Public Comment
Trash Amendments
Deadline: 8/5/14 by 12:00 noon

CALIFORNIA RESTAURANT ASSOCIATION

CALIFORNIA RETAILERS ASSOCIATION

RECEIVED
8-4-14
SWRCB Clerk

August 5, 2014

The Honorable Felicia Marcus
Chair, State Water Resources Control Board
1001 I Street
Sacramento, CA 95814
VIA Email: commentletters@waterboards.ca.gov

RE: Comment Letter - Draft Amendments to Statewide Water Quality Control Plans to Control Trash

Dear Chairwoman Marcus:

On behalf of the California Restaurant Association (CRA) and the California Retailers Association (CRA), we would like to thank the Water Resources Control Board (Board) for the opportunity to comment on the proposed amendments to the statewide water quality control plans to reduce trash. We applaud the Board for its efforts to establish a uniform, statewide policy to reduce trash that flows into the state's waterways, however, we are concerned that an element of the proposal will negatively impact both of our respective industries, and at the same time, fail to help the Board achieve its stated trash reduction objective.

The Draft Amendments to the statewide water quality control plans to control trash would encourage permittees under municipal separate storm sewer system (MS4) permits to enact bans on single-use consumer products. The draft trash amendments describe such bans as "regulatory source controls," which would allow MS4 permittees under Track 2 to ban specific products such as single-use carryout bags and expanded polystyrene foam.

Allowing MS4 permittees to rely on bans to achieve compliance under Track 2 will undermine the Board's objective of reducing trash in receiving waters. The data from polystyrene foam bans indicates that bans do not reduce trash in the receiving waters but simply encourage the substitution of other non-banned materials.

In fact, data from the City of San Francisco's Street Litter Audit revealed the City's ban of polystyrene food service had not reduced litter and instead found that a 36% reduction in polystyrene litter was offset by an increase of the same percentage of coated paperboard on an item by item basis (City of San Francisco 2008).

Additionally, The Brattle Group's recent study (attached) conducted by Dr. David Sunding, a natural resources economist at the University of Berkeley, concluded that a ban of just one product (polystyrene foodservice material) in one city (San Jose) would impose additional costs that could easily reach $4.4 million annually and lead to as many as 40 full-time job losses in the restaurant industry in San Jose. Note, this study was only considering one product, in one city. The proposed trash amendments, under

Track 2, will encourage bans of a multitude of single-use consumer products and packaging across the state which could have significantly greater financial impacts to the restaurant and retail industry.

Furthermore, a ban on certain food service packaging will force restaurants to purchase alternative products that may not perform as well and cost significantly more. Restaurants should have the freedom of choice to use food service packaging that best meets their operational needs, is cost effective, safe and maintains customer satisfaction. If the proposed, Track 2, trash amendments are adopted in their current form, bans on certain products will be encouraged. This leaves restaurateurs with products that may not provide the same performance standards and could leave our members no option but to increase their prices and potentially hire fewer workers.

While we appreciate the Board's efforts to reduce trash in California's waterway, our collective industry is being asked to accept a policy that will hurt its businesses and customers and will more than likely have limited impact on reducing trash form the receiving waters.

To help ensure that the proposed control plans do not result in any "unintended environmental consequences," we would encourage the Board to consider a more holistic approach with trash in the waterways. This approach would avoid arbitrarily creating "winners" and "losers" in the marketplace and instead incentivize manufacturers to aggressively work with local government, restaurants, retailers, waste haulers, recyclers and others to establish the infrastructure that captures all trash in the waterways.

We would ask that State Board to consider amending the trash amendments to completely eliminate "regulatory source controls" from Track 2 and consider a more comprehensive approach that captures all types of trash in the waterways. With some modifications, Track 2 could be an effective means of trash control. Specifically, Track 2 should explicitly prohibit MS4 permittees to rely on measures that the data shows are ineffective to reduce trash in the receiving waters; should require a certification process for non-structural, institutional control elements; and require additional monitoring to show that MS4 permittees using Track 2 are reducing trash in the receiving waters.

Full capture systems are the most effective way to truly deal with trash in California's waterways. The empirical data shows that bans do not reduce trash in the receiving waters but simply encourages the substitution of other non-banned materials. With a few substantial changes as outlined above, Track 2 could be an effective means of trash reduction. We look forward to continuing to work with the Board to find a solution that works for all stakeholders and reduces all types of trash in the receiving waters.

Sincerely,

Kara Bush
California Restaurant Association

Mandy Lee
California Retailers Association

The Brattle Group

Economic Analysis of San Jose's Proposed Polystyrene Ban

February 25, 2012

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Introduction and Summary

A product ban must be considered in terms of its cost and what it achieves from an environmental and social point of view. Based on our analysis, the costs of banning polystyrene food and beverage containers in San Jose could easily be over $4 million per year and lead to the loss of local jobs. This is a substantial expense, especially in view of City Government financial constraints. This amount would, for example, pay the salaries of about 35 police or firefighters, or 60 public school teachers. At the same time, the social benefits of the ban are highly uncertain and quite possibly even negative. According to recent life cycle cost comparisons, substitute products will result in higher energy and water consumption and, depending on the mix of substitutes preferred by consumers, higher greenhouse gas emissions. The impact on litter—a main objective of the ban—also appears to be small or nonexistent. Litter collection costs are unlikely to fall because polystyrene food service items represent a small share of litter and polystyrene replacements will also generate litter—perhaps more than continued use of polystyrene. Polystyrene also represents a very small share of total litter volume. Further, a ban is not an effective or cost-effective means to help the City meet trash reduction targets. Comprehensive actions aimed at multiple sources of waste and litter are likely to be far more cost effective. Finally, the impact of polystyrene on marine ecosystems is yet unknown and available evidence does not provide justification for significant environmental and economic costs the ban will entail.

The Costs of a Polystyrene Ban Are Likely to be Substantial

Based on our analysis, the costs of the proposed polystyrene ban are likely to be substantial. The cost to San Jose consumers could easily reach $4.4 million annually.

Household expenditures on food and meals away from home would clearly increase. Based on a recent comparison of posted prices, the price differential between polystyrene food service items (cups, plates, and trays) and alternative items is large. According to distributor price lists, the price for substitute cups, for example, is on average twice the cost of equivalent expanded polystyrene (EPS) cups. As shown in Table 1, based on EPS alternative price differentials and regional market volume, San Jose consumer spending could increase by over $4 million per year. This cost is only for cups, bowls, plates, and clamshells (also referred to as hingeware). Similar increases are likely for the other EPS food service items replaced by higher cost substitutes. Consequently, the total cost to households could be higher.

Table 1: Total Costs of Expanded Polystyrene Substitution in San Jose

SAN JOSE NATIONAL MARKET SHARE

US Population	307,000,000	[1]
San Jose Population	967,500	[2]
San Jose Share of Population	0.32%	[3]

SAN JOSE EPS MARKET VOLUME

Item	National Volume [4]	San Jose Volume [5]
Cups	25,503,000,000	80,371,832
Bowls	2,637,000,000	8,310,415
Hingeware	10,817,000,000	34,089,406
Plates	2,637,000,000	8,310,415

PRICE COMPARISON

Product	Cost (per 1000) [6]	Cost of Substitution [7]	Cost of San Jose Substitution [8]
Dart White Foam Cup - 16 oz.	$33.50		
Choice Paper Hot Cup - 16 oz.	$47.55	$14.05	$1,129,224
Dart White Foam Bowl - 12 oz.	$13.17		
White Heavy Weight Plastic Bowl - 12 oz.	$27.06	$13.89	$115,432
Dart Perforated Hinged Lid Take Out Container - 9" x 9" x 3"	$66.40		
Clear Hinged Lid Plastic Container - 9" x 9" x 9"	$146.00	$79.60	$2,713,517
Dart 3 Compartment White Foam Plate - 9"	$24.64		
Solo Medium Weight Paper Plate - 9"	$74.98	$50.34	$418,346
Total Estimated Annual Cost of EPS Substitution in San Jose			**$4,376,519**

