FACT SHEET – LANDFILL IMPACTS

Unintended Consequences Of A Plastic Carryout Bag Ban

By Anthony van Leeuwen, 6 April 2013

An ordinance has been proposed for municipalities and unincorporated areas in Ventura and Santa Barbara counties to ban plastic carryout shopping bags and charge a 10 cent fee for every paper bag issued at the store checkout counter. The 10 cent fee serves to encourage the use of reusable shopping bags instead of paper bags. The basic idea is that reusable bags, because you use them over and over have a smaller impact on the environment than plastic carryout bags. One California state legislator even stated "the amount of plastics going into the waste stream is pretty large." However, the unintended consequences of a plastic carryout bag ban have some unpleasant surprises!

Law of Unintended Consequences[1]. *"In the social sciences, unintended consequences (sometimes unanticipated consequences or unforeseen consequences) are outcomes that are not the ones intended by a purposeful action."*

"Unintended consequences can be roughly grouped into three types:

- *A positive, unexpected benefit (usually referred to as luck, serendipity or a windfall).*
- *A negative, unexpected detriment occurring in addition to the desired effect of the intended action.*
- *A perverse effect contrary to what was originally intended (when an intended solution makes a problem worse)."*

Plastic Carryout Bags. A plastic carryout bag is the lightweight plastic shopping bag given to the consumer at checkout to take their purchases home. The bag is made from either High Density Polyethylene (HDPE) or Low Density Polyethylene (LDPE) plastic and has built in handles that make the bag a favorite for reuse. Not all plastic carryout bags weigh the same, but for purposes of this paper we will assume that plastic carryout bags weigh 5.5 grams or 0.01213 lbs. each.

Plastic Carryout Bag Reuse. The benefit of receiving plastic carryout bags at retail stores is that these bags are extensively reused for a variety of purposes. This include reuse as liners for small waste cans in the bathroom or bedroom, as trash bags, to pick up pet litter, hold wet clothes, to store items, etc. By reusing plastic carryout bags the purchase of smaller plastic trash bags is avoided.

Plastic Carryout Bag Recycling. Under California State Law AB 2449 and SB 1219 retail stores that issue plastic carryout bags at checkout have to provide an In-Store Recycling Bin so that customers can bring plastic carryout bags back for recycling. In addition, stores are required to sell reusable shopping bags.

[1] Wikipedia, "Unintended Consequences". Available at: http://en.wikipedia.org/wiki/Unintended_consequences

The cost of this recycling program is shouldered by customers through higher prices. A negative unintended consequence of a plastic carryout bag ban is that stores will no longer be required by law to maintain a recycling bin for plastic carryout bags. In San Francisco, after a plastic bag ban went into effect retail stores shut down their plastic bag recycling bins.

In-Store Recycling Bin. The In-Store Recycling Bin is primarily for recycling of plastic carryout bags. However, an added benefit is that "other plastic" bags and wraps can also be recycled in this bin including: produce bags, bread bags, newspaper bags, dry cleaning bags, and plastic wrap from toilet paper, paper towels, diapers, etc. This "other plastic" material is not accepted in the curbside recycling bin because it is uneconomical to recycle and the material get caught in the sorting machinery. Hence, "other plastic" can only be recycled through the In-Store Recycling Bin. An unintended consequence of a plastic carryout bag ban is that "other plastic" will end up in the landfill if retail stores shut down the In-Store Recycling Bins. This Fact Sheet assumes that the In-Store Recycling bins will be shut down.

In-Store Recycling Program Success. The success at the recovery of plastic carryout bags has been very modest at less than 5%. In 2009, only 2.9% of plastic bags issued were recovered through the In-Store Recycling Program. However, for every ton of plastic carryout bags that were recycled, 11.6 tons of "other plastic" was recovered[2] preventing this material from ending up in the land fill.

Replacement Plastic Bags. A secondary effect of a plastic carryout bag ban is the purchase of replacement plastic trash bags to line small trashcans, pick up pet litter, etc. About 40% of the plastic carryout bags are reused as trash bags and disposed of in the landfill and it is expected that consumers will purchase replacement plastic bags to fill this niche. For purposes of this fact sheet, a Replacement Plastic Bag is assumed to weigh the same as plastic carryout bag.

Paper Carryout Bags. A recyclable paper bag has 1.5 times the volume of a plastic carryout bag. A recyclable paper bag has at least 40% post-consumer recycled content and weighs between 45 and 90 grams. A paper bag from Trader Joe's weighs 67.47 grams or 2.38 ounces each.

