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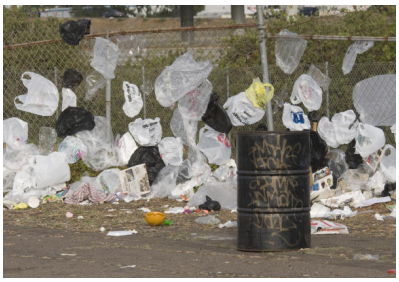
HEALTHY ENVIRONMENT STRONG ECONOMY VIBRANT COMMUNITIES





Plastic Bag Bans: Analysis of Economic and Environmental Impacts

October 2013

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ABBREVIATIONS

Bag-Use Profile	Proportion of bag types used at retail venues
HDPE	High-density polyethylene
LCA	Life cycle assessment
MJ	Megajoule
PBB	Plastic Bag Ban
PBB + Fee	Plastic Bag Ban + Fee on paper bags
Re-PE	Reusable polyethylene bag
SUPB	Single-use plastic bag

EXECUTIVE SUMMARY

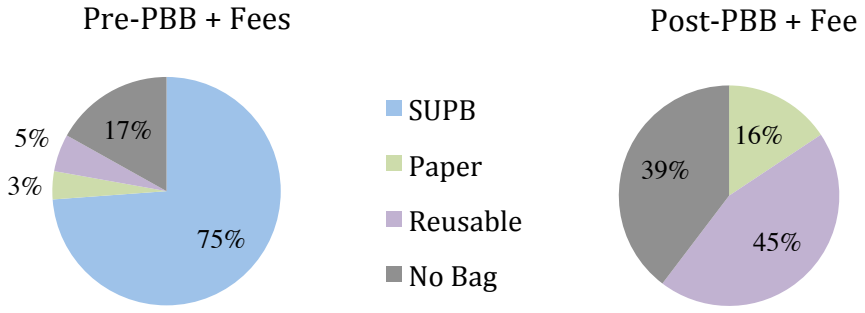
Single-use plastic bags (SUPBs) emerged as a popular product in the 1970's and continue to be a popular bag choice for consumers. For example, more SUPBs were produced in the first decade of the 21st century than the entire 20th century combined. The popularity of single-use bags can be traced to their convenience, lightweight and ability to be reused for other purposes, among other reasons. However, concerns have been raised about the environmental and economic problems they pose. In response, municipalities have increasingly turned to plastic bag bans (PBBs) as a way to phase out SUPBs and encourage a transition to reusable bags. In California, there are currently 64 PBB ordinances covering 85 municipalities, with many including a fee on single-use paper bags (PBB + Fee) to discourage the replacement of SUPBs with single-use paper bags. Together, **these ordinances cover approximately 44% of the state's population**. Equinox Center presents this report in an attempt to examine the potential environmental and economic impacts that a PBB could have in San Diego, in hopes that stakeholders will be armed with a realistic assessment of PBBs.

The Problem with Plastic Bags in San Diego

- **Plastic bags in the waste stream.** Roughly 95 percent of the 500 million SUPBs used annually in the City of San Diego end up in a landfill.
- **Litter cleanup is costly**. The City of San Diego spends approximately $160,000 per year to clean up plastic bag litter, mostly at Miramar Landfill.
- **No curbside recycling of plastic bags.** SUPBs are not listed as recyclables because they have a tendency to jam sorting equipment and are therefore difficult to recycle.
- **Space in landfill is limited.** The Miramar Landfill is projected to close by 2022 if the quantity of waste it receives per year does not decline significantly.

What Have Plastic Bag Bans Achieved in Comparable Locations?

The charts below summarize pre- and post-ban data based on surveys conducted by the Cities of San Jose and Santa Monica, as well as the County of Los Angeles.



In these jurisdictions, plastic bag bans increased reusable bag usage by 40 percent. However, the elimination of plastic bags also led to an increase in paper bag usage (3% to 16%).

Environmental Impact

The resulting change in the Bag-Use Profile is **better overall for the environment** than the current profile.

1. *A PBB + Fee successfully reduces the volume of single-use bags deployed.* A PBB + 10 cent fee in San Diego could achieve an 86 percent reduction of single-use bags,which could amount to a decrease of 348 million single-use bags per year.

2. *Less energy is required, more water is required, less solid waste is generated, and fewer GHG's are emitted from the life cycles of Bag-Use Profiles achieved with PBB + Fees.*

Energy: 74 million MJ reduction
CO_2 eq. emissions: 6,418-ton reduction
Solid waste: 270,000 kg reduction
Water Consumption: 30 million gallon increase

Economic Impact

Local **economies**, comprised of affected retailers and their customers, **are not negatively impacted in the long-term**.

- *Retailers:* short-term increase in baggage costs due to increased paper bag usage. These costs should be mitigated over time as consumers transition to reusable bags. San Jose and San Francisco have reported "no sustained negative impact to retailers."
- *Consumers:* estimated cost of $7.70 per household in the first year after the ban to purchase reusable bags and to account for any fees associated with paper bag usage. Recurring costs should decrease over time due to the long lifespan of reusable bags.
- *Cities:* the City of San Diego will most likely experience savings through litter abatement. The City spends approximately $160,000 per year cleaning up plastic bag litter.
- *Plastics manufacturers:* Although it is possible that job losses may occur in this sector, Equinox Center was unable to find studies that quantify job loss in the plastics industry due to PBBs. If plastics manufacturers are negatively impacted, they have opportunities to expand production to reusable bags, since most reusable bags use a polyethylene derivative.

Despite some claims that a PBB would have only a negligible positive impact, the precedent set by an ordinance in San Diego could pave the way for additional waste reduction measures aimed at other trash types, and to alert residents that the region is taking active measures to reduce the environmental impacts of SUPBs. As municipalities continue to enact PBB ordinances, it is recommended that records be kept not only to measure their effectiveness in promoting reusable bag usage, but also to see how these ordinances impact local businesses. To this point, a lack of research on the economic impacts of PBBs threatens their objectivity and credibility when presented to business leaders and elected officials. This data, while costly to collect, is essential to understand whether or not a PBB is achieving its desired goals.

INTRODUCTION

Ordinances that limit the use of single use plastic bags (SUPBs) and encourage their replacement by reusable shopping bags have become increasingly popular in California and worldwide. Supporters of such efforts frequently cite the need to reduce pollutants associated with plastic bag litter and production. While many municipalities have been successful at implementing either plastic bag bans (PBBs) or mandatory fees on single use bags, opposition has been substantial and efforts to impede such ordinances have been common. Those who oppose plastic bag reduction measures frequently: cite negative economic impacts on the plastics industry and impacted retailers and consumers affected by fees or bans, question the ability of such ordinances to achieve the desired goals put forth by supporters, challenge the magnitude of plastic pollution in affected municipalities, argue that consumers will default to alternative behaviors which are environmentally worse than the status quo, and suggest that reused bags carry bacteria that could harm consumers.

Both advocates and critics of PBBs have been outspoken, fueling the debate around the ability of PBBs to achieve desired goals. Both sides of the debate have accused the other of obscuring facts, often making objective evaluation of the pros and cons of PBBs difficult.

Since the issue of a plastic bag reduction ordinance came forward at the City of San Diego's Rules & Economic Development Committee on September 11, 2013, a number of questions have arisen regarding how an ordinance in San Diego may affect the environment as well as local businesses. Additionally, a statewide PBB that would include San Diego was recently rejected, but may be put forward again. Equinox Center presents this report in an attempt to examine the potential environmental and economic impacts that a PBB could have in San Diego, in hopes that stakeholders will be armed with a realistic assessment of PBBs. Our analyses are based on studies of other regions that have imposed bans, a literature review to assess the merit of supporting and opposing arguments, and consider factors unique to the San Diego region.

