COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

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January 11, 2018

TO: Each Supervisor

FROM: Mark Pestrella
Director of Public Works

BOARD MOTION OF AUGUST 1, 2017, ITEM 2
POLYSTYRENE FOOD SERVICE WARE – UPDATE AND EXPAND NOVEMBER 2011 REPORT

On August 1, 2017, the Board adopted a motion instructing the Department of Public Works in coordination with the Chief Sustainability Officer, Department of Public Health, Department of Consumer and Business Affairs, Internal Services Department, and County Counsel (County Working Group), to update and expand the November 2011 report on Expanded Polystyrene (EPS) Food Containers in Los Angeles County, to include all food service ware made of polystyrene (PS) along with other tasks.

The attached report highlights the County Working Group's findings in response to the Board motion.

In updating the report, published studies were reviewed and analyzed to assess the operational, environmental, and fiscal impacts of PS food service ware. In addition, surveys of recycling facilities and composting facilities were conducted to gather information on recycling and composting of food service ware. Representatives of food service ware manufacturers, restaurants and other retailers, distributors, environmental organizations, and other public agencies were also consulted regarding costs, PS consumption data, effectiveness of hardship waivers, litter impacts, and cleanup efforts.

The report finds there are many alternative food service ware products made of materials other than PS. Alternative products continue to be more expensive, though prices for both EPS and alternative products have decreased since 2011. Information necessary to estimate the true economic impact to businesses (e.g., the number and types of businesses that utilize EPS products, the volumes of EPS products they use, and the percentage of total operating costs spent on food service ware) was unavailable.

Approximately one-third of large material recovery facilities in the region indicated they separate some food service ware for recycling or composting. However, the amount recovered remains a relatively small fraction of the food service ware in the waste stream. The advent of advanced equipment, such as optical sorters could allow the recovery of more materials in the future, including EPS and PS.

There continues to be a significant lack of infrastructure to manage compostable materials in the region. However, recent State legislation requiring reductions in the disposal of organic waste at landfills, is expected to spur the development of organics recycling infrastructure, which would increase food service ware recycling opportunities in the future.

Plastic items, including EPS and PS food service ware, continue to be commonly found in the ocean and waterways and collected during local litter cleanup events. Reductions in the amounts of prohibited EPS products have been documented after implementation of local prohibitions while increases in the amounts of alternative products also have been documented. Some alternative materials to EPS or PS may be more compatible with the environment, particularly if they break down more quickly in an aquatic environment. In addition, EPS can break into small pieces and be blown by the wind into the storm drain system, which ultimately leads to the ocean.

The County Working Group developed the following options for the Board's consideration:

1. Continue to support legislation that would phase out the use of single-use items, such as EPS food containers on a Statewide basis.

2. Prohibit EPS food containers at food service retailers in the unincorporated County areas. This would require adoption of an ordinance.

3. Prohibit all or some PS food containers at food service retailers in the unincorporated areas. This would require adoption of an ordinance.

4. Require food service retailers in the unincorporated County areas to only provide straws and single-use utensils to customers, upon request. This would require the adoption of an ordinance.

5. In collaboration with the Chief Sustainability Officer, direct Public Works to investigate strategies to encourage the unincorporated County areas to adopt sustainable practices, such as a recognition program for businesses that

voluntarily use alternative food service ware products among other sustainable practices. This would not require the adoption of an ordinance.

If you have any questions, please contact me or your staff may contact Shari Afshari, Deputy Director, at (626) 458-4008 or safshari@dpw.lacounty.gov.

PH:jl
P:\Sec\Polystyrene Report Memo.docx

Attach.

cc: Chief Executive Office (Chia-Ann Yen)
Chief Sustainability Officer
Department of Consumer and Business Affairs
County Counsel
Executive Office
Internal Services Department
Department of Public Health

January 2018

Polystyrene Food Service Ware in Los Angeles County

Update to 2011 Expanded Polystyrene Food Containers in Los Angeles County Report

REPORT TO THE COUNTY OF LOS ANGELES BOARD OF SUPERVISORS

Prepared by: Department of Public Works in collaboration with the Chief Sustainability Officer, Department of Public Health, Department of Consumer and Business Affairs, Internal Services Department, and County Counsel

County of Los Angeles

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EXECUTIVE SUMMARY

On August 1, 2017, the County of Los Angeles Board of Supervisors adopted a motion instructing Public Works in coordination with other County departments to update and expand the November 2011 report "Expanded Polystyrene (EPS) Food Containers in Los Angeles County," to include all food service ware made of polystyrene (PS) along with other tasks. Stakeholders including those from the restaurant industry, food service ware manufacturing industry, grocery industry, recycling and composting industry, business advocacy groups, environmental groups, and jurisdictions were contacted to gather the information included in this report.

Latest Advancement in Alternative Products

Since 2011, there are more food service ware products made of materials other than PS that have been identified, such as plant based fibers, paper (coated and uncoated), other plastics [polyethylene terephthalate (PET), polypropylene (PP), and biodegradable plastics such as polylactic acid (PLA)] and other materials. Some of these alternative products are claimed to be biodegradable and/or compostable. Many food service retailers continue to use EPS due to its low cost and insulating properties while others have voluntarily switched to alternative products.

Updated Cost Study

A comprehensive cost analysis specific to the region was completed which compared the cost of commonly used EPS and PS food service ware items to the cheapest alternative. Alternative products continue to be more expensive, though the magnitude of the cost difference varies widely depending on the specific product. In addition, information necessary to estimate the true economic impact to businesses (e.g., the number and types of businesses that utilize EPS products, the types and volumes of EPS products they use, and the fraction of total operating costs spent on food service ware) was unavailable.

Effectiveness of Hardship Waivers

Many of the more than one hundred jurisdictions in California that have adopted bans on the use of EPS and/or PS food service ware, including nine cities in Los Angeles County, allow retailers to apply for a one-time hardship waiver for economic or inventory reasons for one year after the ban becomes effective. Based on a survey conducted two jurisdictions reported receiving one application each for waivers. None of the jurisdictions with bans in Los Angeles County reported receiving waiver applications although all reported full compliance with the bans from small businesses.

Health Risk Associated with Polystyrene and Alternative Products

The Department of Public Health concluded that currently there is not enough comparative research to determine whether alternative food service ware products present a greater, lesser, or similar health risk to consumers as PS products.

Current State of Recycling and Composting of Polystyrene and Alternative Products

Approximately one third of large material recovery facilities (MRFs) in the region indicated they separate food service ware made of various materials and recycle/compost them. However, only one of them separates EPS and one other MRF separates compostable food service ware. Recently China, the major buyer of recyclable materials, announced that it will make changes to its import policy on recycling. This has added a factor of uncertainty to the markets for recyclable commodities, such as recovered plastics and paper. Contamination, fluctuating markets, and lack of organics processing infrastructure are impacting the recycling or composting of food service ware.

Potential for Expanding Recycling/Composting of Polystyrene and Alternative Products

Although there currently remains a significant lack of infrastructure to recycle and compost materials, there is potential for more MRFs in the region to add advanced equipment such as optical sorters that would allow the recovery of more materials including EPS and PS, although as noted above, the market for recovered plastics, particularly, EPS, is uncertain. Also, recent State legislation aiming at diverting organics from landfills has created a need for more organic processing infrastructure including composting and anaerobic digestion facilities. In response, jurisdictions are developing organics collection programs for businesses and residents which may allow more compostable materials to be collected.

Banning the Use of Polystyrene Related to Contracting and Procurement

The use of EPS food service ware at County facilities has been prohibited since 2010. Internal Services Department may implement a clause in its solicitations that would prohibit contractors from purchasing EPS and PS food containers in the course of their business.

Litter

Food service ware including EPS and PS continue to be commonly found items during litter cleanup events and studies at beaches and waterways. Studies from some jurisdictions who have passed EPS and/or PS ordinances report a reduction in the amount of these products being collected during litter cleanup events after the ordinance is implemented, while other jurisdictions have shown an increase in the alternative products being collected.

Options for the Board's Consideration

1. Continue to support legislation which would phase out the use of single-use items such as EPS food containers on a Statewide basis. This would not require the development of a draft ordinance.

2. Prohibit EPS food containers at food service retailers in the unincorporated County areas. This would require development of a draft ordinance.

3. Prohibit all or some PS food containers at food service retailers in the unincorporated areas. This would require development of a draft ordinance.

4. Require food service retailers in the unincorporated County areas to only provide straws and single-use utensils to customers upon request. This would require the development of a draft ordinance.

5. In collaboration with the Chief Sustainability Officer, direct Public Works to investigate strategies to encourage food service retailers in the unincorporated County areas to adopt sustainable practices such as a recognition program for businesses, who voluntarily use alternative food service ware products among other sustainable initiatives. This would not require the development of a draft ordinance.

CHAPTER 1 – INTRODUCTION

Board Motion

On August 1, 2017, the County of Los Angeles Board of Supervisors adopted a motion instructing the Department of Public Works, in coordination with the Chief Sustainability Officer, Department of Public Health, Department of Consumer and Business Affairs, Internal Services Department, and County Counsel to do all of the following:

- Update and expand the November 2011 report, "Expanded Polystyrene (EPS) Food Containers in Los Angeles County," to include all food service ware made of polystyrene (PS), including EPS;
- Explore the latest advancements in alternative food service ware products and technology;
- Provide a revised cost study comparing the cost of PS food service ware products against the cost of alternative products;
- Analyze the effectiveness and use of hardship waivers for small businesses in other jurisdictions that have adopted PS bans;
- Provide a summary of existing research into the human health risks associated with PS and alternative food service ware materials and products;
- Provide an analysis of the current capabilities and challenges associated with recycling and/or composting both PS food service ware materials and products and alternative food service ware products;
- Analyze the potential for expanding County recycling and composting capabilities and programs to optimize recycling and/or composting of PS and alternative food service ware products;
- Review and study banning the use of PS and EPS food service ware as related to contracting and procurement for PS in the unincorporated communities of Los Angeles County; and
- Report back to the Board with the revised report for consideration by the Board within 120 days.

Methodology Used

The following report highlights staff findings in response to the Board motion. Published studies were reviewed and analyzed to comprehensively assess the operational, environmental, and fiscal impacts of PS food service ware. In addition, surveys of solid waste recycling facilities, composting facilities, cities, and distributors of single-use food service ware products were conducted to gather information on recycling and composting, litter cleanups, waste characterizations, and costs. Representatives of food container manufacturers; restaurants and other retailers; environmental organizations; and other public agencies were also consulted regarding PS consumption data, management options, litter impacts, and cleanup efforts.

Background

Restriction of EPS at County Operations

On May 22, 2007, the Board instructed Public Works, in consultation with Internal Services Department and County Counsel, to investigate the impact of prohibiting the purchase and use of EPS food containers at all County-owned facilities, and investigate the feasibility of prohibiting the use of EPS food containers at all food service establishments and retail stores in the unincorporated County areas, among other things.

Subsequently, on September 21, 2010, the Board adopted a restriction on the purchase and use of EPS food containers at County operations to take effect 60 days following the adoption and instructed Public Works to report back within 12 months on the feasibility of implementing a restriction on the use of EPS food containers at food service establishments and retail stores in the County unincorporated areas.

November 2011 EPS Staff Report

On November 22, 2011, Public Works submitted a report to the Board titled, "Expanded Polystyrene Food Containers - Report on the Feasibility of Implementing a Restriction at Food Establishments and Retail Stores in Unincorporated County Areas," summarizing its findings, conclusions, and recommendations in response to the Board's instruction. This report was developed following extensive investigation, review of case studies, and consideration of stakeholder feedback. During the preparation of this report, Public Works staff met with the stakeholder Working Group to receive input. The Working Group consisted of representatives of food container manufacturers; restaurants and other retailers; environmental organizations; other public agencies; and members of the public.

