution and solid waste generated during the entire lifecycle of a product.
- The disposal phase is not the only factor to consider and may not have the biggest impact. Because the lion's share of impact is from production, reuse can result in large benefits when it displaces need for new production.

If people might pick an alternative product in reaction to a ban or restriction, what is the lifecycle of that alternative product?

Which environmental outcomes are most important to our community—total environmental impacts throughout product life cycle or solid waste generation?

In Minnesota, **preferred ways of managing waste** are clearly defined in a hierarchy. As shown in Figure 1, it is best to prevent waste from occurring in the first place (reduction). Next best is to keep items in use longer (reuse). Breaking wastes down and remanufacturing them into other products (recycling) is next, along with capturing organic materials for composing (organics recycling). Products that are lighter weight have been reduced already. The next step is to maximize their reuse, and then, finally, recycle them.

Figure 1: The waste management hierarchy



LCA's have generally supported the validity of the hierarchy. They have shown that the benefits of prevention and reuse come from reducing the amount of materials in products or the need for manufacturing new products, and that the benefit of recycling comes from eliminating the need for virgin raw materials, such as wood or aluminum.

Contrary to frequent assumption, keeping waste out of landfills is not where most environmental benefit of reduction, reuse and recycling happens. It happens by displacing the need to extract virgin materials for production or for the production of new products at all.

This is the underlying rationale for promoting a circular economy – in which resources continue to circulate and are not disposed. In this model, businesses either take back their own products for reuse or recycling, or discarded products (e.g. milk jugs) are used as the raw material for another business' product (e.g. outdoor furniture).

In some cases, threat of local bans on specific products or materials has prompted businesses to step forward with offers to support take back or recycling programs.

Questions to consider:

Where does the proposed policy restriction or ban fit in the waste management hierarchy?
Will the proposed policy restriction or ban shift a portion of the community's waste toward a more preferred management option?
How could our community support better capture, reuse, or recycling of this type of product?

Reviewing **overall waste trends** while considering targeting a specific product can be helpful in understanding the relative prevalence of the product in waste compared to other waste stream components. Developing and passing policy requires time and money as well as political capital. Understanding waste trends can help a community narrow in on types of wastes that are prevalent in tonnage or problematic because of volume, or that are growing or shrinking. Consumer packaging products like bags and bottles aren't the only parts of the waste stream that policy makers may want to consider.

With growth in research and popular focus on marine plastics, public sentiment seems drawn to targeting plastics for product restrictions. In general, in the municipal solid waste (MSW) stream, plastics are among the waste types that are increasing, while paper and metals are decreasing, reflecting, in part, changes in packaging. However, paper, paperboard and food are still larger components of discards in municipal solid waste than plastic.[23] Plastic is a lightweighted material and is helping packaging become lighter (using less material) all the time (e.g. flexible packaging pouches versus metal cans or glass jars).

It is easy to think that household and commercial waste makes up all the waste. However, in Minnesota, about half of waste is from construction and demolition and industrial processes. In 2013, about 4.7 million tons of construction, demolition and industrial waste went to landfills alone. This doesn't include any recycling of these waste types. For comparison, about 5.7 million tons of household and commercial waste was generated (and managed by recycling, composting, waste-to-energy or landfill). Generally, construction and demolition wastes are recycled at a much lower rate than MSW in Minnesota because relatively little emphasis has been placed on construction and demolition recycling.

Considering the whole waste picture (trends in waste generation, as well as all types of waste) may help a community decide the best target for policy to achieve stated goals.

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[23] United States Environmental Protection Agency (2015). *Advancing Sustainable materials management: Facts and Figures*. http://www.epa.gov/smm/advancing-sustainable-materials-management-facts-and-figures#Materials

The MPCA and the United States Environmental Protection Agency both offer waste characterization studies that describe disposal and recycling rates of different materials from MSW, industrial, and construction and demolition waste streams (see Resources).

Questions to consider:

What are the largest components of our community-generated discards?
What resources are available (existing reports, advice from staff, data or expertise from MPCA) to help us understand our local waste issues?
What other portions of the waste stream, if addressed, would have a greater environmental impact than the product we are considering?
How would a specific ban or restriction affect trends in solid waste disposal?
Would a specific ban or restriction have environmental impacts beyond the solid waste stream?

Knowing the local context

Taking time to understand details of the local context can help in crafting better policy. Specifically, **information about local litter** composition, **consumer patterns of use** of the targeted products and potential alternatives, and **constituent values** can all inform policy development.