BACKGROUND

THE ISSUE

The Rise of Plastics

Plastics have become increasingly popular for industrial and consumer uses since their emergence in the 1940s. The volume of plastic manufactured each year continues to rise rapidly, with the quantity produced in the first decade of the 21st century approaching the total produced during the entire century prior. Today, approximately 260 million tons of plastics are produced for various purposes worldwide on an annual basis.[1]

The Rise of Single-Use Plastic Bags

SUPBs are defined in the literature as recyclable high-density polyethylene (HDPE) bags designed to be used once.[2] SUPBs rose to popularity for use in retail venues in the 1970s and remain the most popular grocery bag choice for American consumers where bans are not in place.[3] Today, 500 billion to 1.5 trillion SUPBs are used annually around the world, with at least 100 billion of those

used in the United States.[4] Note that the US figure is for single-use plastic *shopping* bags, which PBBs are largely designed to mitigate; the total number of plastic bags consumed in the US is closer to380 billion annually.[5] Of these, an estimated 20 billion were consumed annually in California in the early 2000s,[6] with that number declining to roughly 14 billion in 2012 estimates.[7] The average number of SUPBs used by each Californian who resides in municipalities without PBBs is 550 per year.[8]

The Life Cycle of Plastic Bags

A SUPB's life cycle begins with the conversion of fossil fuels (crude oil or natural gas) into polymers used to manufacture all plastics, including plastic bags.[9] Around 4 percent of world oil production is, in turn, used as a feedstock to make plastics while a similar amount is consumed as energy in the process. 12 million barrels of oil are required to produce the SUPBs consumed annually in the US.[10] The window of consumer use for SUPBs averages only 20 minutes. End of life scenarios are consistent with the very properties that make plastic bags popular: exceptional durability and strength. The thin plastics that most SUPBs are composed of take between 400 and 1000 years to break down, leaving them to persist in their disposed environment. A portion of SUPBs are indeed recycled, but this fraction averages only 5% in the US.[11] A national survey found that 92% of polled consumers reuse plastic shopping bags at least once. However, this fraction is generally not recycled, and is instead diverted to landfills.[12] A Los Angeles study found that the majority of bags diverted towards recycling processes are ultimately taken to landfills due to the high contamination rate of SUPBs used as bin liners, the propensity for SUPBs to get caught in recycling machinery, and the lack of markets for recycled HDPE bags.[13]

The Problem with Plastics

Primary concerns with the global prevalence of plastic bags include:

- **Plastic bags persist for a long time.** Plastic bags can last for up to 1000 years. The vast majority of this life cycle is spent in the end-of-life phase, either in a landfill or as litter in the environment. A plastic bag's extensive lifespan is the direct result of plastic's immunity to biodegradation. Plastics instead photodegrade[1] over time, releasing any toxic additives they contain. In a landfill, these can leach out over time. In the environment, these can harm ecosystems.[14]
- **Plastic bags in the waste stream.** A study performed by the California Integrated Waste Management Board found that plastics of all types comprise nearly 10 percent of California's disposed waste stream. Of this, plastic bags account for 0.3 percent of the total waste stream. Plastic grocery bags specifically make up 0.13 percent of the total waste stream.[15]
- **Plastic bag litter.** While figures vary depending on the study, proportions of litter comprised of plastic bags are found to fall between 0.9 and 5 percent.[16] If the US consumes 100 billion SUPBs per year, these figures indicate that as much as 50 million plastic bags become litter during that time period, nationwide.
- **Plastic bags are manufactured from fossil fuels.** Plastic bag life cycles are greenhouse-gas intensive on the front end due primarily to the use of fossil fuels in their production.

[1] Photodegradation is the decomposition of a compound by radiant energy, such as natural sunlight.

- **Plastic bag marine pollution**. 80 percent of marine debris originates from land sources, 60-80 percent of which are plastics, according to a major assessment by the United Nations Environment Programme.[17] UNEP noted that plastic marine debris dispelled almost anywhere poses a global pollution problem due to its portability in ocean currents and long lifespan. Plastics have been reported to negatively impact between 180 and 660 species of animals, including birds, fish, turtles, and marine mammals, with a portion of these plastics presumably comprised of plastic bags.[18,19] Marine animals confuse plastic bags for food, which can lead to blocked digestive tracts and eventual death. For example, one in three dead leatherback turtles were found in San Francisco Bay with some form of plastic in their stomachs, 'most often a plastic bag,' according to a study of 370 autopsies.[20]

Plastic Bags in San Diego

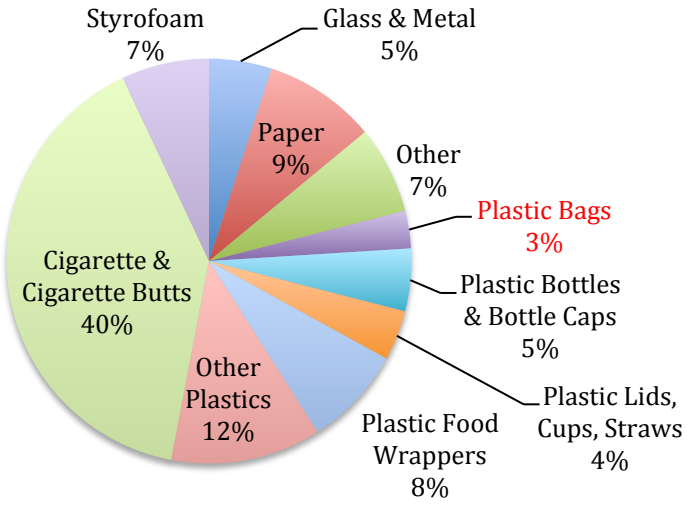
The state's average per capita SUPB consumption has fallen recently, presumably due to the number of PBBs imposed in the last few years. But in CA municipalities *without* bans, the average annual SUPB consumption is approximately 550 per person.[21] The City of San Diego's Environmental Service Department estimates that 500 million SUPBs are distributed annually in the City.[22] This amounts to approximately 375 SUPBs used per resident each year.

The Problem with Plastic Bags in San Diego

Primary concerns with plastics in San Diego are described here:

- **Plastic bags in the waste stream.** The most recent survey of the city's waste stream, performed in 2000, found that film plastic comprised 2.8 percent of San Diego's waste stream by weight.[23] Plastic bags fall within that category, although the fraction of SUPBs was not delineated. According to state recycling statistics, however, roughly 95 percent of the 500 million SUPBs used in the City of San Diego annually end up in the landfill.[24]
- **Litter cleanup is costly**. A 2012 study prepared for the EPA found that West Coast communities spend approximately $13 per resident annually to clean up litter that would otherwise likely become marine debris.[25] The City of San Diego spends approximately $160,000 per year to clean up plastic bag litter.[26]
- **Plastic bags as litter.** This graph documents the volume by weight of debris types gathered in 2012 during beach cleanups by the non-profit organization San Diego Coastkeeper.[27] Three percent of litter by weight was plastic bags, equaling 7,500 bags for a total of 228 pounds.

Debris From 2012 San Diego Beach Cleanup



Source: San Diego Coastkeeper

- **No curbside recycling of plastic bags.** SUPBs are not listed as recyclables, according to San Diego's Environmental Services Department, due to the fact that plastic bags have a tendency to jam sorting equipment and are therefore difficult to recycle.[28] This has contributed to the lack of curbside recycling available for plastic bags in San Diego.[29,30] However, consumers can return used plastic bags back to their supermarket for proper recycling and handling.
- **Space in landfill is limited.** The Miramar Landfill, where San Diego's trash goes, is cited for closure by 2022 if the quantity of waste entering it per year does not decline significantly.[31] Eliminating plastic bags could help extend the lifespan of this landfill.