The recommendations of that report were based on consideration of all the information gathered, stakeholder feedback, the estimated effectiveness of an unincorporated area prohibition, and other potential measures to reduce the negative environmental impact of EPS food container litter consisted of three components:

1) *Pursue the passage of a prohibition of expanded polystyrene food service containers at a Statewide level*. This was considered the most effective measure to reduce EPS food container litter. In the 2011-12 legislative session, Senate Bill 568 (Lowenthal) passed the State Senate, but failed to pass in the State Assembly.

2) *Partner with industry to establish a comprehensive program to reduce litter, including EPS food container litter, in the region*. The program envisioned combined efforts from industry, restaurants, nonprofits, environmental organizations, and municipalities throughout the County. It would focus on efforts to reduce the prevalence of EPS food container litter and other forms of litter. The program would integrate public education, litter collection and management, EPS recycling, composting infrastructure, enhanced enforcement of anti-litter laws,

extended producer responsibility, and conversion technologies/waste-to-energy. This program would be considered a success if it achieved a similar reduction in the prevalence of EPS food containers being littered to a prohibition.

3) *Consider a ban in unincorporated County areas if measures 1 and 2 above are not found to be successful*. The Board may consider adoption of a prohibition in the unincorporated areas of the County if the State Legislature failed to adopt legislation addressing EPS litter and the comprehensive litter partnership program is not determined to be successful.

Roadmap to a Sustainable Waste Management Future

The Board adopted the Roadmap to a Sustainable Waste Management Future (Roadmap) in October 2014. The Roadmap is a long-term planning document that includes more than 100 initiatives on how the County can reduce the amount of waste it sends to landfills and be more sustainable.

As available landfill space in the County decreases, the County is continuing to develop innovative policies and procedures for waste management that further reduce County reliance on landfills. This involves rethinking the approach to waste management and rethinking the characterization of waste and which materials might be suitable for reuse and recycling. A traditional waste hierarchy seeks to implement waste reduction measures, reuse practices, recycling and composting techniques, and waste-to-energy processing to handle a large portion of the typical waste stream. Even when this is done effectively, a large volume of waste is still disposed at landfills.

The Roadmap creates a new vision to significantly reduce and someday eliminate waste. As a result, an increasing amount of materials previously characterized as waste will be reduced, reused, or recycled, and a decreasing volume of material will remain for disposal. The Roadmap includes three focus areas: County unincorporated areas, Regional/Countywide, and County operations.

Through the implementation of the Roadmap, the County's goal is to maximize the recovery of products, materials, and energy from waste that would otherwise be disposed of at landfills, and achieve the following:

- 80 percent diversion from landfills by 2025
- 90 percent diversion from landfills by 2035
- 95+ percent diversion from landfills by 2045

Potential product bans are discussed in the following Roadmap Initiative under County Unincorporated Communities Subcommittee's Strategy of Program and Services:

> Initiative C6 - Research the feasibility of implementing product bans or disposal bans where sustainable alternatives are readily available and reasonable.

Compostable food service ware requirements are discussed in the following initiative under County Unincorporated Communities Subcommittee's Strategy of Program and Services:

> Initiative D4 - Consider establishing an ordinance for the food service industry to provide compostable take-out containers and utensils, once options to compost or recover such materials are widely available.

CHAPTER 2 – LATEST ADVANCEMENTS IN ALTERNATIVE FOOD SERVICE WARE PRODUCTS AND TECHNOLOGY

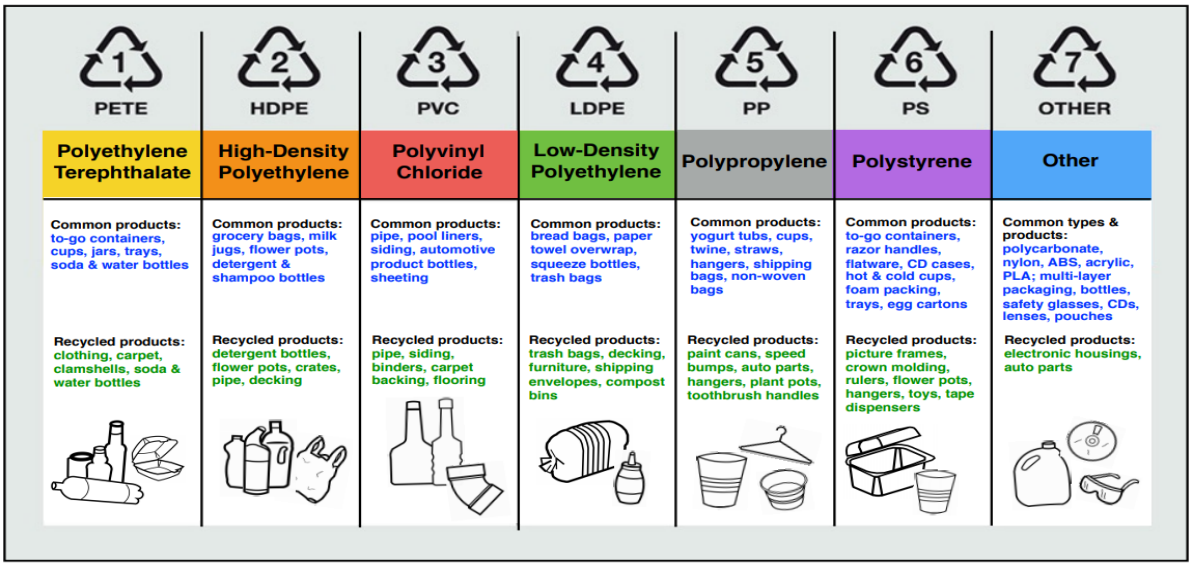
Disposable food service ware includes an extensive list of products, such as plates, bowls, trays, wrappers or wrapping, platters, cartons, condiment containers, cups or drink ware, straws, lids, utensils, or any other container in or on which prepared foods are placed or packaged for consumption. Food service ware can be composed of various types of materials or combinations of materials as described in this chapter. Many alternative products to PS are readily available at local retailers with new products made of natural materials continuing to enter the market.

Plastics

Plastics are categorized by a large group of synthetic or natural organic compounds consisting of molecules linked together into a large number of repeating polymer chains. Plastics are versatile materials which are used to fabricate many different products, including food service ware. The plastics industry introduced resin codes on common plastic products to assist recyclers in identifying the resin content of materials found in waste streams.[1] Figure 1 below lists these resin codes and describes common consumer products as well as recycled products which can be fabricated from these plastics.[2] Resin codes 1 through 6 represent plastics made from petrochemicals whereas, resin code 7 categorizes everything else including new plastics and bioplastics. The resin code appears on many products and in some cases, is required by law to be placed on items over established sizes.

Figure 1:

Plastic Resin Identification Codes



[1] American Chemistry Council, Inc. (Ed.). (2005-2017). Plastic Packaging Resin Identification Codes. Retrieved from https://plastics.americanchemistry.com/Plastic-Packaging-Resin-Identification-Codes/

[2] The Association of Plastic Recyclers (Ed.). (2016). Remanufacturing. Retrieved from http://www.plasticsrecycling.org/recycling-beyond-bottles/caps-on/remanufacturing

Polystyrene

One type of material that is a petrochemical derived plastic identified by plastic resin code 6 and is widely used to make products such as food service ware is polystyrene (PS). PS comes in a rigid and expanded form. However, both are made from the same building blocks which are molecules of styrene polymerized into long chains. Rigid PS has the appearance of hard plastic and food service ware comprised of this material typically come in various colors such as translucent, black, and white. EPS is lightweight, having the consistency of foam, typically white in color, and can be torn or ripped apart easily. Both forms are popular due to their relatively low cost, with EPS being a popular choice for packaging food because of its insulating properties, which allows it to keep food either warm or cold.

Other Plastics

Other petrochemical-derived plastics can be utilized in the making of disposable food service ware as an alternative to PS. Two common types of plastics used to make food service ware include resin code 1 polyethylene terephthalate (PET) and 5 polypropylene (PP). PET is usually clear and is commonly used to make single-use water bottles and food containers. PP comes in a variety of colors including translucent and is used to make a variety of products such as yogurt containers, reusable food containers, and other single-use food service ware. Both PET and PP are crack-resistant and perform better than PS in terms of impact strength[3]. Other plastic food service ware such as wraps are comprised of resin code 3 polyvinylchloride (PVC) and 4 low-density polyethylene (LDPE).

Bioplastics

Bioplastics and petrochemical plastics look and perform similarly, with the difference being that bioplastics are made from renewable biomass sources such as corn, soybeans, or microbiota. Bioplastics are classified under resin code 7 with a common type of bioplastic being polylactic acid (PLA). PLA can be used to make a variety of food service ware products such as clamshells, cups, lids, straws, and bowls. PLA performs well in many categories such as impact strength, durability, and appearance to other plastics[4]. Another type of bioplastic which has emerged recently is polyhydroxyalkanoates (PHA) which has potential in making food service ware products. PHA has the potential to biodegrade in many different environments when discarded as litter such as on land or in the ocean. PHA production worldwide is very low. However, if

[3] Alpha Packaging (2017). Plastics Comparison Chart. Retrieved from: http://www.alphap.com/bottle-basics/plastics-comparison-chart.php

[4] Biodegradable Products Institute (Ed.). (2015). Confused by the Terms Biodegradable & Biobased. Retrieved from http://www.bpiworld.org/Resources/Documents/Confused%20by%20the%20terms%20Biodegradable%20Jan%2015.pdf

quality and price can become competitive with other types of plastics, it has more potential to be a viable alternative due to its ability to biodegrade[5].

Food service ware products can be labelled and certified by scientific testing to qualify as compostable or biodegradable. Biodegradable Products Institute (BPI) is a multi-stakeholder association made up of government, industry, and academia groups which promote the use and recovery of biodegradable polymeric materials. BPI references industry-accepted specifications and standards, such as the American Society for Testing and Materials (ASTM), to determine if a product is compostable and/or biodegradable. The test for plastics compostability is ASTM D6400[6] and D6868[7] which test for compostability in municipal and industrial aerobic composting facilities and degradability leaving no synthetic residue.

Other Materials

Paper

Paper can be used to make many different types of food service ware products. Paper pulp can be used to make clamshells, plates, and bowls which can be compatible with relatively dry foods. Paper can also be combined with other types of materials to give the products different properties that may be more suitable to handle different products. For example, plates and cups can be lined with plastic, wax, or clay to give the paper product an impervious property and to add to the strength. Hot cups are commonly coated with polyethylene plastic or PLA to give waterproof qualities needed for beverages and wet foods. Also, paper wrappers can be combined with other materials such as foils to create wrap sheets that have good insulating properties for keeping food warm. These types of wraps are commonly used for hamburgers and other types of sandwiches.

Other Plant Fibers

Other types of fibrous plants can be used as an alternative to tree-based paper products to provide the raw materials needed for making food service ware. Below is a list and brief description of other plant fibers that can be used in the fabrication of food service ware, such as clamshells, bowls, trays, plates, and lids:

- Bagasse – Bagasse is a dry pulp residue left after the extraction of juice from sugar cane. Variants of this product also include sorghum and agave. Bagasse is widely

[5] Van Der Hoeven, D. (2016, Aug 21). PHA: Promising, Versatile, Biodegradable. Retrieved from https://www.biobasedpress.eu/2016/08/pha-promising-versatile-biodegradable/

[6] ASTM International. (2004). Standard Specification for Compostable Plastics (Designation: D 6400-04). USA: ASTM International.

[7] ASTM International. (2003). Standard Specification for Biodegradable Plastics Used as Coatings on Paper and Other Compostable Substrates (Designation: D 6868-03). USA: ASTM International.

available and has been used for the manufacturing of food service ware for many years.