Litter is a common reason for product restrictions. For a product policy to be effective at addressing litter, a community needs to know how much of which items is littered in their community, a question that can be answered by a litter audit. Billowing bags are visible, but are they actually more of a problem than beverage bottles or snack bags and candy wrappers? A litter audit will provide baseline data that will help target types of wastes and guide actions. Minnesota and national litter data is sparse. As an example, Texas did a thorough study in 2013 by counting the number of items at over 200 sites around the state. Of all visible litter items, 2% were plastic retail bags, 2.5% were polystyrene foam cups and clamshells, tires and vehicle debris were 20% and other beverage containers and tops/straws comprised 18.5%. Of micro litter (less than 2 square inches), cigarette butts were 48%.[24]

Sometimes, plastics in oceans or other waters are a particular concern. Again, it will help to know the degree to which the community contributes to this problem prior to taking action, in order to know the potential effect and to have a baseline to measure against. Most ocean plastic is caused by people living within 30 miles of a coast. The U.S. is responsible for 0.3 million metric tons, under 1% of ocean plastic globally.[25]

Consumer behaviors in response to the policy will partially determine policy impacts – intended and unintended, so it is helpful to understand them before passing product-specific policy. Most research in

[24] Environmental Resources Planning, LLC (2013). *2013 Texas litter Survey*. http://www.dontmesswithtexas.org/docs/DMWT_2013_Litter_Survey.pdf Accessed on 7/1/15.
[25] Hotz, R.L. Which Countries Create the Most Ocean Trash? *Wall Street Journal*, Feb 12, 2015 http://www.wsj.com/articles/which-countries-create-the-most-ocean-trash-1423767676

this area examines impacts of single-use shopping bag restrictions, though some lessons may transfer to other products.

- *Consumer reuse affects environmental impacts*: To what degree are single-use bags reused currently? Are plastic bags routinely reused as trash bin liners? If so, there is some evidence that bag bans may cause increased purchase of new plastic trash bags, reducing waste reduction impacts.[26]

  Will consumers actually use thicker plastic bags as reusables? In Austin, Texas what were intended to be reusable plastic bags were sometimes used as single-use bags, and often ended up being pulled out of recycling lines and sent to landfill.

- *Fees versus bonuses*: Research suggests that fees are more powerful behavior levers than bonuses (e.g. five cent refund for bringing a reusable bag). A 2013 study on shopping bag taxes and bonuses found that even a small fee of 5¢ is enough to compel a customer to use reusable bags rather than pay the fee. [27]
- *Convenience*: Innovative approaches can influence behavior by making desired behaviors more convenient and appealing. For example, if a goal is to reduce bottled water use, communities might consider something like the Tap Minneapolis campaign which promotes drinking tap water by providing water fountain/jug filling stations at community events, and by installing public water fountains.

  An example to increase recycling of plastic bags would be requiring businesses that give out plastic bags to collect them for recycling as the state of Delaware has done.[28]

There is some evidence that there is an interaction of fees and reuse behaviors. When Ireland raised their bag fees beyond the cost of new trash can liners, sales of trash can liners reportedly increased by over 70%. In Seattle, 5% of people reported that they would increase their purchase of trash can liners if a fee were charged on plastic shopping bags.[29]

Additionally, there can be important social justice impacts to consider. Would the proposed policy impact those with low-incomes differently than those with middle- or high- incomes? Are there ways to offset those impacts? Are their cultural differences in bag use or preferences?

Consumer behavior is complex. A thorough understanding of current consumer behavior is important when crafting a policy, as is a commitment to measuring the impact of any enacted policy.

Encouraging or partnering with the private sector can be another consideration. Some retailers have taken steps to reduce the use of some products or support recovery of products for recycling. For example, IKEA used a phased approach to discourage use of single-use bags. They started with a fee on

[26] Connecticut Office of Legislative Research (2008). *Effect of plastic bag taxes and bans on garbage bag sales*. https://www.cga.ct.gov/2008/rpt/2008-R-0685.htm Accessed 12/3/15.

[27] Homonoff, T. (2013). *Can Small Incentives Have Large Effects? The Impact of Taxes versus Bonuses on Disposable Bag Use*. http://www.human.cornell.edu/pam/people/upload/Homonoff-Can-Small-Incentives-Have-Large-Effects.pdf Accessed 5/29/15.

[28] State of Delaware. http://delcode.delaware.gov/title7/c060/sc09/index.shtml Accessed 12/3/15.

[29] Frisman, P. *Effect of Plastic Bag Taxes and Bans on Garbage Bag Sales*. December 17, 2008. http://www.cga.ct.gov/2008/rpt/2008-R-0685.htm Accessed on 6/16/15.

disposable bags and lowered the cost of reusable bags, then they stopped offering single-use bags altogether.[30] Local governments could work with retailers to encourage similar approaches.