PLASTIC BAG BANS

History

Due to the undesirable factors associated with the widespread use of SUPBs described above, efforts to reduce the consumption of SUPBs have taken various forms worldwide in the last two decades. Studies have shown that consumer education alone does not achieve significant reductions in single-use bag consumption, with an average decrease in single-use bag consumption of only 5 percent where consumer education campaigns have attempted to induce voluntary bag decreases.[32,33] As a result, a rise in mandatory ordinances has occurred. 17 states currently have some ordinance in place to limit paper or plastic bag use, mostly bans. Some foreign countries and states other than California have chosen to place a tax or fee on plastic and/or paper bags, but CA's AB 2449, passed in 2006, prohibited the state from placing any sort of fee on plastic bags (*not* paper, however) through January 2013.[34]

California's 64 ordinances covering 85 municipalities take the form of bans, with many including a fee on single-use paper bags (PBB + Fee) to discourage replacement of SUPBs with single-use paper bags instead of reusables.[35] Major players thus far include the City of Los Angeles (2013), Los

Angeles County (2012), San Francisco (2007), San Jose (2011), and San Diego County's own Solana Beach (2012).[36] Statewide efforts to place fees on SUPBs before AB 2449 were rejected. AB 1998, a California-wide bag ban bill, was on the horizon in 2012 but was also rejected. Another attempt at a statewide bag ban followed in 2013 under the proposed SB 405, but also failed.[37]

What are Plastic Bag Bans?

Plastic bag bans have been designed in various ways, taking into account: the ban's effectiveness in reducing plastic bag use, consumer behavior once the ordinance is enforced, the ordinance's ability to limit overall environmental damage associated with single use bags, and the negative economic impact bans might have on affected consumers and retailers.

Variables include:

- **Types of bags banned**
  - Thin HDPE bags only, thin HDPE + thicker non-recyclable plastic (at least 2.25 mil[2] thick), or all types of plastic including biodegradable and compostable plastics
- **Inclusion of a fee** on the other popular single-use bag alternative (paper)
- **Amount of the attached fee** on paper bags
  - Between 10 and 25 cents in CA, 5 cents to 30 cents worldwide
- **Characteristics of the alternative single-use bags offered for a fee**
- **Type of reusable bag promoted**
  - Cotton, thick plastic, non-woven polypropylene, or non-woven polyethylene
- **Sizes and types of retail venues affected**
  - From large retailers and grocery outlets only, to all retail venues including small convenience stores and restaurants
- **Incentives to enforce ordinance**
  - Fines and fees for non-compliance
- **Ordinance exemptions**
  - Pharmacy bags and bags for meat and produce
  - Customers on food assistance programs

What did the Proposed State Ban Look Like?

The most popular construction of a PBB in CA, which the statewide ban proposed in 2013, contained the following elements:[38]

- Prohibits any provision of SUPBs provided at the point of sale by affected retail venues.
  - **Exemptions** were included for single-use bag (paper or plastic) applications that reusable bag use couldn't replace, including: plastic produce bags, bags provided by pharmacies for prescription medications, and plastic bags used for separating items which could contaminate or damage other items, such as meat. Restaurants, non-profits, and farmers markets were also exempted.
- Prohibits the free offering of ALL single-use carryout bags by affected retail venues, including compostable and biodegradable single-use bags, except in jurisdictions where a majority of residents have access to curbside collection of food waste and compostables.

[2] A mil = one-thousandth of an inch.

- Allows for a 10 cent purchase of a paper bag made of at least 40% post-consumer recycled material.
- Allows for the sale of reusable bags that meet a set of criteria. The criteria for offered reusable bags are critical for ensuring that reusable bags are capable of being used in a manner that make their more resource-intensive manufacturing and production processes fall below the comparable impacts of single-use bags. These criteria include:
    - Ability for the bag to withstand a minimum of 125 uses
    - A minimum carrying capacity of 22 pounds per bag,
    - Ability for the bag to withstand machine washing and disinfection regularly,
    - The exclusion of any toxins including heavy metals in bag content,
    - If a plastic material comprises the base of the *reusable* bag, it must be at least 20 percent post-consumer recycled, and must meet the above criteria.
- Retail venues would be impacted in different phases. Retail grocery stores with annual sales of $2 million or more, or retail space of over 10,000 square feet, would be affected first with the extension of the ordinance onto smaller convenience stores, food stores, and other such venues to follow a year later. All stores would be given time before the ordinance takes effect, and smaller stores without franchises in other municipalities would also be given more time, so that adequate customer education, logistical transition activities, and most importantly the existing stocks of SUPBs could be used up before the ban took effect.
- Enforcement of bag bans relies on fines for violators, with fines ranging from $500 to $2,000 based on the magnitude of the infraction and previous bag ban violations.

Bag Alternatives

As discussed, most California bag ordinances are PBB + Fees. Authorities recognize the utility bags provide to consumers and therefore don't expect consumers to completely *forego* using bags. The goal of PBB + Fees rather is to *alter* the composition of what is referred to as the "Bag-Use Profile": the proportion of bag-types used at retail venues. Bag-Use Profiles are typically comprised of a mix of SUPBs, single-use paper bags, reusable bags, or no bag. The following table presents the standard variety of bag types, describing some relevant attributes associated with these bag types. It also reports the composition of bag types used in retail venues without bag-limiting ordinances:

Table 1. Characteristics of Bag Alternatives

	A[39]	B[40]	C[41]	D[42]	E[43]
Bag Type	$/Bag	Weight/Bag (grams)	% Recycled in CA	# of Intended Uses	Observed Bag-Use Profile at Grocery Retailer (No Ban)
SUPB	$0.01	7	5%	1	75%
Paper	$0.15	40	21%	1	3%
Reusable	$1.00	44	N/A	125	5%
No Bag	-	-	-	-	17%

Table 1 Notes:

(Bag Type)

- SUPBs are standard HDPE single-use plastic bags
- Reusable bag type characteristics are for 40 percent post-consumer recycled content recycled polyethylene bags, which have been deemed the most low-impact reusable bag type from an environmental perspective[44]
- No Bag represents transactions where no bag is used to carry a customer's purchase.

(A) Prices are based on the average of price ranges observed in the literature.
(C) The statistics for recycling of reusable bag types are too variable to estimate, although the reusable bag type represented above can be made of 20-100 percent post-consumer recycled material, and is itself recyclable.
(D) This figure represents the average number of uses bags are actually designed to withstand, thus representing the *intended* number of uses.
(E) This represents the average Bag-Use profile found in Los Angeles County, San Jose, and Santa Monica grocery retail venues before reduction ordinances were implemented.

Biodegradable bags are another bag type that is becoming increasingly popular as a way to reduce waste from plastic bag use. This bag type is made of natural polymers, either starch or a blend of bacteria-based polyesters, which are water soluble or photodegradable.[45] The City of San Francisco, for example, selected BioBag – a leading brand which produces certified compostable bags – to provide 100,000 rolls of biodegradable bags to residents within the county as a way to promote the importance of reducing waste.[46]

However, biodegradable bags, such as the BioBag, have their limitations. For example, if these bags are placed in an anaerobic (air-locked) landfill, they will be deprived of oxygen and micro-organisms which feed on the biodegradable materials, severely limiting their ability to decompose. This is also true for paper, yard waste and food waste. According to BioBag, *the majority of US landfills are in fact air-locked landfills*, including San Diego's Miramar landfill.[47] As such, BioBag products require appropriate composting facilities. Currently, there are eight composting facilities in San Diego County:[48]

- El Corazon Compost Facility—Oceanside
- Ennis Inc. Materials Division—Lakeside
- Evergreen Nursery—Oceanside
- Evergreen Nursery—San Diego
- Inland Pacific Resource Recovery—Lakeside
- Miramar Greenery—San Diego
- San Pasqual Valley Soils—Escondido
- Slaughterhouse Recycling—Lakeside

Of these, Evergreen Nursery (Carmel Valley) and Miramar Greenery (Miramar) are within the City of San Diego's jurisdiction.