- Wheat Straw – Wheat straw, historically thought of as an agricultural waste, is a relatively new material being used in the production of food service ware. Wheat straw products are available on the market. However, its use is not as common as some other alternative products such as bagasse.
- Rice - Rice plants are composed of fibrous materials which has been used in the production of paper-like products. Rice fiber, which can be used as a raw material, is not as common as bagasse and similar products.
- Silver grass – Silver grass is a non-invasive species of plant in the grass family which resembles bamboo. In recent years, two international companies have begun manufacturing and marketing products made from this type of grass and expanding operations and distribution domestically. The beneficial claims of this product include the following: it can be used for both hot and cold items, it is soak proof even without plastic or wax lining, it is composed of natural fibers and can compost in 2 to 4 months in a commercial composting facility[8].

Metal

Metal such as aluminum is used to make pans and foil, which can be utilized as food service ware particularly for take-out items. Aluminum can also be combined with other materials such as paper to add insulating properties to products. Metals are generally accepted as being recyclable. However, composite materials may not be as recyclable as the pure metal products themselves.

Wood/Bamboo

Wood or bamboo is used to make various food service ware such as stirrers, chop sticks, and bowls. These materials are not as versatile as plastic and paper products. However, they have long been established and have the benefit of coming from renewable sources with the ability to compost or biodegrade.

Advancements

Over the last few years more alternatives to PS and EPS have become available for use as food service ware products. Currently, alternative products are widely available for almost every type of product and they are becoming more mainstream over time.[9] Innovation and technology are driving product development and products that may be more compatible with the environment. In addition to bioplastics such as PLA and PHA,

[8] World Centric (Ed.). (2004-2017)., Silver Grass Plates & Clamshells – Made in the USA!. Retrieved from http://worldcentric.org/biocompostables/silvergrass

[9] BioMass Packaging (Ed.). (2017)., A Division of Excellent Packaging & Supply, The Basics of Compostable Food Products. Retrieved from http://www.biomasspackaging.com/the-basics-of-compostable-food-products/

and plant-based fibers such as bagasse and silver grass, other products such as edible eating utensils baked from millets, wheat, or rice have been developed and marketed in India[10]. Companies are creating new products from natural resources such as plates created from the leaves of vines and plants harvested in Asia and South America. As innovation in technologies moves forward, advancements in food service ware products should continue as well.

In addition to the materials from which products are fabricated, innovative ideas are emerging to address other challenges facing recyclable and/or compostable products. One challenge with compostable products nationwide is the inability to differentiate between compostable plastic and recyclable plastic.[11] A labeling initiative for manufacturers to feature a green band or line that identifies the product as compostable aids in the sorting and collection to facilitate cleaner food waste feedstocks for commercial composting and anaerobic digestion facilities.

Summary

Advancements in alternative food service ware continues to develop with many products being readily available in the County. The key findings from the review of the latest advancements in alternative food service ware products and technology can be summarized as follows:

- Since 2011 there are more alternative and compostable products readily available on the market for nearly all food service ware needs.
- Alternative products can be fabricated from other plastics (PET, PP, and biodegradable plastics such as PLA), paper (coated and uncoated), plant based fibers, and other materials.
- Many products are available that claim to be compostable in commercial composting facilities such as those certified by BPI.
- Innovation in new technologies including plant fiber based materials such as silver grass and bio based plastics such as PHA continue to develop.

[10] Kelmachter, M. (2016, Mar 30). India's Edible Cutlery Points The Way For A Zero-Waste Future. Forbes. Retrieved from https://www.forbes.com/sites/micakelmachter/2016/03/30/indias-edible-cutlery-paves-the-way-for-asia-to-dream-of-zero-waste/#61dc8a331ef9

[11] USEPA (Ed.). (2016). Organics: Composting Regional Initiatives. Retrieved from https://archive.epa.gov/region9/organics/web/html/init.html

CHAPTER 3 – COST ANALYSIS

To analyze potential cost increases for businesses located in the unincorporated Los Angeles County areas, a comprehensive cost analysis specific to the region was undertaken. As important objectives including profitability, customer service, core values, growth, change management, marketing, and competitive analysis[12] are considered by business owners, the way businesses present their products to prospective customers also influences daily operations. Restaurants, bakeries, delicatessens, and other food service providers may consider their establishment's atmosphere and "branding" in selecting the types of containers they use for their food and beverages.

Methodology

To perform the cost analysis of food service ware between PS products and alternatives, the following methodology was utilized:

- Identify local outlets selling bulk quantity of food service ware.
- Survey each company/outlet on their available food service ware materials including: PS (including EPS), other plastic (clear/translucent or white), metal, and tree/plant fiber products.
- Note the types of material used for each food service ware item if printed on the package/item label or was seen on the item through the packaging.
- Collect data on the following most commonly used PS single-use food service ware items and alternatives: cups, clamshells/lidded containers, bowls, bowl lids, plates, forks, soup spoons, straws, stirrers, and cup lids.
- Collect information on the least expensive unit priced EPS and/or PS and alternative product for each size category and material.

Food service ware products from various distributors available to food service providers in Los Angeles County were canvassed. These distributors included Costco, Restaurant Depot, Smart and Final, Shun Fat Supermarket, Green Office Supplies, and Webstaurant Store.

This cost analysis will provide a unit price comparison of common food service ware typically made of EPS and of PS with those made of alternative materials. Complete cost analysis of food service operations would require obtaining information on food service ware usage and on overall costs of food service operations from representative restaurants in the unincorporated County areas that utilize PS food service ware.

[12] Root, G. N. (2017) *10 Most Important Business Objectives*. Houston Chronicle. Retrieved from http://smallbusiness.chron.com/10-important-business-objectives-23686.html

Findings

The following table shows a comparison of lowest unit price of commonly used single use food service ware items and alternative products for EPS foam only and for all PS in general visual categories of similar size, strength, and function.

Table 1:

LOWEST UNIT PRICES FOR COMMON EPS FOOD SERVICE WARE AND ALTERNATIVE MATERIALS

Item/Material	**Hot Cup** (Small to Large)	**Cold Cup** (Small to X-Large)	**Clamshell/ Lidded Container**		**Bowl**	**Plate**
			Small	Meal		
EPS	1.8 ¢ to 5.4 ¢	1.8 ¢ to 5.4 ¢	6.6 ¢	7.3 ¢	3.2 ¢	2.7 ¢
Other Material	6.4 ¢ to 7.3 ¢	2.6 ¢ to 5.7 ¢	7.9 ¢	16 ¢	8.2 ¢	3.0 ¢
Alternative to EPS	Paper*	Paper & PS	PET	PET & Molded Fiber	Paper	Molded Fiber
Price Change	1.9 ¢ to 4.6 ¢	0.3 ¢ to 0.8 ¢	1.3 ¢	8.7 ¢	5 ¢	0.3 ¢
Percent Change	+35% to +256%	+6% to +44%	+20%	+119%	+156%	+11%

N/A: Not applicable
**includes cost of cup sleeve*

Table 2:

LOWEST UNIT PRICES FOR COMMON PS FOOD SERVICE WARE AND ALTERNATIVE MATERIALS

Item/Material	**Bowl Lid**	**Fork/ Soup Spoon** (per 10 units)	**Hot Cup Lid** (per unit)	**Stirrer** (per 10 units)	**Cold Cup Lid** (per unit)	**Straw** (per 10 units)	
						Slim	Fat
PS	4.6 ¢	6.4 ¢	2.4 ¢	1 ¢	1.8 ¢	1.5 ¢	7.4 ¢
Other Material	7.2 ¢	6.6 ¢	2.8 ¢	5 ¢	2.2 ¢	13.2 ¢	22.2 ¢
Alternative to PS	PS	PET	PLA	Wood	PET	PLA	PLA
Price Change	2.6 ¢	0.2 ¢	+0.4 ¢	4 ¢	0.4 ¢	11.7 ¢	14.8 ¢
Percent Change	+57%	+3%	+17%	+400%	+22%	+780%	+200%

Single-use food service ware of foam PS is mainly used to insulate hot food and beverages, and includes cups, clamshells, bowls, and plates. Commonly used single-use food service ware comprised of non-foam PS items include cup lids, straws, stirrers, utensils, cups, bowls, and plates. Some plastic products did not have printed on the packaging or imprinted/embossed on the items themselves the plastic resin or resin code the product was made of.

Hot Cup – The available alternative to PS found was paper. The lowest priced available alternative to PS found was a single-layer lined paper hot cup insulated by a separate cup sleeve. Price increase to alternatives was found to average 3.7¢ per cup or 167 percent among the common sizes.

Clamshell/Lidded Container – The available alternatives to PS found were other plastics (PET, PP), paper, aluminum (using paperboard/foil or plastic lid), sugarcane pulp fiber (certified compostable), and other plant fiber (certified compostable). Price increase to alternatives was found to average 5¢ per clamshell/lidded container or 70 percent among the common sizes.

Bowl - The available alternatives to PS found were paper, aluminum, and plant fiber (certified compostable). Price increase to alternatives was found to be 5¢ per bowl or 156 percent.

Bowl Lid - The available alternatives to PS found were PP, paper, and plant fiber (certified compostable). Price increase to alternatives was found to be 3¢ per lid or 57 percent.

Plate – The available alternatives to PS found were paper and plant fiber (certified compostable). Price increase to alternatives was found to be 0.3¢ per plate or 11 percent.

Cold Cup – The available alternatives to PS found were other plastics (PET, PP, PLA [compostable]), paper, and other plant fiber (certified compostable). Price increase to EPS alternatives was found to average 0.6¢ per cup or 38 percent among the common sizes.

Fork/Soup Spoon - The available alternatives to PS found were other plastics (PP, PLA [compostable]). Price increase to alternatives was found to be 0.2¢ per utensil or 3 percent.

Hot Cup Lid – The available alternative to PS found was PLA compostable plastic. Price increase to alternatives was found to be 0.4¢ per lids or 17 percent.

Stirrer – The available alternative to PS found was wood. Price increase to alternatives was found to be 0.4¢ per stirrer or 400 percent.

Cold Cup Lid – The available alternatives to PS found was PET and PLA compostable plastic. Price increase to alternatives was found to be 0.4¢ per lid or 22 percent.

Straw – The available alternative to PS found was PLA compostable plastic. Price increase to alternatives was found to average 1.3¢ per straw or 490 percent among the common sizes.

Other Studies

Many jurisdictions in the State which have considered a ban on PS food service ware have undertaken a study to compare the cost of EPS to alternative food service ware to quantify potential impacts to businesses that could be affected by such a ban.

- City of Milpitas[13] (2011)
- City of Pasadena (2016)
- City of San Jose[15] (2014)
- San Mateo County[14] (2010)
- City of Santa Clara (2011)

Each study had its unique methodology for comparing cost differences between EPS and alternative food service ware. General findings from the studies reviewed include the following information:

- Compostable alternatives to EPS cups and plates were priced at a maximum of 4 cents higher per unit.
- Compostable alternatives to EPS clamshells were priced at a maximum of 10 cents higher per unit.

The Initial Study on a Polystyrene Foam Disposable Food Service Ware Ordinance published in July 2013 for the City of San Jose concluded that an ordinance banning PS foam food service ware was not likely to be responsible for causing food-related businesses to fail, since the cost of purchasing food service ware is one of many variable costs associated with running such a business. In transitioning the Public Works Headquarters cafeteria to alternative food containers, it was found that only 2 percent of the operator's overall expenses were attributed to purchasing food containers although the unit cost of the food containers themselves increased in the range of 50 to over 100 percent during 2008 to 2009. Comparing unit costs of EPS to alternatives then and now is inconclusive. Overall, unit costs for both EPS and alternatives food service ware decreased over the years.

The City of Pasadena calculated the following financial impacts for restaurants using PS on an annual basis following that City's ban on PS.