Notes:
[1]: U.S. Census Bureau
[2]: U.S. Census Bureau
[3]: [3] / [2]
[4]: 2010 Market Research Study on Foodservice Packaging Products, Foodservice Packaging Institute.
Assumes evenly split allocation of market volume for bowls, plates, and platters.
[5]: [3] x [4]
[6]: Price of lowest cost polystyrene and alternative products obtained from www.webstaurantstore.com
[7]: Difference between alternative and polystyrene products from [6]
[8]: [7] x ([5] / 1000)

These costs reflect the assumption that restaurants will simply pass the cost of polystyrene replacement items through to consumers. This, however, may not be possible for some types of restaurants because of negative customer response, as acknowledged by an economic impact report prepared for the City.[1] While it is difficult to estimate this response with any

[1] Economic and Environmental System Planners, "Economic Impact Analysis of Expanded Polystyrene Costs", Final Report, November 2012. Prepared for the City of San Jose.

degree of certainty, the ability of fast food restaurants in particular to absorb these costs is limited. As noted in the economic impact report, these restaurants operate on very small margins. In addition, as of March 2013 they must raise wages to meet San Jose's new minimum wage law. Consequently, facing additional costs and consumer price sensitivity owners will be forced to consider cost cutting measures including firing employees. If only a quarter of the $4.4 million cost increase is absorbed, this could result in as many as 40 minimum wage ($10/hour) full-time or 80 half-time equivalent job losses. These jobs are primarily held by younger and unskilled workers, many of whom are from minority communities. In San Jose, the low wage workforce most likely to be impacted by a ban is disproportionately Hispanic.[2] Furthermore, businesses in the foodservice industry in the San Jose area that are likely to be affected are predominantly minority-owned. According to the U.S. Census' 2007 Survey of Business Owners, out of 1,895 businesses in the accommodation and food services industry operating in San Jose, 74% were owned by minorities.[3]

The Environmental Benefits of a Polystyrene Ban Are Uncertain and Possibly Negative

Measuring the benefits of a ban requires special attention to the available substitutes. Substitutes for polystyrene foam food service products would not have smaller environmental impacts overall. In fact, based on several life-cycle assessments, polystyrene food service products consume less energy and water and generate less greenhouse gases in production and transport than substitutes such as wax coated paper and polyethylene.[4] Consequently, a ban is likely to substantially increase energy and water consumption and possibly generate more greenhouse gases.

Impacts on Energy and Water Consumption

For example, if 16 oz polystyrene cups were replaced by any one of several substitutes identified in a recent lifecycle cost analysis, the resulting additional energy consumption would be equal to 0.8 to 3.2 million BTU for every 10,000 16oz hot cups substituted, and 0.7 to 9.9 million BTU for 32oz cold cups.[5] This is shown in Figure 1.[6]

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[2] Reich, Michael. "Increasing the Minimum Wage in San Jose: Benefits and Costs." Center on Wage and Employment Dynamics, University of California, Berkeley. October 2012.

[3] U.S. Census Bureau, *2007 Survey of Business Owners. "*Statistics for All U.S. Firms by Geographic Area, Industry, Gender, Ethnicity, and Race: 2007." Accessed at http://factfinder2.census.gov.

[4] We reviewed Franklin Associates (2011) and Herrera Environmental Consultants (2008).

[5] These calculations rely on Franklin Associates (2011). Assumes Average household energy consumption is 77 million BTU. See appendix table A-1.

[6] The lifecycle cost analysis did not consider that unlike polystyrene cups, which contain heat effectively, other cups do a poor job resulting in many consumers using double cups. The study did account for the addition of paper sleeves to contain heat in some non-polystyrene cups.

Substitutions could also lead to increased water consumption of 1,404 to 3,543 gallons for every 10,000 16oz hot cups, and 837 to 15,553 gallons for 32oz cold cups.[7] This is displayed in Figure 2.

Impacts on Greenhouse Gas Emissions

Greenhouse gas emissions from the same substitutions could decrease by 631 pounds or increase by 492 pounds for every 10,000 16oz hot cups, and decrease by 1,166 pounds or increase by 1,493 pounds for 32oz cold cups. [8] This is portrayed in Figure 3. The result depends on which polystyrene substitutes consumers prefer and what assumptions are made about whether substitute products are fully compostable. For example, if consumers use two paper cups as a substitute for one polystyrene cup for hot beverages, which is common because polystyrene cups are excellent insulators and paper cups are not, the paper cup substitutes will emit more greenhouse gases.

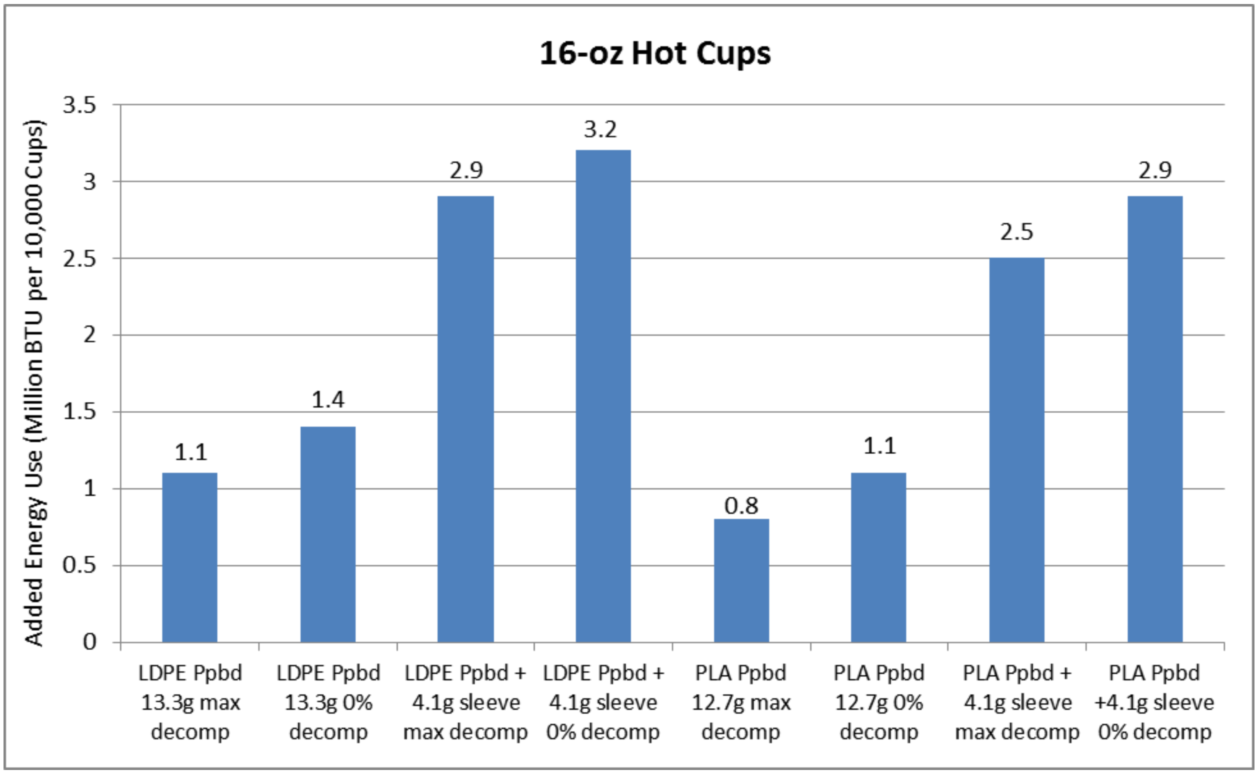
If one assumes that substitute products are fully compostable, then polystyrene products have lower greenhouse gas emissions than the substitute products. If one assumes that the substitute products are not compostable, then the substitute products may have lower greenhouse gas emissions; however, this negates one of the asserted advantages of these products (i.e., that they are compostable). The measurement of greenhouse gas emissions highlights how uncertain the measurement of the benefits of a polystyrene ban can be.