Grocery Bag Needs in San Diego

Table 2.Grocery bag needs at potentially affected retail venues in San Diego based on 2013 estimated population:

	A	B
	# bags needed to carry all groceries per person (1 year)	Millions of bags needed to carry all groceries in City of SD (1 year)
SUPB	375	525
Paper	250	350
Reusable	5	7

Table 2 Notes:

(A) This figure represents the equivalent number of each bag type needed to carry allpurchases in *affected* retail outlets in a year, based on lifespan and carrying capacity of each bag type. Los Angeles County estimated[49] that 68 percent of bags used were in retail venues affected by their ordinance, a statistic we've extended as an estimate for our own example.

(B) Values from column A multiplied by the population of the City of San Diego (~1.4 million).[50]

ANALYSIS: THE IMPACT OF PBBS

The notion that PBBs effectively mitigate the problems that result from SUPBs without adversely impacting the local economy in the long-term rests on a number of previously observed post-ban trends, including:

1. PBBs + Fees are successful in converting baggage behavior, so that **Bag-Use Profiles change** from single-use bags to reusable bags, or the use of no bag for small purchases**.**
2. The resulting composition of the Bag-Use Profile is **better for the environment** than the current profile, from a life-cycle perspective.
3. Local **economies**, comprised of affected retailers and their customers, **are not negatively impacted in the long-term**.

IMPACT OF PBBS ON BAG USE

Have Single-Use Bags Declined Under PBB+Fees?

Municipalities that have implemented a mandatory plastic bag reduction ordinance have reported successful reductions in the volume of single-use bags distributed by affected retail venues. Methods for determining the reduction in single-use bag distributions have varied, but generally involve either: feedback from retail venues, feedback from consumers, observational studies at

retail venues, analyses of baggage records reported by retail venues, or analyses of the disposition of waste streams pre- and post-ordinance.

Domestic plastic bag reduction ordinances have been reportedly successful. In Washington DC where retailers must charge customers for paper and plastic bags, there was a combined 60 percent reduction.[51] In a Seattle survey study, 80 percent of retailers reported a 'significant reduction' in single-use bags after Seattle instated PBB + Fee.[52] Portland Oregon's PBB + Fee, which was supported by the state's largest grocer coalition (members include Safeway and Fred Meyer), resulted in roughly 100 million fewer SUPBs in the region during the first six months after the ordinance took effect.[53]

Internationally, reported results of SUPB reduction measures include: 90 percent reduction in Ireland where a national bag fee was instated, 66 percent reduction in Denmark under a bag fee, 79 percent reduction in Australia under a bag fee, and a 92 percent reduction at international IKEA locations where the corporation voluntarily charged customers for plastic bags.[54]

Bag-Use Profile Changes in Comparable Locations

Analyses on the economic and environmental impacts of PBBs require observations of post-ordinance changes in Bag-Use Profiles, not just the reduction in SUPBs. To accurately assess how a Bag-Use Profile changes under a PBB + Fee, customer behavior must be known both pre- and post-ordinance. Although data from CA jurisdictions with PBB + Fees is limited, evaluations were performed for the City of San Jose, the City of Santa Monica, and the County of Los Angeles.

All three are coastal Californian regions with PBB + Fees, all post-ban results were reported at least six months after ordinances took effect, and the ordinances in all three regions closely mirror the ordinance being discussed in the City of San Diego. Santa Monica's fee on paper bags is 10 cents, San Jose's fee will be 10 cents until 2014 (after which it will rise to 25 cents), and Los Angeles County's fee is at the discretion of the retailer, although the minimum is 10 cents. Below are reported pre-ban and post-ban Bag-Use Profiles in the three regions, followed by a bag profile representing their respective averages.

Table 3. The measured percentage changes in Bag-Use Profiles observed in San Jose, Santa Monica, and Los Angeles County.

	PRE - BAN				POST - BAN			
	SUPB	Paper	Reusable	No Bag	SUPB	Paper	Reusable	No Bag
San Jose[55]	75	3	3	19	0	22	35	43
Santa Monica[56]	69	5	10	15	0	23	41	36
LA County[57,58]	82	2	2	17	0	2	58	40
Average:	**75**	**3**	**5**	**17**	**0**	**16**	**45**	**40**

Figure 1. Change in Bag Use Profiles (as a Percentage)

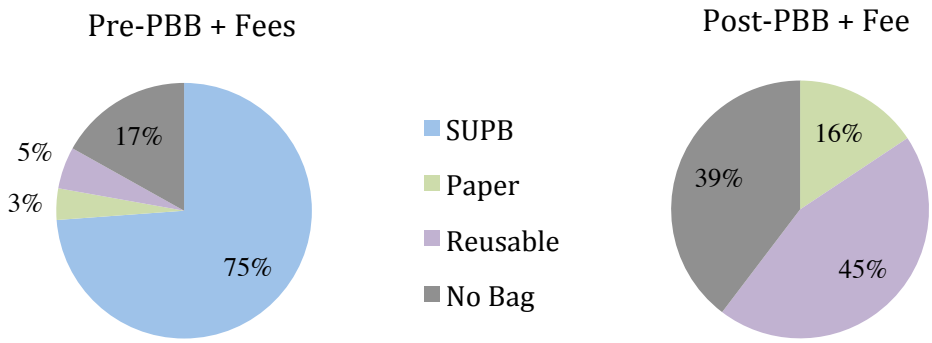


Figure 1Notes:
These figures are constructed from the derived "average" values from Table 3.

How Could SD Grocery Bag Needs Change with a PBB + Fee?

It would be difficult to quantify the exact impact of a PBB + Fee on the City of San Diego's Bag Use Profile. Such an effort would require the creation of an economic model that considers variables such as demographics and consumer behavior specific to the region. However, a hypothetical calculation using the average pre- and post-ban data from San Jose, Santa Monica and Los Angeles County can quantify what that impact *may* look like.

Table 4. Calculation of the Pre- and Post-PBB+Fee Bag-Use Profiles in San Diego

	Millions of bags needed to carry all groceries in City of SD per year	PRE - BAN		POST - BAN	
		SD Bag Use Profile (%)	SD Bag Use Profile (Millions of Bags)	SD Bag Use Profile (%)	SD Bag Use Profile (Millions of Bags)
SUPB	525	75	393.8	0	0
Paper	350	3	10.5	16	56
Reusable	7	5	0.4	45	3.15
No Bag	-	17	-	40	-

As projected, a PBB + Fee could significantly lower the use of both single-use plastic and paper bags in San Diego. The estimated reduction as presented in Table 4 and Figure 2 represents an **86 percent reduction** in the quantity of single-use bags consumed in a year in San Diego, which translates to **approximately 348 million single-use bags**. The increase in reusable bags in the Bag-Use Profile from **5 percent pre-ban to 45 percent post-ban would result in an increase of approximately 2.75 million reusable bags**. The 100 percent reduction of SUPBs rests on the assumption that retailers comply with the ban-behavior that has typically been observed in the municipalities whose data was used in this assessment. It also measures the elimination of SUPBs at point-of-sale, and therefore does not reflect the SUPBs such as produce and meat bags that would most likely be exempted under a bag reduction ordinance.

ENVIRONMENTAL IMPACT OF PBBs

The environmental impact of a PBB + Fee in San Diego must be considered from multiple angles to estimate if the impact would be positive or negative. To assess the environmental impact, the following was assessed:

- Bag life cycles that comprise the derived pre- and post-ban Bag-Use Profiles as measured by previously performed Life Cycle Assessments (LCA). These impacts include life cycle contributions to greenhouse gas (GHG) emissions, fresh water consumption, solid waste generation, and total energy use.
- The decrease in single-use bag litter achieved in other regions with PBB + Fees.

What is an LCA?

Life Cycle Assessments (LCA) are a common tool, used to quantify the environmental impacts of products throughout their life cycle. Product life cycles include all stages of a product's existence: from raw material extraction, to manufacturing, to consumer-use, to disposal.

Do PBB + Fees lower environmental impacts from a life cycle perspective?