- $840 to $2,400 for a primary dine-in restaurant
- $3,200 to 4,800 for a mixed dine-in take-out restaurant
- $7,200 to $16,800 for a primary take-out restaurant

[13] Cascadia Consulting Group. City of Milpitas (2011) Expanded Polystyrene Food Service Take-Out Container Study. USA: City of Milpitas. Retrieved from http://www.ci.milpitas.ca.gov/_pdfs/eng_EPS_Study_FINAL.pdf

[14] Memo to Environmental Quality Committee from Chief of Health System and Director of Environmental Health for San Mateo County. (2010 Jun 3). San Mateo County Board of Supervisors. Retrieved from https://www.sccgov.org/sites/rwr/rwrc/Documents/Foodware-Cost-Comparison-and-Intro.pdf

[15] Cascadia Consulting Group. City of San Jose. (2014) EPS Alternative Product Pricing. USA: City of San Jose. Retrieved from https://www.losgatosca.gov/DocumentCenter/View/13386

Potential Cost Mitigations

Several cost mitigations have been identified which may potentially help offset the cost to businesses which may be incurred by a restriction on polystyrene food service ware.

- *Restaurants Switching to Reusable Food Service Ware*

  Dine-in restaurants currently using single-use food service ware to serve customers could consider replacing those items with washable food service containers and utensils, which may result in a cost savings. Restaurants may consider replacing single-use food service containers with reusable containers and charging a nominal fee for to-go orders or leftovers placed in them.[16,17] This fee would then be waived for customers who bring back the reusable container or show a card that shows they have already brought back a container. This card could place a maximum number of times the container fee can be waived and the repeat customer would have to pay the fee the next time they take home an order or their leftovers from dining in.

- *Bring Your Own Campaign*

  Customers who are unable to finish their food at food establishments are often faced with the dilemma of leaving the uneaten food on the plate as waste or taking it home in a container. For customer convenience, single-use containers are typically provided. To avoid creating more waste by trashing the single-use food container, customers may bring their own food container for possible leftovers. Los Angeles County has implemented such a campaign with the messaging tagline of "Anywhere you go…BYO" in which BYO is an acronym for "bring your own." BYO outreach has already been implemented at County facilities and radio spots have already been running on popular local radio stations. BYO can apply to food and beverage containers as well as carryout bags and utensils.

- *Utensils Upon Request*

  Another measure that can be implemented by food service retailers to reduce costs is to provide utensils only upon request for take-out orders. This is particularly effective with environmentally-minded customers who have made other arrangements such as bringing their own utensils or who will be taking the food to work or home where they may already have reusable utensils and do not need the single-use items. Other jurisdictions have implemented or are currently considering such a provision in their PS food service ware ordinance.

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[16] University of California, Irvine (Ed.). (2017). What We're Doing. Retrieved from https://uci.campusdish.com/Sustainability/WhatWeAreDoing.aspx%20

[17] Careyva, J. (2015, Jan 26). *Penn Dining Reduces Waste With Green2Go*. The Daily Pennsylvanian. Retrieved from http://www.thedp.com/article/2015/01/penn-dining-green-containers

- *Strawless Campaign*

  Due to their small size, straws are particularly difficult to collect when ending up as litter and not cost effective for sorting in MRFs. There are also several movements that focus on switching from single-use plastic straws to more environmentally friendly options such as paper straws or opting to not use a straw at all.[18] As with utensils, food service retailers can reduce costs by providing straws only upon request, participating in a BYO campaign for straws, or making reusable straws available for a nominal fee.

Summary

It has been found that alternative products generally are priced higher than PS products. Chain restaurants and larger food establishments may be able to contract with a private or larger distributor for greater cost savings and wider selection of alternative materials for their food service ware needs. A higher demand for alternative materials from these larger clients may then cause the unit price for such products to decrease over time, thus reducing the price gap between food service ware made of PS and alternative materials.

[18] Woody, T. (2017, Nov 1). Strawless in Seattle: How One City Is Tackling Ocean Plastic Pollution. Retrieved from https://www.newsdeeply.com/oceans/articles/2017/11/01/strawless-in-seattle-how-one-city-is-tackling-ocean-plastic-pollution

CHAPTER 4 – MANAGING FOOD SERVICE WARE

Recycling

Management of discarded food service ware materials can be handled in a variety of ways. However, most residents and businesses in Los Angeles County unincorporated communities have waste materials collected curbside in separate waste bins designated for collection of trash, recyclables, and green waste through a waste hauling contractor. Once collected, the materials in the recycle bin can be sent to a material recovery facility (MRF) to be sorted and accumulated. The most common recycled materials by MRFs include certain metals, glass, paper, plastics, and wood. The market for recyclables is comparable to the market for raw materials in which prices can fluctuate with supply and demand locally and globally. Recycling is beneficial as an alternative to landfilling since recovered materials instead of raw materials are used to manufacture products; thus, conserving natural resources.[19] Closed loop recycling in which materials are recycled indefinitely is generally considered more sustainable than open loop recycling, where materials have a limited number of lives before it is sent to a landfill.

Material Recovery Facilities (MRF)

A MRF is a facility which accepts waste materials either as source separated recyclables or mixed waste processing where waste and recyclables are mixed together. MRFs separate materials they receive using a variety of mechanical and manual sorting systems. They can range from very simple in operation such as a transfer station performing very minimal separation of material to a facility with multiple conveyer belt lines and segregation of many different types of materials. Once recyclables have been sorted and stockpiled, often in bales, they are shipped to the next destination which can include outlets for the recycled materials, a secondary MRF for further processing, a landfill if no markets are available, or a waste-to-energy facility. MRFs can also receive green waste and food waste at their facility which can ultimately be sent to anaerobic digestion or composting facilities. The primary function of a MRF is to divert recyclable material from the waste stream and prepare those materials to be marketed to end-user manufacturers.

Optical Sorting

In recent years, MRFs have added high tech mechanical sorting systems such as optical sorting equipment to their facilities. Optical sorting has the potential to optimize the recovery of recyclables at MRFs by identifying materials based on their chemical properties and mechanically sorting these materials into the proper holding areas. This technology can distinguish between a wide variety of materials including plastics and paper. For example, optical sorters can be programmed to identify different types of plastics such as polyethylene terephthalate (PET), colored and natural high-density polyethylene (HDPE), polyvinyl chloride (PVC), polypropylene (PP), polystyrene (PS) and polylactic acid (PLA). The sorting is performed by a blast of compressed air at the

[19] USEPA (Ed.). (2017) Recycling Basics. Retrieved from https://www.epa.gov/recycle/recycling-basics

targeted material separating it into a target stream. In general, optical sorting is faster and more accurate than manual sorting. One potential deficiency of optical sorting is its insufficient ability to identify contamination which could be a factor with food service ware.

Survey of MRFs

Public Works reached out to identify all known MRFs and transfer stations located in the County currently serving the disposal and diversion needs of the Los Angeles County region to gather information relevant to current practices of recycling food service ware, and current capabilities and challenges associated with handling these products. Information was collected from 16 MRFs regarding diversion of food service ware comprised of PS and alternative materials. From the surveys, it was revealed that:

- MRF operators do not generally target food service ware for diversion and of the 16 facilities contacted, only six indicated that food service ware of any type was actively targeted and pulled from the line for recovery.
- Of the 6 MRFs recycling food service ware, all indicated that although PS food service ware technically can be recycled, EPS was not being collected for recycling but rather being sent with other waste residuals to a landfill. One MRF outside of the County was identified and surveyed which recycles EPS food service ware and is discussed later in this chapter.
- Although several of the MRFs indicated that compostable fiber-based food service ware could be recycled with mixed paper, only one indicated that the material was specifically sent to a composting facility.
- Compostable plastics, if collected, were sorted with mixed plastics, which generally consists of plastic resin code numbers 3 through 7, instead of being sent to a composting facility.

Furthermore, although food service ware is recyclable, PS and alternative products are challenging to recover for the following reasons:

- Food service ware of all types are often contaminated with food product and may contaminate other recyclables if pulled from the line. This was one of the reasons that many MRF operators did not target these items for recycling.
- Not enough clean food service ware products could be pulled from the line and stockpiled to make the process economically viable. This was especially true of lightweight materials such as EPS and small items such as straws, utensils, and lids.
- Markets for some food service ware materials are weak and uncertain at this time. Recycled materials such as mixed plastic and papers which have historically been exported to other countries such as China for recycling face the most uncertainty due to recent restrictions which is discussed later in this chapter.
- Compostable food service ware comprised of plant-based plastics such as PLA are not being sent to composting facilities because they are considered a contaminant to other organic waste streams.

- Contaminated compostable food service ware made of plant-based fiber is not generally targeted for recovery due to a lack of systems and infrastructure in place to deliver to composting facilities.

Facilities Recycling Polystyrene

Titus MRF Services

Titus MRF Services operates a secondary MRF in Los Angeles County and has been successful at recovering items that other MRFs have not been able to collect and make economically viable. The facility is currently receiving and further separating mixed plastics and mixed papers from other MRFs. By processing these materials from multiple MRFs, Titus is able to achieve the large volume of plastics it needs to make the process economically viable. As the materials are transported from equipment to equipment, large pieces contaminating the material may fall away. Mixed plastics, which can include PS food service ware, are baled and have traditionally been exported to China for recovery. However, domestic markets for some plastics such as polyethylene and PS do exist domestically. Titus is hoping that its prototype MRF will be the model for other secondary MRFs in metropolitan areas.

Burrtec

Burrtec currently operates a MRF in Riverside County that accepts and recycles PS materials including EPS food service ware. Burrtec first started recycling EPS foam with assistance from the Dart Container Corporation. As an incentive to collect and recycle EPS foam, Dart Container Corporation supplied Burrtec with a densifier which is a machine used to compress EPS foam into blocks, called “ingots”, to facilitate accumulation and storage. Burrtec believes markets in California need to be developed to expand recycling potential for this material.

Dart Container Corporation

Dart Container Corporation has operated a PS foam recycling drop-off site in Corona since 2008. The facility is able to accept EPS packaging for consumer products as well as clean EPS food service ware and compress the material utilizing its proprietary foam densifier. Since Dart Container Corporation is the largest manufacturer of EPS foam cups and a leading manufacturer of other single-use EPS food service ware, the facility is part of an effort to promote recycling of these materials.

Facilities Utilizing Recycled Polystyrene

NEPCO

NEPCO (Natural Environmental Protection Company) operates a facility in Pomona which uses recycled EPS from companies such as Burrtec to manufacture other products including picture frames. NEPCO utilizes a portion of the product on-site to manufacture frames for posters and other artwork, and sells the remainder to framers and distributors to create their own products. NEPCO is currently the only identified facility using recycled PS in the Los Angeles region.

Plastic Recycling, Inc.

Plastic Recycling, Inc., is a company in Indiana specializing in postconsumer EPS and rigid PS from residential recycling programs and sorted by MRFs. Typical PS products accepted for recycling include foam cups, rigid PS cups, and fast-food containers. The facility has a capacity to handle up to approximately 65 tons per day of mixed recyclables. The facility processes PS among other materials into feedstock that can be used by other companies to make products such as picture frames, tape dispensers, crown molding, and base boards. Titus MRF Services has used this company as an outlet for its recovered PS bales.

Challenges

Economics of Material Recovery

Materials separated at MRFs are treated as commodities, where the value increases and decreases based on a variety of factors. For some materials, there is a direct relationship between the size and density of a material and its value. Large and heavy material can be collected with less effort and often translate to more profit for recovery facilities. Food service ware by nature are generally smaller in size and lighter in weight with items such as straws and lids being the smallest of the items. PS food service ware are comparable in size and weight to alternative food service ware. However, EPS, which is comprised of 95 percent air by volume, is one of the lightest of all of the materials that can be found in a MRF, and requires that a significant amount be collected in order to make the material economically attractive.