In addition, the greenhouse gas analysis assumes that neither polystyrene food containers nor their substitutes are recycled. This is a conservative assumption, because polystyrene food containers are readily recyclable and their substitutes may not be. For example, cups that combine paper and plastic are not generally recyclable.

[7] These calculations rely on Franklin Associates (2011). Assumes average household water consumption is 114,464 gallons. See appendix table A-2.

[8] These calculations rely on Franklin Associates (2011). Assumes average auto fuel emissions used are 7064 lbs CO2 equivalent. See appendix table A-3.

Figure 1: Added Energy Consumption from Substitution of EPS 16-oz Hot Cups and 32-oz Cold Cups



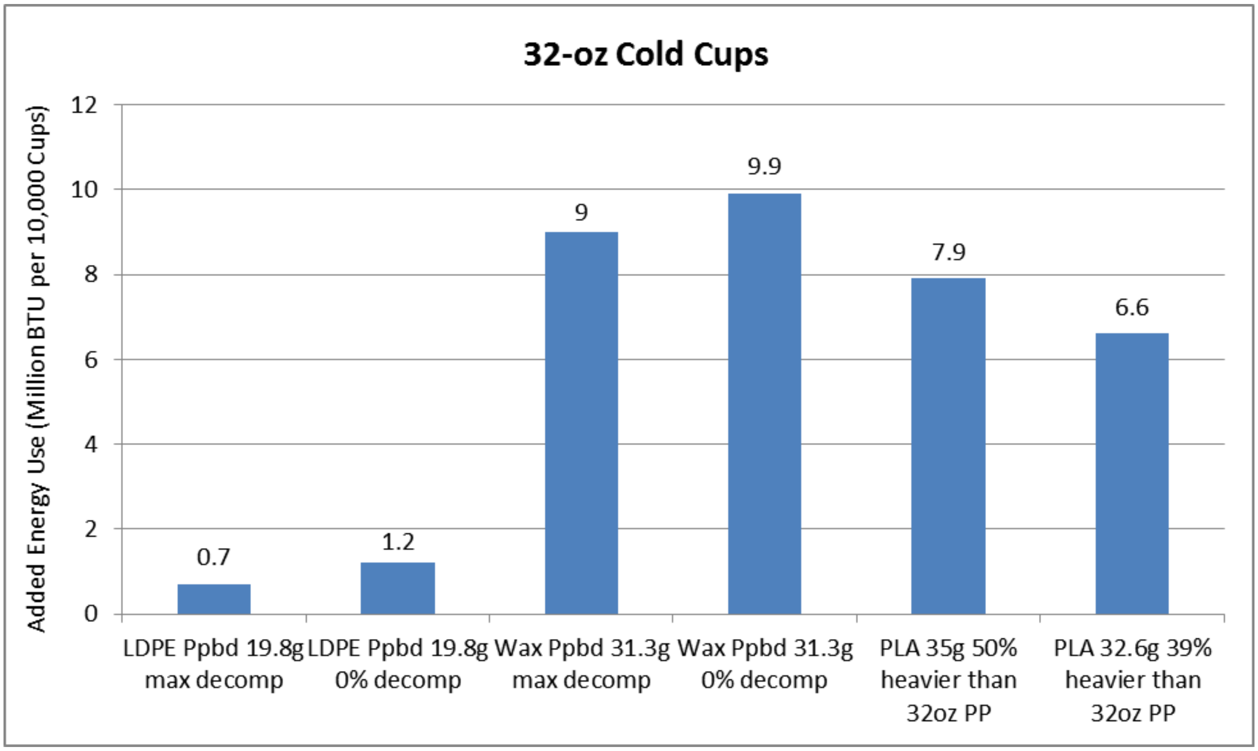
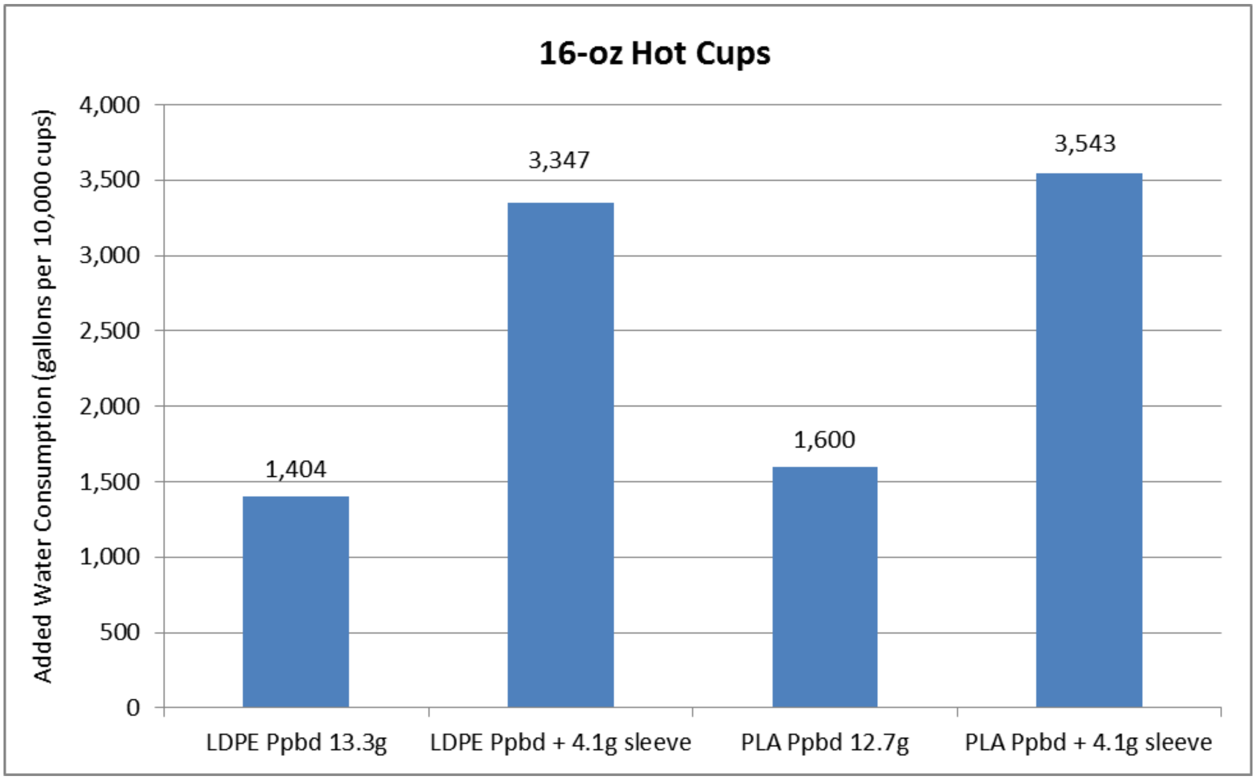


Figure 2: Added Water Consumption from Substitution of EPS 16-oz Hot Cups and 32-oz Cold Cups