Double Bagging Paper Bags. Double bagging at the checkout stand normally occurs when the customer purchases items that are heavy e.g. canned food, etc. Observations from one market shows that double bagging may occur as much as 60% to 80% of the time. While the weight of the items carried in the bag is one factor, the other factor is that the paper handles break off easily. Double bagging of paper bags in not taken into account in the analysis of landfill impacts.

Reusable Bags. Reusable bags come in small, medium, and large sizes and can hold 10, 25, and 35 lbs. respectively when filled. The most common bags are made from non-woven polypropylene plastic and from cotton or Jute with handles and intended to be used multiple times. The weight of a reusable bags is assumed to be 6.8 ounces as weighed by Rincon Consultants on 8/10/2010.[3] The least common

[2] CalRecycle, "At-Store Recycling Program – 2009 Statewide Recycling Rate for Plastic Carryout Bags", Available at: http://www.calrecycle.ca.gov/plastics/AtStore/AnnualRate/2009Rate.htm

[3] Beacon Single Use Carryout Bag Ordinance Draft Environmental Report SCH #2012111093 dated February 2013. Located at:
http://www.beacon.ca.gov/assets/PDFs/Bag-Ordinance/BEACON_Single_Use_Carryout_Bag_Ordinance_DEIR.pdf

Reusable bags are made from LDPE or HDPE plastic which is nothing more than a thick plastic bag. Reusable bags are assumed to be used once per week for 52 weeks and have a lifespan of 1 year.

Reusable Bag Recycling. The LDPE and HDPE reusable bag are fully recyclable through the In-Store Recycling Bins. The non-woven Polypropylene (PP) bag and cotton fabric bags are not recyclable since no recycling facilities in Ventura and Santa Barbara Counties exist; hence, disposal is in the landfill. This is another example of a negative unintended consequence of a plastic bag ban, where a recyclable plastic carryout bag is replaced by a reusable bag that cannot be recycled.

Reusable Bag Proliferation. Proliferation of reusable bags is a perverse side effect of the plastic carryout bag ban. Customers purchase more reusable bags than they really need (for example, they don't have any with them on a spur of the moment shopping trip) or receive free bags during promotions. As a result, an extraordinary quantity of reusable bags are being disposed of in landfills. This occurred in Australia[4] where the reusable bag has been dubbed the "new green monster". Reusable Bag Proliferation is not taken into account in landfill impacts discussed in this Fact Sheet.

Impact to Landfills. When bags reach their end of life they are disposed of either by recycling or by disposal in the landfill via the curbside trash bin. Pre Ban we are concerned about disposal of plastic carryout bags in the landfill. Post Ban we are concerned with disposal of plastic carryout bags (the remaining 5%), paper bags, reusable bags, replacement bags, and "other plastic".

Landfill Impact Using Draft EIR Bag Quantities. The impact to landfills is calculated using bag quantities assumed in the Draft EIR which are based upon the assumption that Californians use 20 billion plastic carryout bags per year.[5] The Study Area defined in the Draft EIR consists of Ventura and Santa Barbara Counties. A total of 658,241,406 plastic carryout bags were assumed in the Study Area Pre Ban. Post Ban it was assumed that 5% of plastic carryout bags or 32,912,070 would remain; 30%, would be replaced by 197,472,422 paper bags; and 65%, would be replaced by 8,228,018 reusable bags. 60% of paper bags were assumed to be landfilled with 40% recycled. 97.1% of plastic carryout bags were assumed to be landfilled with a 2.9% recovery rate by recycling. The Post Ban "other plastic" is calculated from the 2.9% of Pre Ban plastic carryout bags recycled multiplied by 11.6[6] times the weight of a single plastic carryout bag.

Post Ban/Pre Ban Ratio. The ratio of material deposited in the landfill Post Ban compared to the material deposited in the landfill Pre Ban is calculated as follows:

$$Post\ Ban\ /\ Pre\ Ban\ Ratio\ = \frac{Post\ Ban\ Landfill\ Weight\ Deposited}{Pre\ Ban\ Landfill\ Weight\ Deposited}$$

[4] Munro, Peter. 24 January 2010. "Bag the bag: a new green monster is on the rise." Located at: http://www.theage.com.au/national/bag-the-bag-a-new-green-monster-is-on-the-rise-20100123-mrqo.html