Contamination

Food service ware can often be contaminated with food. Plastics may be overlooked or not targeted at MRFs because of the concern of contaminating clean material that may be collected. To reduce contamination, there are efforts by some jurisdictions encouraging residents to rinse the containers before putting them in the recycle bin if that jurisdiction promotes the recycling of these materials. Compostable materials made of paper may face similar challenges with contamination if they are sorted with recyclables. If they are sorted and processed with food waste, contamination is not a factor.

Composting

Composting is the natural decomposition of organic materials like leaves, twigs, grass clippings, food scraps, and paper. Certain types of bioplastics may also be compostable if processed in an industrial composting facility. Organic materials that are diverted to a composting facility are turned into a useful product which keeps them out of landfills where they would break down and produce methane gas. Composting of materials such as food service ware is generally considered more sustainable and carbon neutral in comparison to open loop recycling.

Public Works surveyed 12 composting facilities in Los Angeles County and the surrounding region, with the survey revealing the following:

- Of the 12 facilities, 8 currently do not accept any compostable, biodegradable, or similar type of food service ware products, but may consider accepting them in the future.
- The remaining 4 specified that they either accept or could accept some compostable food service ware products. These 4 facilities mentioned that the compostable products accepted are generally made of a fibrous or plant-based material.
- All the composting facilities also specified that there are many food service ware products available that are marketed as "compostable" or "biodegradable" that they do not accept or want to receive because they do not adequately compost or breakdown in the same time frame as other organics. Those products are considered contamination to the composting process and end up being screened out.
- Most facilities were also skeptical of compostable plastic products, such as those certified by BPI. There was also concern regarding polylactic acid (PLA) and its ability to compost in the same time frame as other organics.

Anaerobic Digestion

Anaerobic digestion is the process where organics are processed in the absence of oxygen with microorganisms feeding on the organic material and producing methane gas as a byproduct. This methane gas can then be captured and reused or combusted on-site to produce electricity or create fuel. Food waste is acceptable for co-digestion at some municipal wastewater treatment plants. However, food service ware is not suitable at these types of facilities. Industrial anaerobic digestion facilities may be more suitable to handle other organics, such as green waste, paper, and potentially compostable food service ware.

Public Works identified and surveyed three anaerobic digestion facilities in the region yielding the findings as follows:

- All three anaerobic digestion facilities specified that they do not currently accept any compostable food service ware products.

- The anaerobic digestion facilities also specified that they do not anticipate accepting any compostable food service ware in the near future.
- These facilities mentioned that the current compostable products available are not ideal for the digestion process itself but could be added to the material that remains after digestion ("digestate") if that material is to be composted.

Future Opportunities

The potential for expanding recycling and composting capabilities and programs within the County to optimize recycling of PS and alternative food service ware depends on further technology advancements, local government policy, and State legislation/policy.

China Policy

On July 18, 2017, China announced that it will make changes to its import policy. This has added a factor of uncertainty to many recyclable commodities, specifically recovered plastics and paper. Recycling companies across the country that are unable to find buyers for these commodities have resorted to stockpiling the materials and in some cases, have been forced to landfill materials.[20] The policy officially takes effect on January 1, 2018. This announcement of China to the World Trade Organization has already slowed shipment of these materials and in some cases, halted them all together. This new policy has devalued the prices for mixed plastics, which typically consists of plastic resin code numbers 3 through 7, and mixed paper, which were already low-value, to a point where recyclers are less concerned with prices and more concerned with being able to move the product at all. In California, materials are piling up as well and industry experts are hopeful that the reduction in Chinese demand will spur new investment in domestic recycling infrastructure.

Legislation and Policy

Assembly Bill 1826 is a commercial organic waste recycling law which was signed in 2014. This law requires businesses (including government facilities) and multi-family residences of five or more units to arrange for organic waste recycling services depending on the amount of waste they generate per week. Additionally, Senate Bill 1383, which was signed in 2016, establishes targets to achieve a 50 percent reduction in the level of Statewide disposal of organic waste from the 2014 level by 2020 and a 75 percent reduction by 2025. Currently California Department of Resources Recycling and Recovery is hosting informal rulemaking workshops to develop the regulatory language. Each county in the State beginning 2025 would identify recycling capacity needed (covering a 15-year planning period) to ensure that 75 percent of organic waste can be diverted from landfills. According to California Department of Resources Recycling and Recovery, Los Angeles County is currently projected to have a shortfall of over 2 million tons per year which is the largest shortfall of any county in the State.

[20] Staub, C. (2017, Oct 3). Local Programs Feel the 'Dire' Effects of China's Ban. *Resource Recycling*. Retrieved from https://resource-recycling.com/recycling/2017/10/03/local-programs-feel-dire-effects-chinas-ban/

These policies regarding organics, including food waste, will drive the need for new facilities to process organics, such as composting and anaerobic digestion to meet the projected shortfall. In addition, programs and services will need to be implemented to divert organics to these facilities. These types of facilities, which may be able to process green waste and food waste, may also be able to treat compostable food service ware even if the material is heavily contaminated by food waste, which may not be an option in efforts to recycle food service ware.

Secondary Material Recovery

Titus has been a pioneer in the market of secondary material recovery, by inventing a secondary MRF to process low volume materials which have already passed through other MRFs. Titus, which is primarily an equipment manufacturing company, is hopeful that its secondary MRF concept will serve as a model that other companies will follow. A growth in secondary MRFs would develop the infrastructure needed to collect plastics that other MRFs view as not economically viable. By taking in the residuals from several other MRFs, Titus is able to process enough material such as EPS and rigid PS to put together truckloads of clean material. It is uncertain whether the model that Titus has created for this type of secondary MRF will be copied by others.[21]

Optical Sorting Technology

Optical sorting technology is more efficient than manual sorting and could allow MRFs to process more throughput with a higher-quality product. In the last few years the latest innovations in this technology have been with lenses and cameras that enable better recognition of materials.[22] These improvements in technology could allow MRFs to collect materials which they may have previously been passing over if they are able to have the type of consistency in the product that may be required.

[21] Verespej, M. (2016, Nov 15). First Steps for Secondary Processors. *Plastics Recycling Update*. Retrieved from https://resource-recycling.com/plastics/2016/11/15/first-steps-for-secondary-processors/

[22] Flower, W. (2015, Sep 9). A Look at Optical Sorting. *Waste360*. Retrieved from http://www.waste360.com/commentary/look-optical-sorting

CHAPTER 5 - HUMAN HEALTH RISKS

Research on the human health risks associated with PS and alternative food service ware materials and products is limited. There is little-to-no conclusive evidence regarding potential human health risks from consumer exposure to PS food containers and associated products. Most of the existing research is focused on occupational settings and environmental impacts. That said, any recommendations regarding consumer use of these products would be based on precautionary principles.

Current Research on Styrene and Polystyrene

Occupational studies have documented health effects from both short- and long-term exposures to styrene, the main building block of PS. Per the Environmental Protection Agency, acute occupational exposure to styrene can lead to eye, nose, and throat irritation, and gastrointestinal effects. Chronic or long-term occupational exposure can lead to fatigue, headache, weakness and depression, hearing loss, central nervous system dysfunction, and peripheral neuropathy. The International Agency for Research on Cancer (IARC) has identified styrene as a possible human carcinogen and the National Toxicology Program has listed styrene as "reasonably anticipated to be a carcinogen," based on occupational exposures to high levels of styrene. Exposure to styrene has been associated with lymphoma, leukemia, and other blood cell cancers and linked to an increased risk of cancer of the esophagus and pancreas. The most significant source of styrene exposure for the general population is from cigarette smoking, and workers in certain occupations are potentially exposed to much higher levels of styrene than the general nonsmoking public. These health effects have not been elucidated in the setting of consumer exposure to PS food service products.

Research on PS microplastics and nanoparticles have only recently been studied in marine animals. Results from these studies have shown that PS microplastics and nanoparticles could negatively impact the health of marine animals' feeding behaviors, reproduction system, liver, and influence iron absorption. The potential effects on human consumption of marine animals exposed to these particles has not been studied, though studies have shown plastic debris to be present in fish and shellfish sold for human consumption.[23] Furthermore, plastic debris may be a source of toxic chemicals to an organism consuming it due to release of additives that comprise the material, and also because it has been shown to absorb certain compounds from the environment, including DDT and PCBs.[24,25,26]

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[23] Rochman, C. M.; Tahir, A.; Williams, S. L.; Baxa, D. V.; Lam, R.; Miller, J. T.; Teh, F.; S. J; Werorilangi, Sig (2015). Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption. *Scientific Reports, 5,* 14340. http://doi.org/10.1038/srep14340

[24] Rochman et al., 2015

[25] Engler, R. E. (2012). The Complex Interaction between Marine Debris and Toxic Chemicals in the Ocean. *Environmental Science and Technology, 46*, 12302-12315. http://dx.doi.org/10.1021/es3027105

[26] Mato, Y., Isobe, T., Takada, H., Kanehiro, H., Ohtake, C., and Kaminuma, T. (2001) Plastic Resin Pellets as a Transport Medium for Toxic Chemicals in the Marine Environment. *Environmental Science and Technology, 35*, 318-324. http://doi.org/10.1021/es0010498

Current Research on Alternative Food Service Ware and Products

There are alternative disposable materials used in making single-use food service ware, such as those made from recycled and conventional paper, bagasse, compostable PLA, recycled and conventional plastic, and other compostable material. Each alternative food service ware product presents a unique set of theoretical human health risks and environmental impacts that have not been studied. Based on the lack of conclusive comparison data, it cannot be determined whether these alternative products present higher, lower, or similar risks than PS products. Potential risks of alternative products are outlined below:

- Recycled paper and conventional paper products may be bleached with chlorine and chlorine compounds that contain carcinogens, such as dioxins. The bleaching process itself may produce harmful by-products as well. Human studies have shown short-term exposure to high levels of dioxins may result in skin lesions and altered liver function. Long-term exposure may be associated with impairment of the immune system, nervous system, endocrine system, and reproductive system. Animal studies on chronic or long-term exposure to high levels of dioxins have led to several types of cancers. The IARC has classified dioxins as a known human carcinogen. Some companies label their products alternative, or chlorine-free paper products. These products may present less risk, but conclusive studies have not been performed.

- Recycled plastic and conventional plastic products can contain carcinogens and may leach hormone-mimicking chemicals such as bisphenol A (BPA) and phthalates into food. BPA may be linked with endocrine system disruption; adverse perinatal, childhood, and adult health outcomes, including reproductive and developmental effects; and metabolic disease, in studies encompassing both prenatal and postnatal exposures. Animal studies show that phthalates may affect the reproductive system. There is limited research on the human health effects from exposure to low levels of phthalates.

- Bioplastics are plastics made from plants, algae, or microorganisms. Bioplastics utilize corn, wheat, rice, potatoes, barley, or sorghum to produce plastics. Fossil fuel based fertilizers and pesticides are routinely used when growing crops for bioplastics. The use of fossil fuels may contaminate drinking water, impacting people working on farms and neighboring communities.

- Bagasse is a fibrous waste product after sugarcane juice extraction that can be used to manufacture food service products. Studies have shown adverse human health effects have been seen in workers in sugarcane processing refineries, including irritation of the airways, decreased lung function, asthma exacerbations, chronic bronchitis, and other respiratory conditions.

- Biodegradable products are made from plant materials, conventional plastics with chemicals added so the plastic breaks down, or a combination of the two. Pesticides sprayed on the plants may be transferred to or adulterate the finished biodegradable

product. The finished product can also break down into smaller components, thus becoming a pollutant in water and ecosystems.

- Alternative reusable food service ware materials and products made from metal, polypropylene, glass, porcelain, melamine, ceramic, stainless steel, and acrylic have also been used. In general, reusable food service ware products use far less energy, use fewer material resources, generate lower levels of air and water pollution, and create less solid waste during production. A caveat about reusable products is that some manufacturers may use base materials with known adverse human health and environmental health impacts. For example, many such products are made with PS, polyvinylchloride, polyethylene terephthalate, and lead-based ceramics.