Questions to consider:

Would restricting or banning a specific product increase the use of other products that are worse from an environmental perspective?

Would the proposed policy take advantage of patterns in consumer behavior?

Are there other approaches that could drive the desired consumer behavior?

Defining success and evaluating policy

Passing a policy or ordinance does not guarantee compliance or success. For that reason, it is helpful to be clear at the outset about what will constitute success. Consider writing into the policy details for enforcement and a requirement to evaluate policy effects a year or two after implementation.

In the review of policies for this paper, wherever product policies have been evaluated, findings suggested improvements or other changes. In one case, a policy was working so well that the planned fee increase on bags wasn't necessary.[31]

There are many possible policy approaches – fees, bans, education, new recycling requirements or reuse infrastructure. No one can anticipate all consequences of an ordinance, but taking time to gather information outlined in this section prior to finalizing policy may make success more likely.

How can communities use this information?

In summary, determining if a product policy is appropriate requires defining the goals. These goals will depend on values and behaviors of the community. Different goals are likely to require different strategies and policies regarding the types of materials being addressed. In the Resources section on page 22, there are examples of the process and analysis that two communities Fort Collins, Colorado and St. Louis Park, Minnesota, used in evaluating possible policy approaches. Table 3 below provides ideas for consideration.

[30] IKEA to Charge Customers for Plastic Bags. *Environmental Leader*. February 20, 2007. www.environmentalleader.com/2007/02/20/ikea-to-charge-customers-for-plastic-bags/ See also IKEA to Ban All Plastic Bags. *Environmental Leader*. April 2, 2008. http//www.environmentalleader.com/2008/04/02/ikea-to-ban-all-plastic-bags/ Accessed 6/16/15.

[31] City of San Jose. Bring Your Own Bag webpage. https://www.sanjoseca.gov/index.aspx?NID=1526 Accessed 1/21/16.

Table 3:

Goal	Possible Approaches to Accomplish this Goal
Increasing recycling/ composting and reducing trash	Promote materials that can be readily recycled in local curbside programs, encourage retailers to collect recyclable materials not accepted in curbside programs, provide access to curbside organics collection, provide organized collection of recyclables to maximize what can be collected curbside, provide city sponsored collection events or ongoing programs for recyclable materials not accepted in curbside programs, promote the use of reusable options in place of single-use products, allow small businesses to take advantage of collection programs, provide technical assistance to businesses on product procurement and solid waste options.
Minimizing litter	Discourage materials that often end up as litter on the ground or in lakes, streams, and wetlands, provide adequate recycling and trash collection in outdoor public spaces, encourage or require retailers to provide recycling containers for their customers when appropriate.
Addressing health or toxicity concerns	Discourage products that use toxic chemicals in their production or which may expose end users to harmful substances. Styrene, for example, can leach from polystyrene containers.[32]
Reducing greenhouse emissions	Promote materials which generate lower total emissions in production, transportation, use and disposal (varies with disposal method) and which have higher rates of reuse.
Reducing the community's overall environmental footprint	Promote lighter weight materials and reuse. Determining which products are environmentally preferable from a life cycle perspective is not always straightforward, especially with packaging materials. However, addressing the entire life cycle of a product will give a more accurate picture of the product's overall environmental impacts.

What about compostable products?

With the popularity of zero waste initiatives (interpreted here to mean zero waste to disposal, but may or may not have a focus on waste prevention), there is a presumption that substituting a compostable product for one that would otherwise be disposed of has an inevitable environmental benefit. When product restrictions are considered, often the idea of banning plastic but allowing compostable emerges. This section provides information to help evaluate how or whether to include or prohibit compostables from a policy.

- **Minnesota statute 325E.046 restricts plastic bags labeled "degradable" or "biodegradable":** No ordinance should allow "degradable" or "biodegradable" plastic bags. The terms "degradable" or "biodegradable" are often used in relation to conventional plastics with additives that cause them to break into small pieces of plastics that may or may not be innocuous in the environment. These bags may not be sold in Minnesota without the

[32] Tawfik and Huyghebaert (1998). Polystyrene cups and containers: Styrene migration. *Food Additives and Contaminants*, 15(5).

establishment of a scientifically valid and certifiable standard. At this time there are no such standards. Bags that are labeled "compostable" must be designed and tested to meet the ASTM Standard Specification for Compostable Plastics (D6400) and be labeled to reflect that it meets the standard. These bags will decompose into healthy compost under commercial organics composting conditions (but not in backyard compost bins). Compost facilities in Minnesota prefer (and some municipalities only allow) bags that also have third party testing through the Biodegradable Products Institute or Cedar Grove.