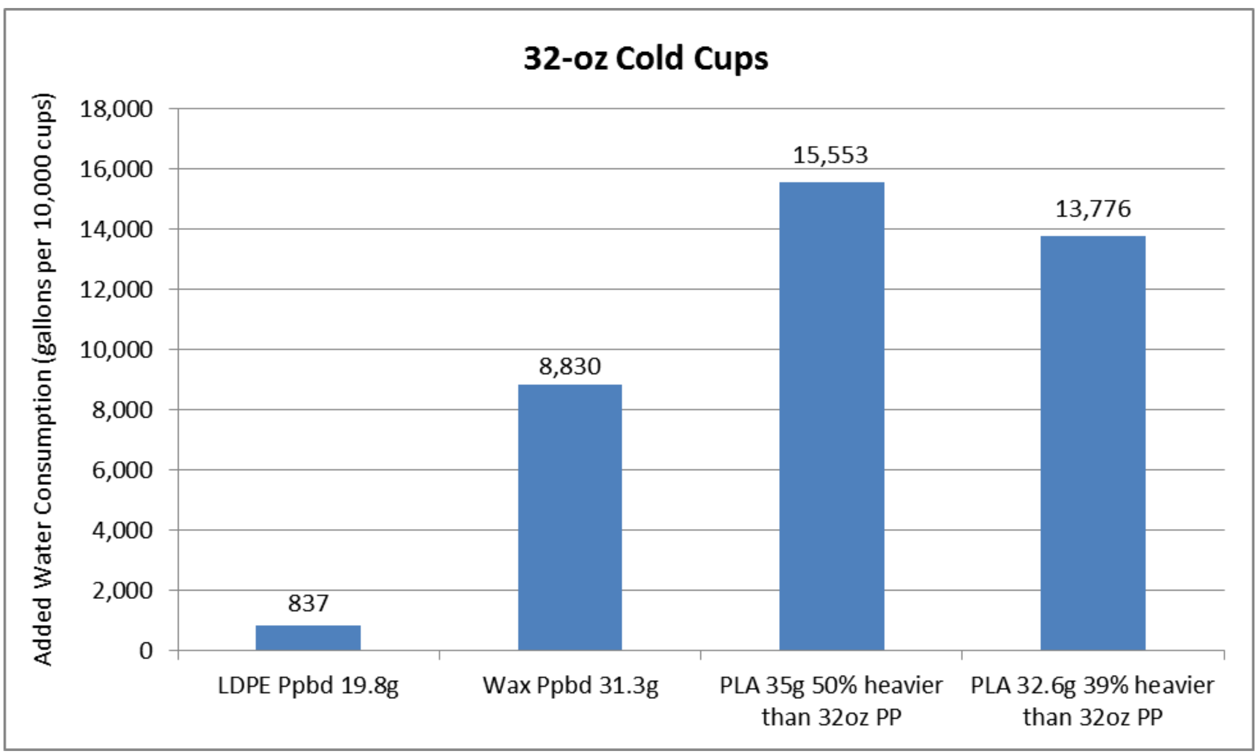
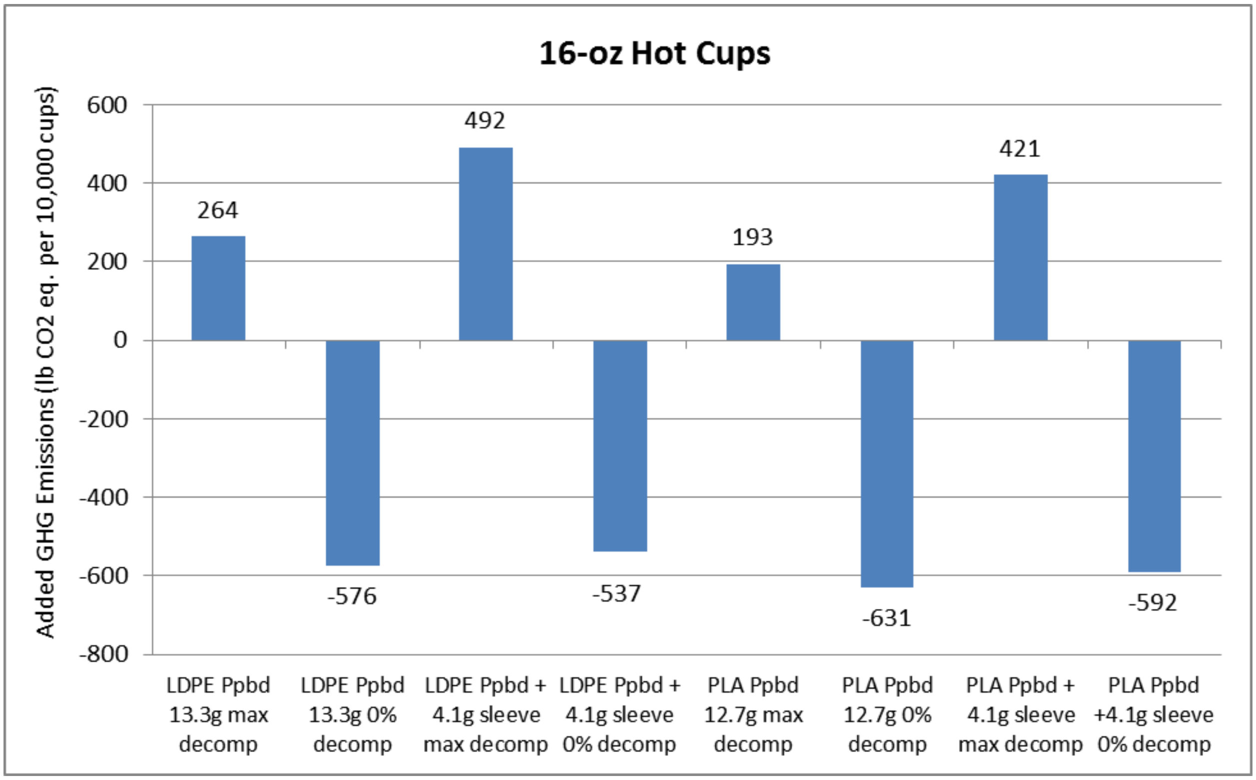
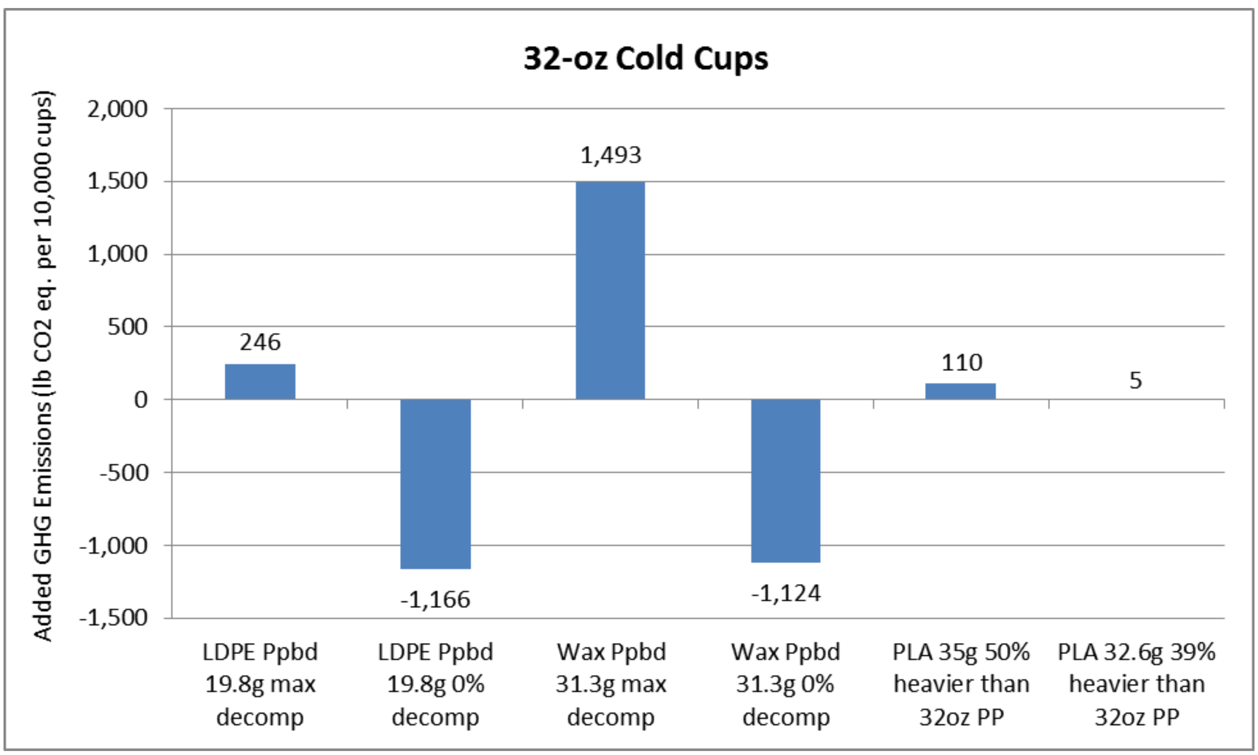