Based on limited studies, PS food service products may present a risk to consumers, but this potential risk is based on a precautionary interpretation of occupational exposure to styrene, and PS nanoparticulate exposure to aquatic ecosystems. Currently there is not enough comparative research to determine whether alternative products present a greater, lesser, or similar risk to consumers. Policy decisions regarding the use of these products should be tempered with emerging data, and must be constantly amenable to change, based on newly published scientific research.

CHAPTER 6 – LITTER AND ENVIRONMENTAL IMPACT

The widespread use of single-use food service ware in Los Angeles County and its propensity to become litter has resulted in large quantities entering our natural environment, with the most lightweight making its way into waterways and the ocean. Some materials are easily broken into small pieces, and windblown into the storm drain system. These are very challenging to contain or collect, and pose a significant nuisance and source of visual blight compared to other litter materials. Still other materials that never make their way into the flood control system remain in the environment. Once on the beach or in the ocean, this litter either floats further out to sea and becomes a part of a "garbage patch" caught in a gyre, or is washed back up on shore where it litters the beach. This blight impacts the County's recreational areas and the quality of life for residents and visitors.

Litter made of biodegradable material has a reduced and less persistent impact on the natural environment and wildlife when compared to nonbiodegradable products, which may take hundreds of years to deteriorate in the natural environment. The unsightly accumulation of littered food service ware material is commonly seen floating on the water among other debris. In worldwide coastal cleanups, foam take-away containers, plastic lids, and straws/stirrers were among the top ten collected items.[27] In the United States alone, straws/stirrers were among the top ten collected items.[28] Litter studies continue to find that plastics make up the majority of particles in the total litter stream.[29] According to a report by the World Economic Forum and Ellen MacArthur Foundation, over 8 million tons of plastics leak into the ocean every year, equivalent to one garbage truck into the ocean every minute. At the current rate of plastics production, this is expected to increase to two per minute by 2030 and four per minute by 2050 if no further action is taken. Estimates suggest that plastic packaging represents the major share of this leakage. In a business-as-usual scenario, the ocean is expected to contain more plastics than fish (by weight) by 2050.[30] According to a report about ocean plastic pollution, visual surveys revealed that foamed PS items were the most frequently observed large particles of plastics.[31]

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[27] Ocean Conservancy. (2017) International Coastal Cleanup 2017 Report. USA: Ocean Conservancy. Retrieved from https://oceanconservancy.org/wp-content/uploads/2017/06/International-Coastal-Cleanup_2017-Report.pdf

[28] Ocean Conservancy, 2017. 13, 18-19

[29] Geyer, R., Jambeck, J., and Law, K. L. (2017) Production, Use, and Fate of All Plastics Ever Made. *Science Advances. 3(7)*. 3. http://doi.org/10.1126/sciadv.1700782

[30] World Economic Forum and Ellen MacArthur Foundation (2016) *The New Plastics Economy: Rethinking the Future of Plastics*. 17. Retrieved from https://www.ellenmacarthurfoundation.org/assets/downloads/EllenMacArthurFoundation_TheNewPlasticsEconomy_Pages.pdf

[31] Eriksen, M., Lebreton, L. C. M.; Carson, H. S.; Thiel, M.; Moore, C. J.; Borerro, J. C.; Reisser, J. (2014) Plastic Pollution in the World's Oceans: More than 5 Trillion Plastic Pieces Weighing over 250,000 Tons Afloat at Sea. *PLOS ONE*. 7. https://doi.org/10.1371/journal.pone.0111913

Plastic pieces are also easily mistaken for food and end up ingested by wildlife.[32,33] A recent study suggested that the chemical signature from plastic debris may actively attract certain fish.[34]

Litter Impact on Local Waterways and Beaches

A Southern California-wide trash and debris survey conducted in 2013 by the Southern California Coastal Water Research Project found that plastic was the most extensive and abundant type of debris in both ocean and riverine systems. 78 percent of Southern California streams contained plastic trash such as wrappers, bags and Styrofoam™. See below tables showing the amounts of debris per this study.

Table 3

SUMMARY STATISTICS OF DEBRIS ABUNDANCE DURING THIS SURVEY OF SOUTHERN CALIFORNIA STREAMS

Debris Category	Debris Item*	Number of Pieces Per Site (Area Weighted Mean)	Standard Error	95%CI	Maximum Number of Pieces Found at a Site
Plastic		18.7	2.49	4.88	217
	Plastic wrapper/pieces	5.3	0.85	1.67	70
	Plastic bags/pieces	3.7	0.53	1.04	124
	Plastic misc pieces (soft/hard)	3.4	0.88	1.73	56
	Styrofoam pieces	3.1	0.94	1.85	77
	Plastic Bottles	1.1	0.21	0.41	39
Biodegradable		2.1	0.37	0.73	46
	Paper/cardboard	1.8	0.35	0.68	46
Glass		1.9	0.56	1.09	119
	Glass pieces	1.6	0.55	1.08	119
	Glass bottles	0.3	0.07	0.13	25
Toxic		1.8	0.37	0.72	29
	Cigarette butts	1.6	0.35	0.69	27
Miscellaneous		2.5	1.05	2.05	390
	Sports balls	1.4	1.00	1.95	388
Construction		1.9	0.88	1.73	80
	Concrete/Asphalt debris	1.2	0.85	1.67	77
Metal		1.5	0.18	0.36	33
Fabric and Cloth		0.7	0.12	0.24	58
Biohazard		0.1	0.04	0.08	5
Large		0.1	0.02	0.04	9
Any Anthropogenic Debris		**31.3**	**3.81**	**7.47**	**516**

*Not all debris items are listed under each category. For larger categories only debris items with values above 1 are listed.
Source: Southern California Coastal Water Research Project. (2016) Technical Report 928. USA: SCCWRP. Retrieved from ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/928_B13_Debris.pdf, p.33

[32] Rochman, C. M.; Tahir, A.; Williams, S. L.; Baxa, D. V.; Lam, R.; Miller, J. T.; Teh, F.; S. J; Werorilangi, Sig (2015). Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption. *Scientific Reports, 5*, 14340. http://doi.org/10.1038/srep14340

[33] Ocean Conservancy. (2017). The New Wave: Investment Strategies for Plastic Free Seas. USA: Ocean Conservancy. Retrieved from https://oceanconservancy.org/wp-content/uploads/2017/05/the-next-wave.pdf

[34] Savoca, M. S.; Tyson, C. W.; McGill, M.; Slager, C. J. (2017 Aug 16) Odours from Marine Plastic Debris Induce Food Search Behaviours in a Forage Fish. *Proceedings of the Royal Society (Great Britain): Biological sciences. 284 (1860).* http://doi.org/10.1098/rspb.2017.1000

Table 4

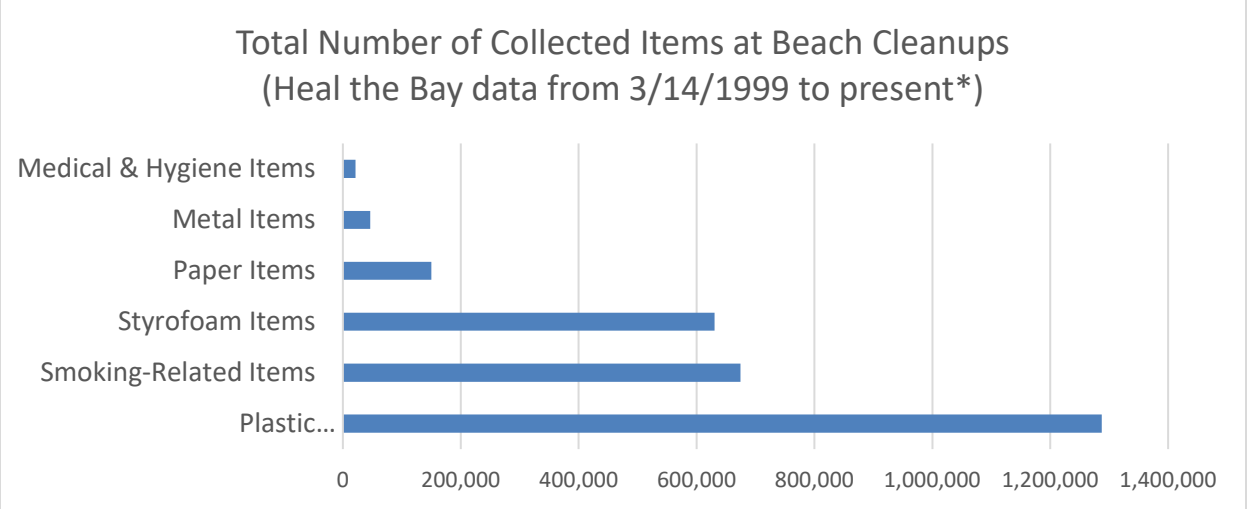
TOP 10 ITEMS MAKING UP 75% OF THE TOTAL DEBRIS IN THE SOUTHERN CALIFORNIA REGIONAL STREAM SURVEY

Rank	Debris Item	% Total	% Cumulative
1	Plastic wrappers	14.8	14.8
2	Plastic bags	14.1	28.9
3	Persistent plastic pieces (soft/hard)	9.0	37.9
4	Styrofoam pieces	8.8	46.6
5	Glass pieces	6.7	53.3
6	Sports balls	6.1	59.4
7	Cigarette Butts	5.3	64.7
8	Paper and cardboard	5.2	69.8
9	Plastic Bottles	3.7	73.5
10	Concrete/Asphalt debris	2.1	75.7

Source: Southern California Coastal Water Research Project. (2016) Technical Report 928. USA: SCCWRP. Retrieved from ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/928_B13_Debris.pdf, p.34

As plastic litter on the local coastline continues to be found, local groups have organized to clean up the local beaches and waterways. According to beach cleanups documented in Heal the Bay's (HTB) Marine Database, plastic items (including wrappers, fast food items, and straws/stirrers but excluding EPS items) make up the most collected of all littered materials with smoking-related and EPS items being the next most collected. The cleanups subcategorize EPS items into peanuts, food containers, and pieces. The data showed that EPS pieces comprised the most collected EPS litter item. And over the last 10 years, cleanups collected over 500,000 EPS items. In 2016 alone, over 110,000 EPS items were collected.[35]

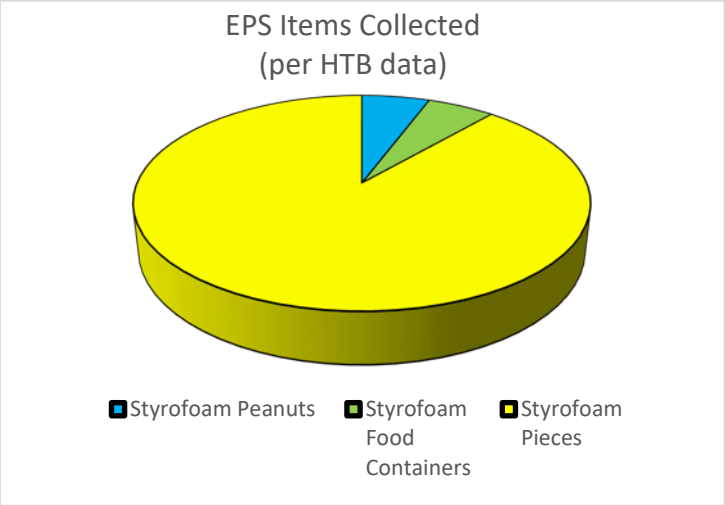
Figure 2



**as of 9/19/2017*

[35] Heal the Bay Marine Database. Accessed on 9/19/17. Searched for Debris Picked Up at All Beaches. Retrieved from http://sites.healthebay.org/MarineDebris/MDDB/AnalysisWizard.aspx

Figure 3



Following are comparisons that have been made between items made of foam and other forms of plastic:

- According to a research study conducted in 2013 by Algalita Marine Research and Education, the most common types of plastics found in both the Los Angeles (LA) and San Gabriel River Watersheds were: "Wrappers/pieces," "Bags/pieces," "Miscellaneous Pieces," and "(foam) PS/pieces."[36]

- According to the City of LA, plastic film and bags, snack and candy packaging, (foam) PS, and heavy plastic film and tarps were found to be the top categories of plastic littered items in the LA and San Gabriel River watersheds.[37]

- Cleanups by Friends of the LA River found that EPS litter at the Fletcher Drive and Bowtie Parcel in Glendale Narrows, the central and longest natural area of the LA River, increased from two percent to five percent of total litter collected between 2009 and 2010.[38] The report did not state the amount of total litter collected at the 2009 and 2010 cleanups nor made comparisons about total litter collected from 2009 to 2010.