The Environmental Impacts of SUPB, Paper Bags and Reusable Bags

To assess this, we have reviewed LCAs previously performed by other organizations that compare life cycle impacts of each bag type, and have applied these findings to projected Bag-Use Profiles in San Diego, pre- and post-ban. Many LCAs have been performed with the goal of comparing the environmental impacts of various bag types, in hopes of determining which bags create the least amount of environmental impact considering each bag's unique life cycle attributes. After reviewing many such LCAs, we present the findings of what we consider to be the most thorough comparative LCA available.

Life Cycle Assessment of Reusable and Single-use Plastic Bags in California[59] is a "cradle-to-gate" assessment published in 2011 by California State University, Chico, which means it considers life cycle stages only up to the consumer-use phase. It includes a comprehensive literature review on bag-comparing LCAs, along with a critical vetting of their assumptions. The strength of this study is the inclusion of important variables, including: the water used in washing reusable bags, the recycled content of various bag types, and importantly, the number of uses each bag is capable of sustaining.

What did the study do?

This study compares SUPBs and various reusable bag types. Reusable bags with the lowest environmental impact– a reusable, low density polyethylene bag composed of 40 percent post-consumer recycled material (Re-PE) –are commonly found and can meet the standards required in PBB + Fee legislation. This bag type is therefore considered synonymous with 'reusable bag' for the remainder of this analysis. Multiple domestic bag manufacturers produce this type of bag.

What did the study find?

Table 5. Environmental Impact Per-Bag

Environmental Impact	SUPB	Paper	Re-PE
Total energy (MJ)	0.50867	2.62000	2.94500
GHG emissions (tons CO2 equiv.)	0.00003	0.00008	0.00018
Solid waste (kg)	0.00467	0.03400	0.03410
Fresh water consumption (gallons)	0.03867	1.00000	0.25000

How does this apply to expected change in San Diego Bag-Use Profile?

Here, we multiply the per-bag environmental impact by the quantity of bags used in San Diego as projected, both pre- and post-ban. This is intended to serve as an approximation for what the environmental impact *could* look like.

Table 7. Environmental Impact of San Diego Bag-Use Profile, Pre- and Post-Ban

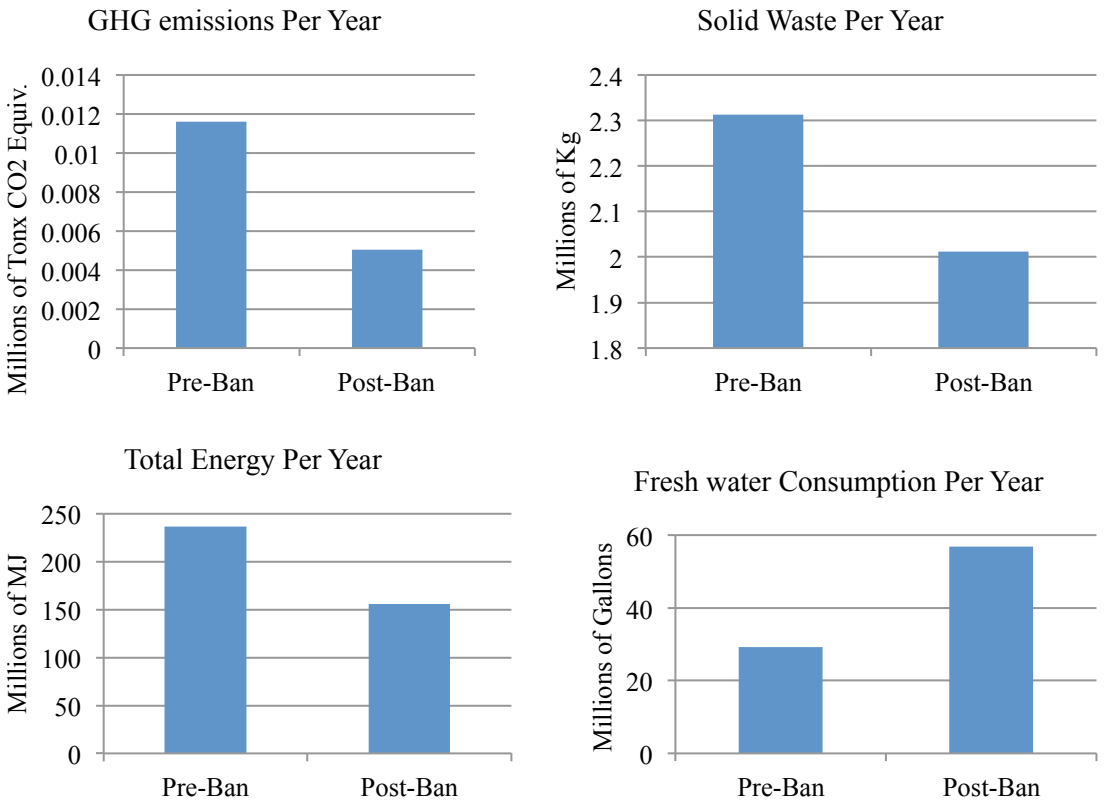
	Environmental Impact	SUPB	Paper	Re-PE	SUM
PRE-BAN	Total energy (million MJ[3])	200.3129	27.5100	2.0615	**229.8844**
	GHG emissions (million tons CO2 equiv.)	0.0105	0.0008	0.0001	**0.0114**
	Solid waste (million kg)	1.8377	0.357	0.0239	**2.2186**
	Fresh water consumption (million gallons)	15.0220	10.5000	0.1750	**25.9019**
POST-BAN	Total energy (million MJ)	0.0000	146.7200	9.2768	**155.9967**
	GHG emissions (million tons CO2 equiv.)	0.0000	0.0045	0.0006	**0.0051**
	Solid waste (million kg)	0.0000	1.9040	0.1074	**2.0114**
	Fresh water consumption (million gallons)	0.0000	56.0000	0.7875	**56.7875**

Table 7 Notes:

- The SUM category represents the total environmental impact from bags *used* in San Diego. Impacts from GHG emissions and energy consumption will be largely felt outside of the region due to the lack of plastic or paper manufacturers in San Diego. The same can be said for paper bag production, which increases the consumption of fresh water as indicated in the pre to post-ban numbers.

[3] MJ = Megajoule

Figure 3. Change in environmental impacts of Pre- and Post-Ban Bag-Use Profiles needed to fulfill one year of baggage needs for City of San Diego.[60]



If San Diego implements a PBB + Fee, the environmental impacts of a year's worth of bag use could result in approximately the following changes in environmental impact from the cradle-to-gate life cycle of the City's grocery bags:

- 56 percent reduction of GHG emissions
- 9 percent reduction of solid waste generation
- 32 percent reduction in total energy use
- 119 percent increase in fresh water consumption
  **Note: The increase in fresh water consumption from pre- to post-ban Bag-Use Profiles is largely a result of the water required in paper bag production, but also considers the water needed to wash reusable bags.

How would the GHG reductions impact SD's overall emissions?

It was estimated that the city emitted 17 million tons of CO_2 in 2010. If the decrease in GHG under a PBB+ Fee were achieved, the avoided GHG emissions would equate to almost 7,000 tons of CO_2 for a year of baggage needs under the post-ban Bag-Use Profile, eliminating 0.04 percent of the City's GHG emissions. Using the US government's estimated cost of $33 per metric ton of CO_2, this would amount to $231,000 in avoided costs each year for the City.

What if single-use paper bags were *also* eliminated in San Diego's Bag-Use Profile?

The majority of environmental impacts that result from San Diego's post-ban Bag-Use Profile are from the projected increase in the single use of *paper bags* by customers who choose to pay the fee instead of using reusable bags or not utilizing bags at all. In looking at the pre- and post-ban data, a significant increase in paper bag usage occurred in San Jose and Santa Monica, an increase from an average of 4% pre-ban to 23% post-ban. The fee on paper bags in each city is $0.10 per bag. This can be contrasted with Los Angeles County, where paper bags comprised two percent of the Bag-Use Profile both before and after the ordinance. The difference in behavior may be attributed to the fact that the fee in Los Angeles County is a minimum of $0.10, allowing retailers to set a price point at their own discretion.