- **Compostables may or may not have a smaller footprint:** In a comprehensive study of drinking water delivery systems, Oregon Department of Environmental Quality found that compostable plastic (polylactic acid, PLA) performed better than PET plastic in some environmental impact areas (less ecotoxicity) but worse in others (water quality).[33]

  Compostable products can vary widely in their base materials (corn, wood, sugarcane pulp, etc.), how those base materials are grown, and the intensity of resources needed in manufacturing. Thus, the life cycle impacts will vary depending on the product or even on the facility where they are manufactured, and may or may not be better than conventional plastics.

- **Consider appropriateness of application:** If there is no system for collecting and composting compostable containers, there is little reason for using them. When burned in an incinerator or placed in a landfill, compostable products generally do not offer an environmental benefit over other plastics or paper. In a landfill, they will emit methane, a potent GHG, to the extent that they decompose at all. Landfills, with lack of air circulation, are designed to hold waste, not to allow things to breakdown, and most certainly do not facilitate composting.

  Compostable plastics are a contaminant in the current recycling system. For that reason, and because compostable plastics are hard to distinguish from conventional, it is recommended that compostable plastic not be used for products where there is an established recycling infrastructure, such as plastic beverage bottles or rigid clear clamshell containers.

  In settings with good organics collection infrastructure, compostable food containers can be a good option. If a community goal is increased capture of organics, one positive of promoting

Which is compostable?

It's hard to tell them apart, so compostable plastics often end up as a contaminant in the conventional plastic recycling stream.

(The clamshell holding vegetables is certified compostable PLA. The berries are in PET plastic.)

[33] Allaway, D. (2013) *Sustainable Materials Management: Mission Possible?* Presentation to Washington State Recycling Association. (Slides 12-15). https://c.ymcdn.com/sites/www.wsra.net/resource/resmgr/2013_conference/david_allaway_plenary_-_wsra.pdf

compostable containers over non-recyclable or traditional recyclable containers is that any food residue would be composted right along with the container.

What does the MPCA say about product restrictions and bans?

In general, the MPCA is supportive of policies that result in net prevention of waste, conserve natural resources, lower life cycle pollution and emissions, and push management of wastes to their highest and best uses. The waste management hierarchy in state statute promotes source reduction first, then reuse, and then recycling, in that order.

MPCA encourages lifecycle or systemic thinking about these issues. Communities should avoid replacing a material with an equally or more problematic material.

Recognizing that citizen behavior is an important part of determining environmental impacts of these products, the MPCA encourages consideration of adding education and other behavioral campaigns to any restriction.

Currently, the MPCA doesn't have a blanket position on policies to prohibit or restrict any single-use consumer packaging products at the city, county or state level. However, MPCA offers the following for specific product types.

Shopping bags: If a community has determined to take action to reduce single-use shopping bags, the MPCA suggests a policy approach that, based on current information, effectively supports reuse – charging a fee for both plastic and paper bags, while promoting reusable bags and more convenient and effective opportunities for recycling of paper and plastic single-use bags. This approach encourages use of reusable bags while still allowing citizens the option of occasionally using whichever single-use bag they are most likely to reuse and/or recycle. It recognizes that for some people plastic bags are frequently reused in place of new (thicker plastic) trash bags or pet waste bags and that this reuse is an environmental benefit. For others, paper bags may be more often reused at the store or more easily recycled than plastic. It may also minimize opposition by not banning any single product type over another.

For communities writing ordinances, defining what is "reusable" is often a challenge. Green Seal standard GS-16 defines standards for reusable bags. While no products are currently listed as certified under the standard, a community could draw from the standard in defining the term in policy.

Polystyrene: Fostering reuse where possible is desirable. Minnesota Department of Health rules allow people to bring their own containers to restaurants for purposes of taking home uneaten food. Communities may want to educate and promote this behavior in ways similar to promotion of reusable shopping bags and coffee cups. Ambitious communities could support development of reusable and returnable take out container businesses similar to the Go Box program in Portland, OR, and San Francisco, CA.

For takeout food, a ban on polystyrene containers will result in an increase in the products that replaces it – another type of plastic, paper with plastic lining, or compostable containers. Some specific alternative products may be manufactured in such a way to decrease life cycle impacts compared to polystyrene.[34] Though more of the alternatives may be recyclable, they are also likely to weigh more

[34] See for example, Vink, E., Davies, S., and Kolstad, J. (2010). The eco-profile for current Ingeo polylactide production. *Industrial Biotechnology*, 6(4), p. 212-224.

than polystyrene, so waste generation tonnage may go up along with recycling rates. Switches to compostable products are beneficial only if there are prevalent organics collections programs in place.