Figure 3: Added Greenhouse Gas Emissions from Substitution of EPS 16-oz Hot Cups and 32-oz Cold Cups





Impact on Marine Environments

Research has not shown any clear link between polystyrene and damage to marine life (birds, fish, and plants).[9] The National Oceanic and Atmospheric Administration (NOAA) observes that the source of the small plastics (microplastics) that are of greatest concern is unknown. Some comes from primary sources (plastics in a small state at the time of discharge) while other small plastic comes from the breakdown of larger plastic sources including litter and other marine debris.[10] NOAA further notes the "paucity of data" on the impacts of small plastic debris on the marine environment.[11] NOAA observes that "…overall the impact on entire seabird populations is either unknown or not considered large enough to warrant further investigation at this time."[12] NOAA concludes that:

> Altogether, the science suggests that microplastics deserve further scrutiny in the laboratory and the field…. Only then will it be possible for the best science to inform management decisions for the remediation and prevention of microplastic pollution in the marine environment.[13]

Not only are the sources and impacts of marine microplastics unknown, the amount of plastic debris from polystyrene is likely to be small. A recent study for Keep American Beautiful (KAB), for example, found that expanded polystyrene materials other than food service items accounted for a very modest share of the litter items found at storm drains nationwide. [14] This is shown in Figure 4. Expanded polystyrene food service items accounted for only 2.5% of litter collected in storm drains and did not make the top ten litter types reported by KAB.[15]

In addition, substitute products for polystyrene are not clearly less of a problem to marine life than some of the available substitutes that contain other plastics. Given the significant environmental and economic costs of a ban on polystyrene food containers, the unknown, speculative potential benefits to the marine environment cannot justify a ban on polystyrene food containers.

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[9] Courtney Arthur, Joel Baker, and Holly Bamford, editors, "Proceedings of the International Research Workshop on the Occurance, Effects, and Fate of Mircroplastic Marine Debris," Department of Commerce, National Oceanic and Atmospheric Administration, Technical Memorandum NOS-OR&R-30, January, 2009.

[10] Arthur, et. al. p. 5 of the Executive Summary.

[11] Arthur, et. al. p. 2 of the Executive Summary.

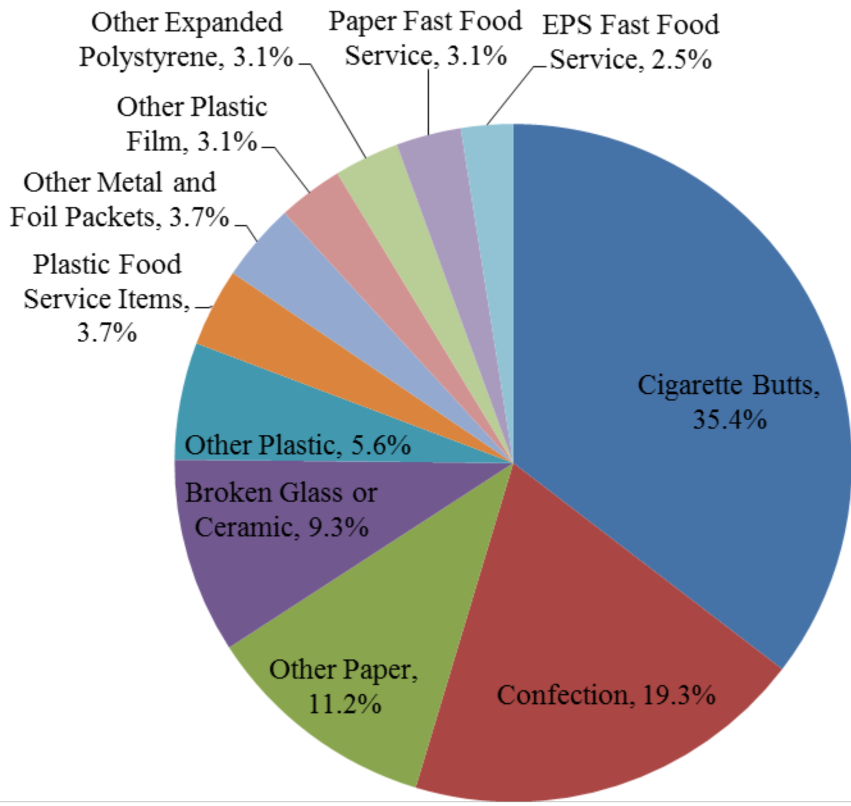
[12] Arthur, et. al. p. 2 of the Executive Summary.

[13] Arthur, et.al. p 5 of the Executive Summary.

[14] Mid Atlantic Solid Waste Consultants, "2009 National Visible Litter Survey" Prepared for Keep America Beautiful, Final Report, September 18, 2009,Figure 3-6, pg.3-30.

[15] Other studies have found polystyrene food items comprising a larger fraction of litter found at storm drains. The Surfrider Foundation, for example, recently studied litter at two storm drains and found that polystyrene food items accounted for 20 percent of litter. Since litter composition will be affected by surrounding land uses, there is likely to be substantial variation across sites. The KAB study is based on a wider sampling of storm drains.