If all single-use bags were eliminated, both plastic and paper, and if all baggage needs were fulfilled by the estimated 40% "no bag" transactions with the remaining 60% by Re-PE bags, then the environmental impacts of a year's worth of bag use could result **in a 93 to 96 percent reduction in all four reported environmental impacts** from the cradle-to-gate life cycle of the City's grocery bags.

The goal of any PBB + Fee is to transition consumers from single use bags to reusable bags. Although this calculation is purely hypothetical, it demonstrates the significant environmental impacts that are mitigated if consumers transition from paper bags to reusable bags after a PBB + Fee is implemented. As mentioned earlier, the City of San Jose will be increasing its fee on paper bags from $0.10 to $0.25 per bag starting January 1, 2014. It would be useful for cities evaluating PBBs to examine the City's data once the fee has been increased in order to evaluate the effect this may have on promoting greater adoption of reusable bags.

Do PBB + Fees decrease single-use bag litter and waste?

Few municipalities have performed before-and-after litter and waste-stream composition studies to assess the effectiveness of bag reduction ordinances in reducing litter and solid waste. However, the following should be considered when determining the impact of PBB + Fee on bag litter and waste:

1. **The documented success of PBB + Fees in promoting a transition towards Bag-Use Profiles that utilize far fewer single-use bags has demonstrated declining quantities of bag litter and bags in the waste stream.** For example, the City of San Jose performed litter surveys, before and 1 year after their PBB + Fee was implemented. Survey results reflected an 89 percent reduction of SUPBs in storm drains, a 60 percent reduction in creeks, and a 59 percent reduction on city streets. The proportion of creek litter comprised of plastic bags declined from 8 to 4 percent during the same time period.[61]
2. **Municipalities have observed increased rates of paper bag use after a PBB + Fee has been implemented.** This is a legitimate concern due to questions about the biodegradability of paper bags in landfills, and the water usage associated with paper bag production.

CONCLUSIONS: ENVIRONMENTAL IMPACTS OF PBBS

1. *PBB + Fees successfully reduce the volume of single-use bags deployed from affected retailers.* A PBB + 10 cent fee in San Diego could achieve an 86 percent reduction of single-use bags deployed from affected retailers, which could amount to a decrease of 348 million single-use bags per year.

2. *Less energy is required, more water is required, less solid waste is generated, and fewer GHG's are emitted from the life cycles of Bag-Use Profiles achieved with PBB + Fees.* The environmental impacts from life cycles of a year's worth of bags used in San Diego under PBB + Fee (10 cents):

   Energy: 74 million MJ reduction
   CO_2 eq. emissions: 6,418-ton reduction
   Solid waste: 270,000 kg reduction
   Water Consumption: 30 million gallon increase

   Were all paper bags avoided and replaced by reusable bags, which could require a higher fee, the change in environmental impacts could be:

   Energy: 224 million MJ reduction
   CO_2 eq. emissions: 10,800-ton reduction
   Solid waste: 2.2 million kg reduction
   Water Consumption: 28 million gallon reduction

3. *PBB + Fees have achieved reductions in litter and solid waste in some municipalities, but most have not measured the impacts.* Post-ban surveys in San Jose reflect an 89 percent reduction of SUPBs in storm drains, a 60 percent reduction in creeks, and a 59 percent reduction on city streets. However, most cities do not track this data, most likely due to the costs associated with collecting such data.

ECONOMIC IMPACTS OF PBBs

PBBs work by directly limiting SUPB consumption with a ban, and by charging the consumer a fee on alternative bag types if a PBB + Fee is enforced. The economic effects of this transition are seen in the change in bag-type consumption (plastic vs. paper or reusable bags), which can impact bag manufacturers, the change in who receives the direct cost associated with the bag purchase, and the impact on local services responsible for municipal waste streams. As a result, PBBs chiefly impact four sectors:

(1) Retailers
(2) Consumers
(3) Cities
(4) Plastics manufacturers

Based on studies of PBBs in other regions, we assess the impacts that a PBB + Fee in San Diego may have on each of these sectors.

Impact on Retailers Affected by PBBs

Do Retailers Save Money on Bag Costs?
In San Diego, retailers currently offer plastic carryout bags to customers at no charge. Retailers, however, must purchase these bags, and their associated costs are an expense they must account for. As a result of a PBB + Fee ordinance, it is expected that retailers will purchase significantly fewer plastic bags and replace them with paper bags, as reflected in the Bag-Use Profile mentioned earlier. Despite not having to pay the previous cost associated with plastic bags, the per unit purchasing cost for paper bags is significantly greater for retailers (approximately 1 cent for plastic and 15 cents for paper).

Under the proposed ordinance, retailers will retain fees collected for paper bags and will use them to partially recover the cost of purchasing paper bags. Although the ordinance may lead to increased baggage costs for retailers in the short-term due to the increase in paper bag usage, this can be mitigated in the long run if customers pay for their own reusable bags. This takes into account concerns that retailers will actually incur more costs by switching to a paper bag if the proposed fee is only 10 cents, given that paper bags can average 15 cents per bag.[62] In addition, some cities such as San Jose have implemented a phased-in fee, which allows the initial fee of 10 cents to increase to 25 cents after two years. In this scenario, retailers could actually profit from the fee once increased to 25 cents per bag.

San Francisco's Office of Economic Analysis released an assessment of projected economic impacts on the local economy of the SF ban with proposed increases in restrictions (inclusion of restaurants).[63] Their models predicted a "slight positive impact on the local economy" due to the overall decrease in bag-related costs post-ordinance, and to the economic multiplier effects that could occur alongside the projected increase in consumer spending associated with decreasing product costs passed on by retailers. The same study reported that impacted San Francisco retailers would enjoy a savings of $3 million over the course of a year under the strengthened ban, due to the forgone purchasing costs of single-use bags.

In Seattle, a third of respondents to a survey of affected retailers reported that their bag costs rose, while a third reported that their bag costs were the same, and a fifth reported a decrease in bag costs. However, the report didn't consider revenues from paper bags, for which customers are charged $0.10.[64]

Do Affected Retailers Lose Business?

The economic concern more widely echoed with regard to retailers affected by bans is the potential for customers to take their business outside of bag-banned regions. However, few studies have been done to examine this issue. California jurisdictions with bag bans in place, including San Jose[65] and San Francisco,[66] have reported "no sustained negative impacts on local retailers." Los Angeles County reported that several local reusable bag businesses emerged post-ban to meet the demands of the new market for reusable bags.[67]

One existing study attempts to correlate PBBs with substantial economic harm to retailers.[68] The study, released in August 2012, was performed by the National Center for Policy Analysis (NCPA). This study has been cited repeatedly by campaigns opposing PBBs, and forms the basis for what many PBB critics substantiate as economic harm from bag bans. The authors stated that stores within the boundaries of the Los Angeles County PBB+Fee ordinance reported a decrease in sales of 3.3 percent, while those outside of the impacted zone enjoyed an increase in sales of 3.4 percent based on before-and-after sales comparisons.

However, limitations in the NCPA's methodology must be considered when examining its claims. Conclusions of the economic analysis were reportedly based on (1) a sample size of only three percent of impacted retailers, (2) standard deviations of reported sales changes were not included, and (3) no attempt was made to ensure that the changes in sales weren't due to an external factor. Other PBB supporters have questioned the methodology used by the NCPA in compiling this study, bringing to light a segment that claims PBB's are bad for the environment, because "plastic bags are better for the environment than reusable or paper bags." As argued in the environmental analysis section of this report, LCAs, after considering the number of uses of each bag type, demonstrate that reusable bags impact the environment to a lesser degree than SUPBs.