- The percentage of total litter that was EPS at the LA River Estuary at Willow Street in Long Beach also increased by 8 percent from 2004 (2 percent) to 2011

[36] Eriksen, et al., 2014. 66

[37] Midbust, J., Mori, M., Richter, P., Vosti, B. Algalita Marine Research Institute (2014) Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds. USA: Algalita Marine Research Institute. Retrieved from http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf

[38] Tyack, N. Friends of the Los Angeles River. (2011). A Trash Biography: Friends of the Los Angeles River 2004-2011 Trash Report. USA: Friends of the Los Angeles River. Retrieved from http://clients.codebloo.com/folar/wp-content/uploads/2014/03/LA_Trash_Sort_Report_-_Final.pdf

(10 percent).[39] The report did not state the amount of total litter collected at the 2004 and 2011 cleanups nor made comparisons about total litter collected from 2004 to 2011.

- At Compton Creek, a tributary to the LA River, EPS comprised 14 percent and food service packaging comprised 9 percent of total litter, both in the top five most abundant item categories for that cleanup.[40]

Litter Prevention

Local Water Pollution Measures

The Los Angeles County Flood Control District, the County of Los Angeles, and cities within the County are required by their National Pollutant Discharge Elimination System (NPDES) permits to control discharges of pollutants into rivers, lakes, and the ocean. In addition, the Regional Water Quality Control Board has imposed total maximum daily loads (TMDL) for what can enter these water bodies. The following information was gathered from documents and personal communication from Public Works.

For years, the County has implemented and maintained numerous best management practices to reduce littering and to remove litter from its right-of-way and storm drain system. Litter prevention maintenance and mitigation costs the County an average of $73 million per year (from Fiscal Year 2011-12 to Fiscal Year 2014-15) for structural and treatment control best management practices (BMP), municipal street sweeping, catch basin cleaning, and trash collection/recycling.

Trash receptacles have been installed at all bus stops within the following four watersheds as mandated by the NPDES permit: San Gabriel River, Dominguez, Malibu Creek and Santa Clara River. Trash receptacles have also been installed at bus stops in the other watersheds based on need and requests from constituents. Trash collection is performed at the trash receptacles anywhere from three to five times per week depending on the need. Trash collection is done to comply with the latest NPDES requirements by promoting BMPs and not to allow any waste or liquid from trash receptacles or liners to enter the storm drains and/or street gutters during their

[39] Tyack, 2011. 12
[40] Tyack, 2011. 17

maintenance. The amount of waste collected from sweeping of road right-of-way is reported weekly, and collections have averaged approximately 3,000 tons per year for the past two years. Street sweeping reduces the maintenance of catch basin screens.

The County has been equipping catch basins with full-capture devices and screens since 2003. Over 6,000 connector pipe screens have been installed inside catch basins in the unincorporated areas of the following watersheds: LA River, Dominguez Channel, San Gabriel River, Ballona Creek, Santa Clara River, Malibu Creek, and Santa Monica Bay. The County retrofitted each catch basin in the LA River Watershed (4,000 catch basins) with a connector pipe screen at all capture devices to meet the Trash TMDL by September 2016. Automatic retractable screens were also installed in the catch basins along with the connector pipe screens, wherever possible. Currently approximately $9 million among all watersheds maintained by the County have been spent on installations. The amount of waste collected from cleaning out catch basins is reported weekly, and collections have averaged approximately 2,000 tons per year for the past two fiscal years at a cost of approximately $1.6 million per year. The amount of waste collected from cleaning out pump station forebays is reported, and collections have amounted to nearly 200 cubic yards this past fiscal year. Since 2000, trash nets have been installed to capture floating trash, debris, and vegetation. This results in improved water quality, enhanced recreation, and improved navigation in the County's waterways. The LA River trash boom and Ballona Creek trash net have collected an average of nearly 1,700 tons and about 50 cubic yards respectively for the past two fiscal years.

Cities within the Los Angeles County watersheds have also installed screen devices similar to the County design as well as continuous deflective separation units. The City of LA also recently installed a trash net in Wilmington Drain as part of their Machado Lake Restoration Project.

Trash TMDL requirements do not currently distinguish between types of trash, only general qualities of pollutants (i.e., floatable, suspended, and settleable material).[41] Some materials are easier to catch before ending up in the waterway, while others can easily break up into pieces. Less dense and lighter materials tend to become windborne more easily and have an easier time escaping litter capture devices, especially in high-flow storm events. The material collected in the booms and nets as well as in the catch basins and through street sweeping operations is generally not recyclable due to the large amount of contamination. For Santa Monica Bay, the target of zero trash must be met by 2020, except for cities that pass ordinances banning plastic bags, smoking in public places, and single-use EPS food packaging, which have until 2023.[42]

[41] State Water Resources Control Board of CalEPA. (2015) Amendment to the Water Quality Control Plan for the Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California - Final Staff Report. USA: State Water Resources Control Board. Retrieved from https://www.waterboards.ca.gov/water_issues/programs/trash_control/docs/01_final_sed.pdf

[42] Von Bitner, T., Stein, E. D., Protopapadakis, L., and Thorsen, K. (2015) Urban Coast Special Issue: State of the Bay. *The Bay Foundation. 5(1*). 29-34

Impacts of Restrictions on Commonly Littered and Easily Windblown Plastic Products

Due to similar lightweight and easily windborne qualities EPS containers have with single-use plastic carryout bags, following are summaries of litter studies comparing the effects restrictions on lightweight and easily windblown plastic products have on the environment.

- Alameda County, California – EPS Bans

  Starting in 1990, the City of Berkeley implemented a prohibition on PS food service ware. Then, starting in 2007 the City of Oakland also implemented a similar restriction, as well as the Cities of Alameda, Albany, and Emeryville the following year. In 2011, three more cities (Fremont, Hayward, and Livermore) in the region followed suit. The policies continued to cover the Cities of San Leandro in 2012 and Pleasanton in 2013.

  From March to June in 2014, a study was conducted on 100 small full-capture devices throughout the County. Accumulation of trash ranged from 82 to 94 days for the different sites monitored, and over 800 gallons of trash and debris were collected. From this study, it was found that approximately 49 percent of the trash characterized was other plastic and no disposable non-foam or paper food or beverage ware products were observed at the 100 monitoring sites, indicating that EPS replacement products are not consistently observed in the storm drain conveyance system in Alameda County. A possible explanation may be that either these products are littered at a lower frequency than other items, or that they are too large to easily fit in the curb opening or grate of a storm drain inlet.[43]

  The study reported that roughly 15 percent (by volume) of the material from storm drain inlets were trash, dominated by plastic film, food and candy packaging, straws, lids, and bottle tops. Single-use plastic bags and EPS food ware comprised a smaller portion of the trash. Non-foam plastic and paper disposable food and beverage ware were not consistently observed in material removed from storm drains.[44]

  The sites monitored within the City of San Leandro showed the average annual volume of EPS food ware during the post-ordinance adoption was 61 percent less than the pre-ordinance volume. No mention was made in the report of alternative food ware observed from the City of San Leandro EPS Food Ware Ordinance Case Study.

[43] EOA, Inc. Alameda County Waste Management Authority. (2014). Alameda Countywide Storm Drain Trash Monitoring and Characterization Project - Technical Report. USA: Alameda County Waste Management Authority. Retrieved from http://www.stopwaste.org/sites/default/files/Bag%20attach%20A.pdf

[44] EOA, Inc, 2014. 19

- City and County of San Francisco - EPS Ban

  According to the April 2007 Street Litter Survey of San Francisco[45], litter was observed from 105 randomly selected sites and EPS food service products were categorized as large items of litter. These products included cups, plates, clamshells, and trays. 68 of the 3,812 pieces (1.78 percent) of large litter observed were classified as EPS food service products. 132 pieces (3.46 percent) of the large litter observed were alternative food service products.

  The April 2008 Street Litter Survey[46] observed litter from 132 selected sites, most of which were the same as the previous year. Of the 3,973 pieces of large litter observed in the 2008 survey, 45 pieces (1.13 percent) were classified as EPS foodservice products. 252.5 pieces (6.36 percent) of the large litter observed were alternative food service products.

  There was a 0.65 percent reduction in PS foam food service products and a 2.9% increase in alternative food service products observed after the ban was implemented in June 2007.

- District of Columbia, USA - Bag Fee

  Per the Anacostia Watershed Trash Reduction Plan (2008) developed by the Anacostia Watershed Society for the District's Department of the Environment, the following information was gathered. From August 2007 to June 2008, trash was surveyed in the Anacostia Basin. The survey found that the largest categories of trash were plastic bags, Styrofoam products, snack wrappers (potato chip and candy bar packaging), and bottles and cans. They composed nearly 85 percent of the items. In the tributary streams, plastic bags, bottles and cans, Styrofoam, and snack wrappers were also prevalent. Most of the trash found were food or drink related.[47] Of the items found in the tributaries, 47 percent were plastic bags, while bags made up 21 percent of items found in the river.[48]

  Paper bags, such as those currently used by large chain fast-food restaurants, were found to not persist in the stormwater route from the streets, through the storm sewers, and into the streams. The absence of bags downstream showed their disintegration

[45] HDR, BVA & Associates, Inc., and MGM Management. City of San Francisco. (2007). The City of San Francisco Streets Litter Audit 2007.
[46] HDR, BVA & Associates, Inc., and MGM Management. City of San Francisco. (2008). The City of San Francisco Streets Litter Audit 2008.
[47] Anacostia Watershed Society. District of Columbia Department of the Environment. (2008). Anacostia Watershed Trash Reduction Plan. USA: District of Columbia Department of the Environment. Retrieved from https://doee.dc.gov/publication/2008-anacostia-river-trash-study
[48] Anacostia Watershed Society, 2008. xvii

throughout the route. Tests were conducted on paper bags to prove this, and it was found that the paper begins breaking apart immediately upon the bags getting wet.[49]

In 2009, the District of Columbia implemented the Anacostia River Clean Up and Protection Act of 2009, which required certain businesses within the District to charge a carryout bag fee.

In October and November 2014, a litter survey of the Anacostia Watershed was conducted. Along the roadways, plastic and paper retail bags were found in nearly 2 percent of the large items of litter.[50] The following data from the 12 non-roadway sites was based on areas identified as litter hot spots. Plastic and paper retail bags were found in nearly 6 percent of the large items.[51] Plastic film was found in 3 percent of the small items of litter, and paper was found in 15.6 percent.[52]

Recyclables comprised 44 percent of large items of litter on non-roadways compared to 33 percent for roadways.[53] Overall, a significant amount of paper and commingled containers of all types (particularly beverage containers) found in the large items of litter category (38-42 percent) would have been recyclable.[54]

The already massive amounts of plastic particles in the marine environment is a litter problem that governments and other agencies have been trying to tackle. One way many have already attempted to prevent further litter from entering the environment is source reduction of single-use plastic products. These case studies do show that EPS food service ware litter can possibly be reduced by the development of laws and policies to curb usage and/or sale of such products. As with any law, efforts to properly educate and outreach to stakeholders throughout the manufacture, distribution, sale, and use of banned and alternative products and the public at large can greatly catapult the implementation and enforcement of product bans to reduce PS food service ware litter.