Figure 4: Share of Top 11 Most Common Litter Items at US Storm Drains



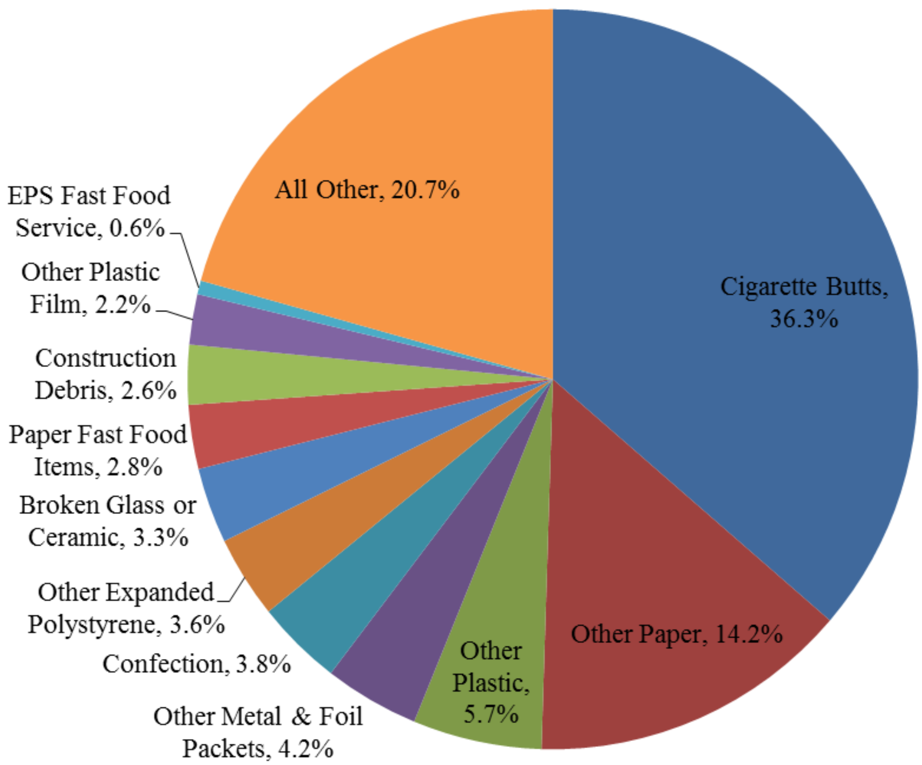
Impact on Litter Reduction

It is also unlikely that banning polystyrene food service items will reduce litter – a prime objective of the ban. What is more likely to happen is a change in the composition of litter. We have found no evidence that litter control costs have declined in cities where polystyrene items have been banned. It is also worth noting that polystyrene does not appear to be a major litter component. Consequently, banning polystyrene will not reduce the cost of litter clean-up substantially. A 2007 San Francisco survey conducted before the City implemented a ban on polystyrene service items, for example, found that polystyrene cups accounted for less than 2% of observed litter.[16] The Keep American Beautiful litter study referenced earlier determined that EPS fast food service litter accounted for only 0.6% of litter found at storm drains and that *other* expanded polystyrene accounted for only 3.6% of the litter itemsfound on at storm drains. [17] See Figure 5. Again polystyrene food service items were

[16] "The City of San Francisco Streets Litter Audit." Prepared for the City and County of San Francisco Department of Environment by HDR, Brown Vence & Associates, and MGM Management, June 2007. P. 27. The survey was completed in April 2007, the ban went into effect on June 1, 2007.
[17] Midatlantic Solid Waste Consultants, 2009 National Visible Litter Survey and Litter Cost Study, prepared for Keep America Beautiful, Final Report, September 18, 2009, pp 3-2 to 3-2, Figure 3-3. The study defines other expanded polystyrene as non-food packaging and finished products with an SPI 6 designation. (See Appendix A.)

not among the top ten sources of litter. Based on the KAB survey, polystyrene food items litter ranked 21st among shares of litter found on U.S roadways.[18]

Figure 5: Relative Share of Litter Items on U.S. Roadways



Additionally, a review of multiple litter surveys conducted in major cities over the past two decades found that polystyrene food products made up a very small proportion of all large litter, with a median value of only 1.5%.[19] San Jose was the site of two of the more recent surveys, with polystyrene food products found to make up only 0.8% of all large litter in 2008, and 2.3% in 2009.[20] Furthermore, in both surveys *none* of the observed small litter was found to come from polystyrene food products. Table 2 below includes a summary of the study's findings.[21] Given the low litter volume of polystyrene observed in San Jose and elsewhere, a ban on polystyrene will achieve little litter reduction at a high cost.

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[18] Personal communications with a KAB study author.
[19] Environmental Resources Planning, LLC. "The Contribution of Polystyrene Foam Food Service Products to Litter." Final Report, May 2012.
[20] Ibid.
[21] Ibid.

Table 2: EPS Food Products Proportion of Large Litter

Survey Region	Year	Percent
San Jose	2009	2.30%
Alberta	2009	0.70%
San Jose	2008	0.80%
National	2008	1.70%
San Francisco	2008	1.10%
San Francisco	2007	1.70%
Alberta	2007	1.10%
Toronto	2006	1.10%
Toronto	2004	1.00%
Region of Peel	2003	0.50%
Region of Durham	2003	0.60%
Region of York	2003	0.30%
Toronto	2002	1.50%
Florida	2002	2.30%
Florida	2001	2.20%
Florida	1997	3.10%
Florida	1996	3.60%
Florida	1995	3.30%
Florida	1994	3.90%
Median Value		**1.50%**

Source: Environmental Resources Planning, LLC. "The Contribution of Polystyrene Food Service Products to Litter." Final Report, May 2012.

Impact on Litter Abatement Costs

San Jose does not appear to have considered the proposed ban's impact on litter abatement costs or to have considered alternative methods to reduce litter. Since polystyrene substitutes are just as likely to be littered, there is no reason to expect that litter abatement costs would fall. Even in the unlikely scenario that banning polystyrene materially reduced litter in San Jose, polystyrene makes up such a small share of observed litter that any savings would be very modest relative to the substitution costs imposed on households and food service establishments.

The previously cited KAB study investigated the cost of litter control via a survey of local, county and state agencies. KAB's consultants used the survey to estimate per capita litter control costs for each level of government. Using this data, we can estimate the cost of litter control in San Jose and allocate the cost share attributable to polystyrene. As shown in Table 3, annual litter control costs for large cities are $2.91 per capita according to the survey, equal to total annual costs of $2.8 million for a city the size of San Jose. Another study reported annual litter control costs of $4.9 million in San Jose, equal to $5.06 per resident. Thus, using the polystyrene share of large litter found in San Jose's recent litter surveys, eliminating polystyrene food items, assuming that there is no litter from the substitute items chosen, would reduce annual litter abatement and removal costs by no more than $75,950. This calculation is depicted in Table 3 below. However, even those savings are likely to be a high estimate. Since polystyrene substitutes such as paper cups will also produce litter, the ban would likely produce no savings in litter abatements costs. Even if these savings were achieved, they would be dwarfed by the $4.4 million total cost of polystyrene substitution incurred by households and food service establishments in San Jose.

The KAB study also found that litter levels have fallen dramatically since the late 1960s. Much of this reduction can be attributed to better education, more waste receptacles, more street cleaning, better landfill management, and container deposit programs.

Table 3: Total San Jose Litter Cleanup Costs

		Keep America Beautiful Study		Green Cities California Study
Surveyed Large City Per Capita Litter Cleanup Cost	[1], [2]	$2.91	-	$5.06
San Jose Population	[3]	967,487		
Estimated San Jose Litter Control Costs	[4], [5]	$2,815,387	-	$4,900,000
San Jose Polystyrene Share of Total Litter	[6]	1.55%		
Polystyrene's Share of Annual Litter Control Costs	**[7],[8]**	**$43,639**	**-**	**$75,950**

Notes:
[1] Keep America Beautiful, "2009 National Visible Litter Survey." Prepared by Mid Atlantic Solid Waste Consultants, Final Report, September 18, 2009, p. 4-7.
[2] = [5] / [3]
[3] 2010 U.S. Census
[4] = [1] x [3]
[5] Green Cities California, "White Paper on the Methodology for Analyzing the Cost of Litter Cleanup Efforts." Prepared by ICF International, October 2010, p. 12.
[6] = Average polystyrene large litter share, 2008 and 2009 San Jose Litter Assessments.
[7] = [4] x [6]
[8] = [5] x [6]

Recycling is a feasible, cost effective and environmentally preferable alternative to a ban

Given the high cost to businesses and consumers from a polystyrene ban, other cost-effective alternatives to the polystyrene ban to reduce litter should be considered. Los Angeles has elected to encourage polystyrene recycling. Collection points for polystyrene recycling currently exist in the Bay Area, as shown in Figure 6, and numerous California cities include polystyrene on their list of accepted recyclables. Many other cities have rejected polystyrene bans, and presumably are pursuing other approaches. Equipment is available to reduce the volume of polystyrene in either a hot or cold densification process, making the material inexpensive to ship.

City documents have asserted that recycling polystyrene foam food containers is not feasible because of food contamination. However, all food containers face similar challenges with recycling. Materials recovery facilities (MRFs) generally sort food containers that are heavily contaminated by food materials for land filling—regardless of what the containers are made of. For example, a recycling facility in Milpitas (approximately 10 miles from San Jose) circulated a promotional flyer stating that it accepts clean polystyrene food containers, noting that it has new technology to handle it.[22]

Polystyrene foam food containers that are relatively free from large food particles are readily recyclable. Numerous MRFs in California already accept used foam foodservice materials.