Impacts on Consumers Affected by PBBs

As mentioned above, while single-use bags are free to consumers, they come at a cost for retailers. Therefore, to assess the actual cost of a PBB on consumers, the cost of bags now paid directly by retailers must be considered in the consumer cost calculations. A 2005 study by the United Nations Environmental Programme found that the average 'hidden' cost of SUPBs per household is $10-15 per year - a price which is embedded in grocery costs whether customers use free carryout bags or not.[69] But to accurately project how consumer baggage costs would be impacted, consideration of the price for paper and reusable bags must be included.

Here, we assess how the projected shift in Bag-Use Profiles would affect baggage costs for San Diego consumers. Using the estimated quantities of each bag type needed for a year of baggage needs considering the pre-and post-ban Bag-Use Profiles generated in Table 3**,** and the average cost per bag type**,** we project the pre- and post-ban consumer baggage costs in Table 8 on the next page.

Table 8. Consumer baggage costs for 1-year of San Diego baggage needs at potentially affected retailers, pre- and post- PBB + Fee.

	A SUPB	B Paper	C Re-PE	SUM
PRE-BAN	$3,838,000	$1,050,000	$400,000	**$5,288,000**
POST-BAN	$0	$5,600,000	$3,150,000	**$8,750,000**

Table 8 Notes:

(A) The calculation assumes retailers pass the cost of plastic bags (~$0.01) on to consumers.
(B) The calculation assumes consumers pay $0.10 per bag.
(C) The calculation assumes consumers pay an average of $1 per reusable bag.

As seen, baggage costs actually increase by $3.5 million in the first year after the ban, or roughly **$7.68 per household**.[4] However, it is important to note that this calculation reflects the costs for the first year only, as consumers start to transition towards reusable bags, which are initially more costly per unit than paper bags. Despite this, switching to reusable bags could actually save consumer dollars in the long run because reusable bags are designed for multiple uses, and it is therefore unlikely that consumers will completely replace their reusable stock on a yearly basis. In other words, consumers save money by purchasing reusable bags once per year rather than paying a recurring fee for paper bags.

Impacts on Cities

Savings from a PBB

The City of San Diego would likely experience long-term economic benefits from a PBB + Fee. The $13 per resident that coastal cities have been estimated to spend yearly on litter cleanup costs and waste management operations will likely decline as the portion SUPBs contribute to litter and the waste stream decline under a bag ordinance. The City of San Diego's Environmental Services Department currently spends approximately $160,000 per year cleaning up plastic bag litter.[70] Although SUPBs represent a small fraction of litter and disposed waste streams in San Diego, the same has been true for other communities who have reported the economic benefits from an SUPB reduction.

San Francisco estimated an annual savings of $100,000 for avoided plastic bag cleanup costs, and $600,000 in savings from avoided SUPB waste processing costs. Because San Francisco also experienced a substantial decline in paper bag use after imposing a 10 cent fee on single-use paper bags alongside their PBB, they estimated to have saved $2.4 million in annual paper bag recycling costs, and $100,000 in paper bag cleanup costs.[71] New York City, which sends 100,000 tons of plastic bags to out-of-state landfills per year, estimated a cost savings of $10 million.[72]

Potential costs associated with a PBB

- ***Litigation*.** Some proposed bag ordinances in other cities have failed due to the high costs of litigation, or threat of litigation from PBB opposition. The most common litigation threats in California aim to require jurisdictions to perform an Environmental Impact Report (EIR) in

[4] Based on 450,691 households, as reported in the 2010 Census.

conjunction with a proposed bag reduction, under the California Environmental Quality Act (CEQA).[73] This has served as a tool by industry opposition to slow down or halt bag bans, due to the cost of completing an EIR. A group called Save the Plastic Bag Coalition (STPBC) is one opposition group that has threatened litigation if an EIR were not done before implementing a PBB. As a result, STPBC and other coalitions have successfully thwarted, or prolonged the passage of bans in Long Beach, Carpinteria, Oakland, and Chico. They were however unsuccessful against Los Angeles County, San Luis Obispo, Marin County, and Manhattan Beach. The 2011 failure of STPBC v. Manhattan Beach was significant in the precedent it set for other jurisdictions hoping to avoid performing EIRs in conjunction with bag ordinances. The state Supreme Court ruled that an EIR was not necessary for the City of Manhattan Beach to prepare, nor for any jurisdiction of similar size or smaller, stating that the plaintiff's logic pertaining to the negative environmental impact of using plastic bag alternatives was based on the false premise that PBBs aim to replace SUPBs with paper, while in reality, PBB + Fees aims to discourage the use of both.[74]

Despite this expense, the City Attorney of San Diego recently stated that an EIR on plastic bag bans for San Diego will be commissioned, which points to both the hurdles of implementing such a ban, and the city's commitment to moving forward with banning plastic bags.

- ***Bag Give-Aways.*** Some communities have held bag give-away events to ensure that economically underprivileged citizens do not face any burden of increased baggage costs. Los Angeles County, for example, cited plans to hand out one million reusable bags to low income residents in areas affected by the PBB + Fee.[75] Additionally, because most ordinances don't require consumers on food assistance programs to pay the cost for reusable or paper bag alternatives offered at retail venues with PBB + Fees, the responsibility of covering that cost could fall onto the city. The decision for San Diego to take on such costs, if it were to implement a bag reduction ordinance, would be one made by policymakers.

Impacts on Plastics Manufacturers

Any substantial economic impacts of PBBs are most likely to fall on the plastics manufacturers who make SUPBs, a significant quantity of which are domestic operations. Plastics manufacturers accordingly represent the bulk of organized opposition towards PBB efforts, forming a number of coalitions such as the American Progressive Bag Alliance (APBA),[76] Save the Plastic Bag Coalition,[77] and the American Chemistry Council, whose members reportedly include Exxon, Dow, and plastic bag manufacturers.[78]

The APBA website argues that PBBs threaten the jobs of 30,000 Americans working in the plastic bag manufacturing industry.[79] Of these, a reported 1,800 are located in California. Senator Padilla, author of the recently failed California statewide PBB ordinance SB 405, noted that only three plastic bag manufacturers are located in Southern California.[80] Of these three, only one had registered in organized opposition to the statewide ban, with the other registered five being located out-of-state. Arguably, the concern displayed by the national plastics industry relates to the precedent that California has set in leading other states towards progressive legislation. But according to Padilla, like other industries, plastics manufacturers generally produce a diverse array of products and are generally capable of transition.[81]

PBBs that eliminate SUPBs in CA communities may hinder manufacturers' revenue streams currently captured by a portion of HDPE bag sales. But, considering that the reusable bag type recommended here and by others is comprised of a polythehylene plastic derivative, plastics manufacturers can mitigate some of the negative impact to their business by switching to greater Re-PE bag production to meet new reusable bag demands.

However, further quantitative analysis would need to be done to forecast the actual losses and gains for plastics manufacturers (i.e. the economic tradeoff) from a plastic bag ban. A PBB in San Diego will at least temporarily lower revenue streams for the plastics manufacturers who previously supplied San Diego retailers with their product.

COMMON ARGUMENTS AGAINST PBBS

1. *PBBs will result in public health issues due to bacteria harbored in reusable bags.*

Concern surrounding the capacity for reusable shopping bags to harbor food-borne illnesses has been a concern among some. This arose primarily from two studies: one relating a food-borne illness incidence to San Francisco's PBB,[82] and the other from a bacterial survey of reusable bags. The first, an unpublished study, compared emergency room food-borne illness data within the affected SF region before and after the ban. The authors reported an increase in 5.5 food borne-illness related deaths per year after the ban, implying correlation between that statistic and the bag ordinance. A San Francisco Medical Epidemiologist Health Officer later fully examined the study's methodologies.[83] The Health Officer reported that the conclusions made by the authors were unwarranted due to methodological limitations, including the authors' inclusion of admissions data from patients with diseases not possibly carried by bags, the failure to mention that the same trend had been observed nationally over the few years prior, and no robust correlation study to control for other possible explanations.