[49] Anacostia Watershed Society, 2008. xv
[50] Environmental Resources Planning, LLC. (2015) 2015 Anacostia Watershed Litter Survey. Retrieved from http://www.erplanning.com/uploads/2015_Anacostia_Watershed_Litter_Survey.pdf
[51] ERP, 2015. 69
[52] ERP, 2015. 29
[53] ERP, 2015. 26
[54] ERP, 2015. 49

CHAPTER 7 – EFFORTS AND BANS

Early in the 2017-18 legislative session, Senator Ben Allen introduced Senate Bill 705 (SB 705) to prohibit food vendors Statewide from distributing EPS food service containers[55]. The bill was amended three times and the final version included a provision allowing local government to grant exceptions to restaurants that demonstrated economic hardship. Ultimately the bill did not receive enough votes to make it out of the house of origin but may be reconsidered next year.

Summary of Prohibitions in Other Jurisdictions

Since our last report in 2011, many more cities in California and across the nation have adopted resolutions or ordinances to restrict the use and/or sale of EPS and/or PS. Currently, 110 counties and cities in California have adopted some type of regulation on the use and/or sale of EPS and/or PS. According to Californians Against Waste (CAW), 13 of these regulations only apply to the use of EPS and/or PS at government facilities and/or government sponsored events, including Los Angeles County, City of Los Angeles, Orange County, and Ventura County[56].

In Los Angeles County, there is now a total of nine cities that have adopted an ordinance prohibiting the use and/or sale of EPS and/or PS food service ware and/or EPS packaging material or other EPS material in their cities:

- Culver City (2017)
- South Pasadena (2016)
- Pasadena (2016)
- Manhattan Beach (2013)
- Hermosa Beach (2012)
- Calabasas (2007)
- Santa Monica (2007)
- Malibu (2005)
- West Hollywood (1990)

In October 2017, the City of Long Beach passed a motion directing the development of an ordinance banning all PS food containers and all other food containers that are not compostable or recyclable. In May 2017, the City Council of Culver City adopted an ordinance to ban the sale and use of PS[57]. The prohibition includes the citywide sale and use of EPS food service ware including cutlery, straws, cup lids, and foam coolers. To further reduce waste, the ordinance also requires prepared food service providers to ask their customers whether they want cutlery included with their take-out order (instead of automatically including it). Additionally, the City promotes the use of reusable food service ware instead of disposable products.

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[55] Senators Allen, Hill, and Stern. (2017). SB-705 Solid Waste: Expanded Polystyrene Food Service Containers. *California Legislative Information*. 2017-2018. Retrieved from https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB705

[56] Californians Against Waste. (Ed.). Polystyrene: Local Ordinances. Accessed on 9/21/17. Retrieved from http://www.cawrecycles.org/polystyrene-local-ordinances/

[57] Culver City. (Ed.). (2017). City Ban on Polystyrene Foodware. Retrieved from http://www.culvercity.org/how-do-i-/learn/city-ban-on-polystyrene-foodware

A representative for the City of Los Angeles, Bureau of Sanitation also reported that per a motion from Council Members Paul Koretz and Bob Blumenfield they are reviewing the City's efforts in instituting the 2008 EPS ban at City facilities and events. They are still gathering information to report back to their City Council.

Similar ordinances have also been adopted by eight counties in California:

- Alameda County (2015)
- Mendocino County (2014)
- Santa Clara County (2012)
- San Mateo County (2011)
- Marin County (2010)
- Monterey County (2010)
- Santa Cruz County (2008)
- San Francisco County (2007)

In 2012, the County of Santa Cruz amended an existing ordinance adopted in 2008 to additionally prohibit the sale of EPS products in the unincorporated area of the county[58]. The original ordinance only prohibited the use of EPS packaging in food service. The amended ordinance not only prohibits the sale of EPS food service ware but also of coolers/ice chests and nonfood related products made of EPS.

San Francisco also amended and expanded their ordinance effective January 1, 2017[59]. The original ordinance prohibited EPS food ware for food prepared and served in the jurisdiction. The amendments include the sale and distribution of EPS products, including food service ware, packing material, meat and fish trays, egg cartons, coolers, beach toys, and dock floats. The county reports on their Department of the Environment website that although the 2007 ordinance successfully reduced PS litter; remaining PS foam was still having a negative impact on the environment.

According to the Surfrider Foundation, there are over 20 additional regulations prohibiting the use and/or sale of EPS and/or PS nationwide distributed among the following states[60]:

- Florida
- Maine
- Massachusetts
- New Jersey
- New York
- Oregon
- Texas
- Washington
- District of Columbia

[58] County of Santa Cruz. (Ed.). (2017). Single Use Polystyrene Ordinance. Retrieved from http://dpw.co.santa cruz.ca.us/Home/RecyclingSolidWaste/ZeroWastePlan/EnvironmentallyAcceptablePackagingMaterialsOrdinance/SingleUsePolystyreneBanOrdinance.aspx

[59] San Francisco Department of the Environment. (Ed.). (2016). Polystyrene Foam and the Food Service and Packaging Waste Reduction Ordinance. Retrieved from https://sfenvironment.org/polystyrene-foam-food-service-packaging-waste-reduction-ordinance

[60] Surfrider Foundation (Ed.). (2017). Polystyrene Ordinances. Retrieved from Surfrider Foundation. http://www.surfrider.org/pages/polystyrene-ordinances

Jurisdictions Opting Against Bans or Delaying Bans

Several jurisdictions have considered a ban on PS food service ware and decided on alternative options or decided not to pursue at that time. A few that we are aware of are listed below:

- Recently, City of San Diego decided that it would allow EPS food service ware to be placed in curbside collection recycling blue bins where it will ultimately end up at a secondary MRF for separation. The City has been allowing large foam pieces in its blue bins since 2014 for recycling, but up until this time, EPS food containers were not allowed. The City estimates that it will cost $90,000 a year to recycle food service ware [61] but has decided to accept this cost instead of enacting a ban on EPS food service ware.

- In 2008, City of Santa Barbara concluded in a staff report that there was no environmental benefit of banning EPS for alternative plastic products. Staff also concluded that compostable alternatives would have a greater environmental benefit, however without a composting program at that time, it was decided to wait on a ban and focus on developing composting infrastructure. Since that time, the City now has a composting program in place that can accept compostable products and is reconsidering a ban of EPS and other plastic food service ware.

- City of Huntington Beach prepared an ordinance which was voted on by its City Council in 2013. At that time, the council voted the ordinance down by a 4 to 3 vote with 4 council members opposed and 3 in favor. Since that time, the City has not revisited the issue of an ordinance.

Types of Ordinances

Over the last 6 years, ordinances developed to prohibit the use of PS products by businesses have included additional requirements and products. The latest ordinances are more detailed in scope and restrict the use and/or sale of additional EPS and/or PS material. Below is a spectrum of existing policies:

- Prohibition on the use of disposable EPS food containers for prepared food.

- Above policy plus requirement that alternative material be compostable, biodegradable, and/or recyclable.

- Above policy plus prohibition on the use of other disposable PS food service ware, such as straws, cup lids, and utensils.

[61] Garrick, D. (2017 Jun 20). *Instead of a Ban, San Diego Will Allow Recycling of Foam Food Containers*. The San Diego Union-Tribune. Retrieved from http://www.sandiegouniontribune.com/

- All of the above policies plus prohibition on the sale of EPS disposable food containers and other EPS products, such as packing material, coolers/ice chests, beach toys, dock floats, tortilla warmers, etc.

- All of the above policies plus prohibition on the retail use of EPS for packaging unprepared food including raw meat, seafood, and produce, such as trays and egg cartons.

CHAPTER 8 - EFFECTIVENESS OF HARDSHIP WAIVERS

Another component of the ordinances that have been passed by other jurisdictions is exemptions including undue hardship waivers for food vendors and the common hardship categories are economic and/or unique packaging. An economic hardship refers to the affordability of an alternate material defined in some jurisdictions by a 15 percent cost increase. A unique packaging hardship refers to the feasibility of a reasonable alternate material. The usual process is for food vendors to submit an application describing the circumstances of their undue hardship and if approved would typically receive a one-year exemption. In our previous report, no records were found of any businesses that applied for a hardship waiver. Staff surveyed over 60 jurisdictions in California to determine the current effectiveness of undue hardship waivers for small businesses. From the responses received only two jurisdictions reported the use of hardship waivers:

- City of San Luis Obispo – since the ordinance's effective date, January 1, 2016, only one application was received and approved.

- City of San Clemente – since the ordinance's effective date, July 1, 2011, only one application was granted when the ordinance initially passed due to a recent significant purchase of EPS material and the business was given a specific time frame to use the material.

Overall, survey responses were consistent with previous findings indicating that although provisions for undue hardship waivers are allowed they are seldom utilized. The nine cities in Los Angeles County, all of which have hardship waivers, reported full compliance from small businesses and have yet to receive applications for hardship waivers. Those jurisdictions along with others in California attribute the small business compliance success to the following efforts:

- Delayed implementation to allow businesses time to use up inventory and find new vendors.

- Initial outreach and education with printed material and/or in-person.

- Stakeholder meetings.

- Clear definitions on the ordinance.

- Development of a list of local distributors of alternate products.

- Food service ware fairs and/or workshops.

- Electronic resources on the jurisdictions webpage.

- Annual and/or periodic inspections.

CHAPTER 9- COUNTY CONTRACTS

In conjunction with the 2011 Expanded Polystyrene Food Container in Los Angeles County report, the Internal Services Department, as the County Purchasing Agent, discontinued the purchase of all such products for use at County facilities. All departmental specifications for food container products were changed from EPS to alternate products. Currently, there are no County facilities for which the County purchases food containers that contain EPS.

In an effort to strengthen the County's position on banning EPS and PS food containers, the County Purchasing Agent may implement a clause in its solicitations that prohibits the purchase of EPS and PS food containers from bidders.

CHAPTER 10 – FINDINGS

Solid Waste Disposal

From a solid waste management perspective, some alternative products are more likely to be recycled, composted, or diverted from landfill disposal as compared to EPS or PS. However, at this time there is a lack of composting infrastructure and a lack of organics programs to effectively divert a significant amount of the compostable food service ware. However, it is anticipated there will be more composting facilities developed regionally as well as more local programs implemented by jurisdictions to more easily accept compostable food service ware.

Litter Consideration

PS food service ware litter continues to be a problem along with other types of food service ware litter in the County's waterways and the ocean. It should be noted that a ban of one product over another could result in a different product replacing the other in the litter stream. Some alternative materials to EPS or PS may be more compatible with the environment, particularly if they break down more quickly in an aquatic environment. In addition, EPS as a material can be broken into small pieces, and windblown into the storm drain system which ultimately leads to the ocean. EPS is challenging to contain or collect, and can pose a disproportionate nuisance and source of visual blight compared to other litter materials.

Options for the Board's Consideration

1. Continue to support legislation which would phase out the use of single-use items such as EPS food containers on a Statewide basis. This would not require the development of a draft ordinance.

2. Prohibit EPS food containers at food service retailers in the unincorporated County areas. This would require development of a draft ordinance.

3. Prohibit all or some PS food containers at food service retailers in the unincorporated areas. This would require development of a draft ordinance.

4. Require food service retailers in the unincorporated County areas to only provide straws and single-use utensils to customers upon request. This would require the development of a draft ordinance.

5. In collaboration with the Chief Sustainability Officer, direct Public Works to investigate strategies to encourage food service retailers in the unincorporated County areas to adopt sustainable practices such as a recognition program for businesses, who voluntarily use alternative food service ware products among other sustainable initiatives. This would not require the development of a draft ordinance.