City documents have also asserted that there is no market for recycled foam. This too appears to be based on incomplete information. The market price for recycled foam ranges from $100-$500 per ton depending on quality.[23] In contrast, the market price for recycled cardboard is approximately between $80-$180 per ton.[24] In other words, there is significant market demand for recycled polystyrene foam. As one example, Natural Environmental Protection Company (NEPCO), a quickly growing California-based manufacturer, used recycled polystyrene foam (including food service foam) to manufacture picture frames. NEPCO reports that is unable to obtain sufficient used polystyrene locally and must import material from Mexico and other locations.

Recycling polystyrene foam food containers is feasible. Banning polystyrene foam is likely to have negative environmental effects (including increasing energy use and water consumption) and would do nothing to reduce trash or litter overall. It would also increase costs to consumers and may result in job losses, particularly by low-wage Hispanic workers. But encouraging recycling would be an effective way for the city to meet its goal of reducing waste that would have none of the negative effects of a ban.

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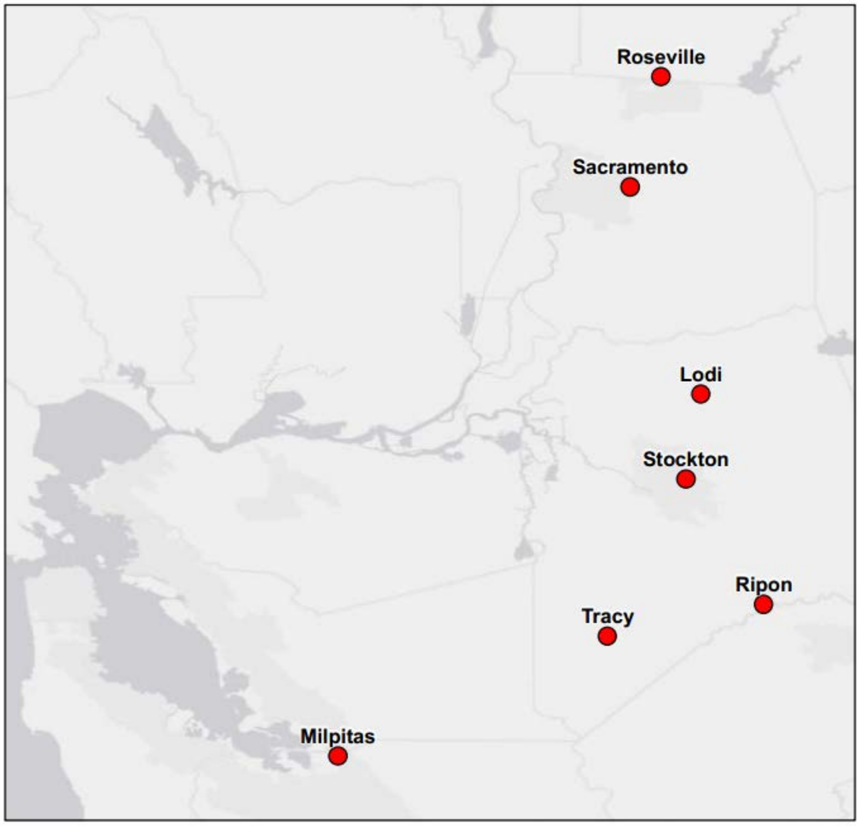
[22] "Stumped by Styrofoam?" < http://www.ci.milpitas.ca.gov/_pdfs/res_StyrofoamRecyclingFlyer.pdf >
[23] Personal communication with California waste broker.
[24] Quote from recycler in San Jose and market observations.

Figure 6: Bay Area Polystyrene Recycling Drop-Off Locations



Devoting resources to comprehensive trash control efforts is likely to have larger, more cost-effective impacts than a policy targeting a specific product that comprises less than 2% of total litter. In a white paper addressing the recycling and disposal of plastics, the State of California Integrated Waste Management Board wrote:

> "Litter is a pervasive problem involving diffuse sources and human behavior, and there are no easy solutions. A principal tenet of this issue is that litter is not a problem caused by specific materials, such as plastics; rather, litter is caused by human behavior. Attributing the litter issue to one particular packaging material does not solve the litter problem, because another type of packaging will take its place as litter unless human behavior changes."[25]

Since other California cities including San Francisco, Oakland, and Berkeley have introduced bans, there is a great opportunity to conduct an important social experiment. Different approaches to litter reduction (and marine protection) can be compared regarding litter volume, composition, and cost and effectiveness provided enough time has elapsed to collect

[25] State of California Integrated Waste Management Board, "Plastics White Paper: Optimizing Plastics Use, Recycling, and Disposal in California," May 2003, p. 16.

the necessary data. Surprisingly, there are no carefully done studies comparing litter pre- and post-ban implementation, despite the number of cities imposing them. At the same time, research regarding the impacts of polystyrene and other plastics on the marine environment is likely to progress to a point where, as NOAA has observed, well informed policy decisions can be made.

Conclusion

The available evidence does not support the introduction of a polystyrene ban. The costs are likely to be large without clear corresponding benefits. This conclusion is consistent with a previous study conducted by the Integrated Solid Waste Management Board for the State Legislature.[26] The Board did not find a polystyrene ban attractive. Instead the Board recommended increasing educational efforts to discourage litter, issuing litter tickets, and conducting further research regarding effective litter management approaches. In fact, the different approaches to litter reduction and polystyrene taken by various California cities and counties provide the opportunity to study the costs and benefits of multiple approaches to efficiently manage polystyrene and other waste materials including bans and incentives for recycling.

[26] Integrated Solid Waste Management Board,"Use and Disposal of Polystyrene in California, A Report to the California Legislature," December 2004, pp5-6.

APPENDICES

Table A-1: Energy Use Comparison for Polystyrene Foodservice Product Alternatives

Product	Million BTU	Net vs. Polystyrene
	[1]	[2]
Energy Use for 16-oz Hot Cups (10,000 average weight cups)		
EPS 4.7g	5.4	
LDPE Ppbd 13.3g max decomp	6.5	1.1
LDPE Ppbd 13.3g 0% decomp	6.8	1.4
LDPE Ppbd + 4.1g sleeve max decomp	8.3	2.9
LDPE Ppbd + 4.1g sleeve 0% decomp	8.6	3.2
PLA Ppbd 12.7g max decomp	6.2	0.8
PLA Ppbd 12.7g 0% decomp	6.5	1.1
PLA Ppbd + 4.1g sleeve max decomp	7.9	2.5
PLA Ppbd +4.1g sleeve 0% decomp	8.3	2.9
Energy Use for 32-oz Cold Cups (10,000 average weight cups)		
EPS 8.8g	9.6	
LDPE Ppbd 19.8g max decomp	10.3	0.7
LDPE Ppbd 19.8g 0% decomp	10.8	1.2
Wax Ppbd 31.3g max decomp	18.6	9
Wax Ppbd 31.3g 0% decomp	19.5	9.9
PLA 35g 50% heavier than 32oz PP	17.5	7.9
PLA 32.6g 39% heavier than 32oz PP	16.2	6.6
Energy Use for 9-inch Plates (10,000 average weight plates)		
Heavy-Duty Plates		
GPPS 10.8g	8.4	
LDPE Ppbd 18.4g max decomp	10.3	1.9
LDPE Ppbd 18.4g 0% decomp	9.7	1.3
Mold Pulp 16.6g max decomp	10.9	2.5
Mold Pulp 16.6g 0% decomp	11.3	2.9
PLA 20.7g	10.4	2
Lightweight Plates		
2009 GPPS 4.7g	3.6	
2009 LDPE Ppbd 12.1g max decomp	6.1	2.5
Energy Use for Sandwich-size Clamshells (10,000 average weight clamshells)		
GPPS 4.8g	3.8	
Fluted Ppbd 10.2g max decomp	5.8	2
Fluted Ppbd 10.2g 0% decomp	6	2.2
PLA 23.3g	14.4	10.6