The second, an American Chemistry Council-funded study from the University of Arizona, surveyed 84 reusable bags for Coliform bacteria including E. Coli, and Salmonella, noting that none of these bags had ever been washed, and most had contained meat products which had not been isolated by any form of plastic or separation from bag surfaces.[84] The authors found that about half of the bags did harbor some variety of Coliform, but only a small fraction was of a variety that could infect humans. No other bacteria known to cause foodborne illnesses were identified at a significant level. They also found that >99.99 percent of all identified bacteria types were eliminated after a standard machine washing.

2. *PBBs discriminate against low-income communities.*

The slight increase in yearly consumer baggage costs under a PBB + Fee projected in Table 8 (Page 22) arises primarily from consumers who choose to pay the fee for single-use paper bags. Recognizing the financial burden that purchasing bags or paying fees may have on low-income communities, cities have taken steps to ensure bags are made available to these communities free of cost. This has commonly occurred through exempting those on food assistance programs (WIC) from paying fees and/or providing reusable bags for free through outreach events, which occurred in Los Angeles County.

An ordinance in the City of San Diego is likely to follow the model of other cities in California, including the most recent statewide measure. In examining the language of the ordinances studied in this report, the following provisions are included for participants in the WIC program:

- City of San Jose: provides one or more recycled paper bags for free through December 31, 2013[85]
- City of Santa Monica: provides a reusable or recycled paper bag at no cost at the point of sale[86]
- County of Los Angeles: retailers have discretion to provide either free reusable bags, free recycled paper bags, or both[87]
- State of California: provides a reusable or recycled paper bag at no cost at the point of sale[88]

Although these measures differ in the type of bag offered, they are all designed to ensure low-income communities are not disproportionately affected by a PBB + Fee. As the City of San Diego crafts its bag reduction ordinance, it should examine the ordinances in other cities to determine what types of bags it will exempt and the impact this may have on retailers.

3. The portion of waste streams and litter comprised of plastic bags is too small to justify action.

While plastic bags comprise a small fraction of local waste streams and litter content, the long-term impacts of SUPBs are large. Plastic's extensive lifespan of up to 1000 years makes what was previously a small fraction much larger and more significant for a city's waste stream and litter content over time. Taken in a more global context, the proliferation of SUPBs comprises a majority of trash in the Great Pacific Garbage Patch, which is a collection of marine debris in the Pacific Ocean.[89] National Geographic reports approximately 1.9 million bits of plastic per square mile in this space.[90]

As a result, the significant ecological litter impacts, lack of curbside recycling, the potential for SUPB replacement by other suitable materials and methods, a commensurate level of community concern, and the unqualified use of highly durable material for single-use applications are just a subset of factors that combine to justify questioning the continued use of SUPBs. Additionally, because SUPBs are given away at defined locations, for defined purposes, the option to target this waste type for elimination is arguably less onerous than others. The precedent set by a PBB in San Diego may pave the way for additional waste reduction measures aimed at other specific trash types later, and to alert citizens that the region is taking active measures to reduce the environmental impacts of SUPBs.

4. PBBs will result in job losses.

It is possible that job losses may occur within the plastics manufacturing industry. However, there is a lack of studies that have been done which quantify the percentage of job loss in the sector that can be traced to reduction ordinances**.** As a result, it is difficult to quantify the degree to which plastic manufacturers would be impacted by an ordinance.

If plastics manufacturers are significantly impacted by the PBB, they could transition to greater Re-PE bag production to meet new reusable bag demand, considering that the reusable bag type

recommended here and by others is partially comprised of a polythehylene plastic derivative. Alternatively, local business may emerge to meet new demands for reusable bags. In Los Angeles, for example, Green Vets is a non-profit that employs local veterans to create reusable bags which are sold in zones impacted by local PBBs. Santa Monica purchased 26,000 Green Vets bags when their bag ordinance passed.[91]

RECOMMENDATIONS

It is recommended that San Diego begin constructing a PBB ordinance. Based on analysis, the benefits of a bag reduction ordinance in San Diego would outweigh the potential consequences. The following are recommended steps to include in implementing a plastic bag ban ordinance that takes into account the potential environmental and economic impacts:

1. Eliminate all high-density polyethylene (HDPE) single-use plastic bags at point of sale.
2. Charge a fee of at least 10 cents for single-use paper bags and require the bags contain a minimum of 40 percent post-consumer recycled material.
3. Require that the reusable bag type, if made of polyethylene, be made of at least 20 percent post-consumer recycled material, and encourage bag give-away events and outreach programs to offer/recommend reusable bags of the same variety.
4. Follow language in recently proposed state ban (SB405) with respect to affected retail venues and bag types that should be exempted from the ban.
5. The City of San Diego should examine plastic bag ban ordinances implemented in other cities to determine what types of bags it will exempt for those on food assistance programs and the impact this may have on retailers in low-income communities.
6. Perform outreach and education before the ordinance takes effect in order to:
    - Educate consumers about the ordinance.
    - Educate retailers about the ordinance.
    - Educate consumers to use reusable bags for the extent of their durable lifespan.
    - Educate consumers that washing their reusable bags is important for avoiding bag contamination.
    - Educate consumers on water conservation as it relates to paper bag production and washing reusable bags.
7. Perform an impact study: gather data on pre-and post-ban litter composition and Bag-Use-Profiles at affected venues to assess ordinance performance.

CONCLUSION

In California, there are currently 64 PBB ordinances covering 85 municipalities, with many including a fee on single-use paper bags (PBB + Fee) to discourage the replacement of SUPBs with single-use paper bags. These ordinances have often been controversial, due in part to litigation brought forward by groups which support plastic bags. Equinox Center presents this report in an attempt to examine the potential environmental and economic impacts that a PBB could have in San Diego, in hopes that stakeholders will be armed with a realistic assessment of PBBs.

Based on pre- and post-ban bag usage data from San Jose, Santa Monica, and Los Angeles County, a PBB in San Diego has the potential to eliminate close to 350 million plastic bags per year. This decline would lead to reductions in GHG emissions, energy consumption, and solid waste generated during the life cycle of a plastic bag. Water usage, however, is projected to increase significantly due to the water needed to create paper bags and wash reusables. Furthermore, a PBB should improve the cleanliness of our waters and beaches, considering that 80 percent of marine debris originates from land sources, 60-80 percent of which are plastics.

While there is substantial literature available on the environmental impacts of PBBs, determining the economic impacts can be more challenging. Due in part to the number of variables affecting consumer behavior, it is difficult to quantify how manufacturers, retailers, and consumers may be affected. Based on reports from jurisdictions with PBBs in effect, there has been no substantial negative long-term impact to retailers, as well as no demonstrated migration of consumers to jurisdictions without PBBs. Retailers may be negatively impacted in the short-term due to increased baggage costs associated with increased paper bag usage, but this is projected to decrease over time as consumers transition to reusable bags.

Furthermore, while it is logical that the plastics industry would be negatively impacted, a lack of research on the topic makes it difficult to estimate what this impact may look like. If the impact is significant, plastics manufacturers could begin producing reusable bags as well, considering the reusable bag type recommended in this report can include plastics as long as it is at least 20 percent post-consumer recycled polyethylene and meets the criteria for reusable bags. The City of San Diego should experience savings through litter abatement, considering the City spends approximately $160,000 per year to clean up plastic bag litter. Cost savings realized by the City could be used to purchase reusable bags for giveaways, which would promote reusable bag adoption in low-income communities.

Ultimately, a PBB has the capacity to mitigate most environmental impacts associated with the life cycle of plastic bags, without causing substantial long-term economic harm to consumers and retailers. While some may argue that a PBB would have only a negligible positive impact, the precedent set by an ordinance in San Diego could allow for future waste reduction measures aimed at other trash types, and to alert residents that the region is taking active measures to reduce the environmental impacts of SUPBs. If the City of San Diego moves forward with a PBB, it is recommended that retailers keep records regarding their distribution of different bag types and what financial impact this may have on their business. This information could then be reviewed by elected officials to determine if the ordinance is meeting its goals, allowing for any adjustments to be made in the process.

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