Bottled water: While the MPCA promotes no specific policy approach for bottled water restrictions at city or county level, research is clear that reusable containers and tap water are an environmentally preferable source of drinking water than bottled water.[35] State agencies in Minnesota operate under an Executive Order (11-13) goal to reduce use of bulk bottled water by fifty percent and are encouraged to use jug-filling water fountains instead. Interested communities may be interested in City of Minneapolis' Tap Mpls campaign, through which the city makes clean city tap water available for free at large community events.

Summary

Local governments have much to consider when they make decisions about proposed product bans and restrictions. This guide points to resources and data that can help officials make sound decisions that are aligned with their community's goals.

This guide also provides policy-makers with ideas for questions to keep in mind as they discuss product restrictions and bans:

Questions to consider:

- What problem are we trying to solve?
- What is our overall goal as we consider this product restriction or ban?
- What trade-offs in outcomes are likely and are we willing to make?
- What is the overall lifecycle of the product we're considering restricting or banning? If people might pick an alternative product in reaction to a ban or restriction, what is the lifecycle of that alternative product?
- Which environmental outcomes are most important to our community—total environmental impacts throughout product life cycle or solid waste generation?
- Where does the proposed policy restriction or ban fit in the waste management hierarchy?
- Will the proposed policy restriction or ban shift a portion of the community's waste toward a more preferred management option?
- How could our community support better capture, reuse, or recycling of this type of product?
- What are the largest components of our community-generated discards?

[35] Oregon Department of Environmental Quality (2009). Comparing Prevention, Recycling, and Disposal. http://www.deq.state.or.us/lq/pubs/docs/sw/LifeCycleAssessmentDrinkingWaterSupplement.pdf Accessed 11/29/15.

- What resources are available (existing reports, advice from staff, data or expertise from MPCA) to help us understand our local waste issues?
- What other portions of the waste stream, if addressed, would have a greater environmental impact than the product we are considering?
- How would a specific ban or restriction affect trends in solid waste disposal?
- Would a specific ban or restriction have environmental impacts beyond the solid waste stream?
- Would restricting or banning a specific product increase the use of other products that are worse from an environmental perspective?
- Would the proposed restriction or ban take advantage of patterns in consumer behavior?
- Are there other approaches that could drive the desired consumer behavior?

Resources

Contact the MPCA

Minnesota Pollution Control Agency
Phone: 651-296-6300
Toll free: 800-657-3864
Website: www.pca.state.mn.us

Examples of life cycle assessments

Disposable Shopping Bags

- Dr. Chris Edwards and Jonna Meyhoff Fry. "Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006." Environment Agency Report SC030148, February 2011. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291023/scho0711buan-e-e.pdf

Bottled Water

- Franklin Associates, "Life Cycle assessment of Drinking Water Systems: Bottled Water, Tap Water, and Home/Office Delivery Water." October 22, 2009: www.deq.state.or.us/lq/pubs/docs/sw/LifeCycleAssessmentDrinkingWaterFullReport.pdf or http://www.fal.com/projects.html

Polystyrene Foam Containers

- Franklin Associates, "Life Cycle Inventory of Foam Polystyrene, Paper-Based and PLA Foodservice Products." February 4, 2011. http://www.fal.com/projects.html

Waste generation and composition data

United States Environmental Protection Agency (2015). Advancing Sustainable materials Management: Facts and Figures. http://www2.epa.gov/smm/advancing-sustainable-materials-management-facts-and-figures-report

Minnesota Pollution Control Agency (2013). Minnesota Statewide Waste Characterization Study. http://www.pca.state.mn.us/zihy86c

Minnesota Pollution Control Agency (2015). Report on 2013 SCORE Programs: A summary of recycling and waste management in Minnesota. http://www.pca.state.mn.us/pyrie49

Examples of community evaluations of policy options

Fort Collins, CO (2012). Triple Bottom Line Evaluation: Plastic Bag Policy Options. http://www.fcgov.com/recycling/pdf/triple-bottom-line-evaluation-plastic-bag-policy-options-10-2012.pdf

City of St. Louis Park, MN (2015). Plastic bags web page. http://www.stlouispark.org/sustainability/plastic-bags.html

City of St. Louis Park, MN (2016). Zero Waste Packaging webpage. http://www.stlouispark.org/sustainability/polystyrene.html