Notes:
Net expended energy = total energy requirements - energy recovery - energy content of landfilled material
[1]: Franklin Associates, "Life Cycle Inventory of Foam Polystyrene, Paper-Based, and PLA Foodservice Products", 4 February 2011.
[2]: [1] - Equivalent Polystyrene Product Energy Use in [1]

Table A-2: Water Use Comparison for Polystyrene Foodservice Product Alternatives

Product	Gallons	Net vs. Polystyrene
	[1]	[2]
Water Consumption for 16-oz Hot Cups (gallons per 10,000 average weight cups)		
EPS 4.7g	4,748	
LDPE Ppbd 13.3g	6,152	1,404
LDPE Ppbd + 4.1g sleeve	8,095	3,347
PLA Ppbd 12.7g	6,348	1,600
PLA Ppbd + 4.1g sleeve	8,291	3,543
Water Consumption for 32-oz Cold Cups (gallons per 10,000 average weight cups)		
EPS 8.8g	8,441	
LDPE Ppbd 19.8g	9,278	837
Wax Ppbd 31.3g	17,271	8,830
PLA 35g 50% heavier than 32oz PP	23,994	15,553
PLA 32.6g 39% heavier than 32oz PP	22,217	13,776
Water Consumption for 9-inch Plates (gallons per 10,000 average weight plates)		
Heavy-Duty Plates		
GPPS 10.8g	7,466	
LDPE Ppbd 18.4g	8,898	1,432
Mold Pulp 16.6g	9,017	1,551
PLA 20.7g	14,208	6,742
Water Consumption for Sandwich-size Clamshells (gallons per 10,000 average weight clamshells)		
GPPS 4.8g	3,873	
Fluted Ppbd 10.2g	4,951	1,078
PLA 23.3g	15,996	12,123

Notes:

[1]: Franklin Associates, "Life Cycle Inventory of Foam Polystyrene, Paper-Based, and PLA Foodservice Products", 4 February 2011.

[2]: [1] - Equivalent Polystyrene Product Water Consumption in [1]

Table A-3: Greenhouse Gas Emissions Comparison for Polystyrene Foodservice Product Alternatives

Product	Pounds CO2 Equivalents	Net vs. Polystyrene
	[1]	[2]
Greenhouse Gas Emissions for 16-oz Hot Cups (lb CO2 eq per 10,000 average weight cups)		
EPS 4.7g	723	
LDPE Ppbd 13.3g max decomp	987	264
LDPE Ppbd 13.3g 0% decomp	147	-576
LDPE Ppbd + 4.1g sleeve max decomp	1,215	492
LDPE Ppbd + 4.1g sleeve 0% decomp	186	-537
PLA Ppbd 12.7g max decomp	916	193
PLA Ppbd 12.7g 0% decomp	92	-631
PLA Ppbd + 4.1g sleeve max decomp	1,144	421
PLA Ppbd +4.1g sleeve 0% decomp	131	-592
Greenhouse Gas Emissions for 32-oz Cold Cups (lb CO2 eq per 10,000 average weight cups)		
EPS 8.8g	1,309	
LDPE Ppbd 19.8g max decomp	1,555	246
LDPE Ppbd 19.8g 0% decomp	143	-1,166
Wax Ppbd 31.3g max decomp	2,802	1,493
Wax Ppbd 31.3g 0% decomp	185	-1,124
PLA 35g 50% heavier than 32oz PP	1,419	110
PLA 32.6g 39% heavier than 32oz PP	1,314	5
Greenhouse Gas Emissions for 9-inch Plates (lb CO2 eq per 10,000 average weight plates)		
Heavy-Duty Plates		
GPPS 10.8g	1,142	
LDPE Ppbd 18.4g max decomp	1,406	264
LDPE Ppbd 18.4g 0% decomp	206	-936
Mold Pulp 16.6g max decomp	1,712	570
Mold Pulp 16.6g 0% decomp	532	-610
PLA 20.7g	840	-302
Lightweight Plates		
2009 GPPS 4.7g	497	
2009 LDPE Ppbd 12.1g max decomp	927	430
Greenhouse Gas Emissions for Sandwich-size Clamshells (lb CO2 eq per 10,000 average weight clamshells)		
GPPS 4.8g	529	
Fluted Ppbd 10.2g max decomp	681	152
Fluted Ppbd 10.2g 0% decomp	216	-313
PLA 23.3g	1,492	963

Notes:

[1]: Franklin Associates, "Life Cycle Inventory of Foam Polystyrene, Paper-Based, and PLA Foodservice Products", 4 February 2011.

[2]: [1] - Equivalent Polystyrene Product Emissions in [1]

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Biography

Dr. Mark Berkman is an expert in applied microeconomics. His experience spans the areas of the environment, energy, and natural resources; environmental health and safety; labor and employment; intellectual property; antitrust; commercial litigation and damages; and public finance. He has assisted both public and private clients and provided testimony before state and federal courts, arbitration panels, regulatory bodies, and legislatures.

His environmental work has involved the review of proposed air, water, solid waste, and worker and product safety regulations. Dr. Berkman has quantified the costs and benefits of these regulations, as well as toxic tort and product liability claims. In addition, he has valued natural and water resources as well as property damages associated with pollution from Superfund sites, landfills, and power plants.

His work on energy matters includes the valuation of coal resources, power plants, and transmission rights-of-way. He has also prepared energy demand and price forecasts. He has extensive experience working with Native American tribes on energy valuation matters.

Clients in a variety of industries ranging from computer chip to shoe manufacturers have sought Dr. Berkman's assistance to value patents, trade secrets, and trademarks. He has also been called on to address questions of market power in a variety of industries including solid waste, computer manufacturing, and medical devices. He has testified regarding market definition and market power and participated in Hart-Scott-Rodino proceedings.

Dr. Berkman also has substantial experience in labor and discrimination litigation. He has conducted statistical analyses of alleged discrimination in hiring, promotion, pay, and contracting, and completed damage analyses regarding these allegations. He has also conducted statistical analyses regarding mortgage lending discrimination.

Prior to joining *Brattle* he was a co-founder and director at Berkeley Economic Consulting and a vice president at both Charles River Associates and NERA Economic Consulting.

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Dr. David Sunding has extensive experience as a researcher, consultant, and expert witness in matters related to natural resources, environmental quality, energy, and the economics of regulation. His expertise includes experience in complex litigation, regulation, and transactions. He has testified in state and federal courts and in regulatory proceedings around the country.

He has assisted corporations, utilities, and government agencies in developing economic testimony in a variety of matters concerning environmental damages, product liability, risk assessment, resource planning, cost allocation, and project financing. Dr. Sunding has played a central role in several prominent water resource matters, including the landmark Quantification Settlement Agreement for the Colorado River, interstate water disputes before the U.S. Supreme Court, and the Federal Energy Regulatory Commission's relicensing of hydropower facilities. He has authored several widely cited studies on the economics of water quality regulation and has served as an expert in cases involving regulation and litigation under the Clean Water Act, the Endangered Species Act, and other statutes.

Dr. Sunding is the Thomas J. Graff Professor in the College of Natural Resources at UC Berkeley, where he is also the co-director of the Berkeley Water Center. He has received numerous awards for his research, including grants from the National Science Foundation, the U.S. Environmental Protection Agency, and private foundations. He is currently a Visiting Professor in the Woods Institute of the Environment at Stanford University.

Prior to joining *The Brattle Group*, Dr. Sunding was a founding director of Berkeley Economic Consulting. Previously, he was a senior consultant at Charles River Associates and NERA. He served as a senior economist for President Clinton's Council of Economic Advisers, and is a member of the American Economic Association, the Association of Environmental and Resource Economists, the Econometric Society, and the American Law and Economics Association.