[5] Beacon Single Use Carryout bag Ordinance Draft Environmental Report SCH #2012111093 dated February 2013. Located at: http://www.beacon.ca.gov/assets/PDFs/Bag-Ordinance/BEACON_Single_Use_Carryout_Bag_Ordinance_DEIR.pdf

[6] CalRecycle, "At-Store Recycling Program – 2009 Statewide Recycling Rate for Plastic Carryout Bags", Available at: http://www.calrecycle.ca.gov/plastics/AtStore/AnnualRate/2009Rate.htm

Table 1 shows the Pre Ban and Post Ban quantity of bags, weight per bag, and the weight in pounds and weight in tons. Table 1 shows a Pre Ban weight of **3,876.46** tons for plastic carryout bags. In addition, Table 1 shows a Post Ban weight of **13,700.15** tons for the remaining plastic carryout bags, paper bags, reusable bags, replacement bags, and "other plastic".

The Post Ban/Pre Ban Ratio in Table 1 is calculated as follows using the above equation:

$$Post\ Ban\ /\ Pre\ Ban\ Ratio = \frac{13{,}700.15}{3{,}876.46} = 3.53$$

The Post Ban/Pre Ban Ratio as described in the above equation shows that after a Plastic Carryout Bag Ban is implemented that the weight of material deposited in the landfill is 3.53 tons for every ton of plastic carryout bags deposited in the landfill before the ban. Table 1, clearly shows that the perverse unintended consequence of the plastic carryout bag ban is more material in the landfill, not less.

	Quantity	Weight per bag (lbs.)	Weight (lbs.)	Weight (tons)
Pre-Ban				
Plastic Carryout Bags	639,152,405	0.01213	7,752,918.68	**3,876.46**
Post Ban				
Plastic Carryout Bags	32,912,070	0.01213	399,223.41	199.61
Reusable Bags	8,228,018	0.42500	3,496,907.84	1,748.45
Paper Bags	118,483,453	0.14875	17,624,413.66	8,812.21
Replacement Bags	263,296,562	0.01213	3,193,787.30	1,596.89
Other Plastic	19,089,001	11.6 x 0.01213	2,685,975.15	1,342.99
Total				**13,700.15**
Post Ban /Pre Ban Ratio				**3.53**

Table 1. Landfill Quantities using Draft EIR Plastic Bag Quantities

Landfill Impact Using Reasonable Bag Quantities. More reasonable bag quantities were determined from the quantity of bags purchased by Stores subject to California State Law AB 2449 or about 9 billion plastic carryout bags per year. A quantity of 293,791,362 plastic carryout bags were assumed in the Study Area with 2.9% recycled Pre Ban. Post Ban it was assumed that 5% or plastic carryout bags or 14,689,568 would remain; 30%, are replaced by 88,137,409 paper bags; and 65%, are replaced by 3,223,028 reusable bags. In addition, 117,516,544 replacement bags were purchased and 599.1 tons of "other plastic" was calculated from the 2.9% of plastic carryout bags that were recycled Pre Ban in the Study Area. Paper bags are shown at 60% assuming a 40% recycle rate.

The Post Ban/Pre Ban Ratio in Table 2 is calculated in the same manner as for Table 1 as follows:

$$Post\ Ban\ /\ Pre\ Ban\ Ratio = \frac{5{,}985.02}{1{,}730.17} = 3.46$$

The Post Ban/Pre Ban Ratio shows that the weight of material deposited in the landfill is 3.46 tons for every ton of plastic carryout bags deposited in the landfill before the ban. Table 2, also shows that a perverse unintended consequence of the plastic carryout bag ban is that more material is deposited in the landfill after the ban than before.

	Quantity	Weight per bag (lbs.)	Weight (lbs.)	Weight (tons)
Pre-Ban				
Plastic Carryout Bags	285,271,412	0.01213	3,460,342.23	**1,730.17**
Post Ban				
Plastic Carryout Bags	14,689,568	0.01213	178,184.46	89.09
Reusable Bags	3,223,028	0.42500	1,301,297.56	650.65
Paper Bags	52,882,445	0.14875	7,866,263.75	3,933.13
Replacement Bags	117,516,545	0.01213	1,425,475.68	712.74
Other Plastic	8,519,950	11.6 x 0.01213	1,198,825.13	599.41
Total				**5,985.02**
Post Ban/Pre Ban Ratio				**3.46**

Table 2. Landfill Quantities Using Reasonable Bag Quantities

Summary of Landfill Impacts. The impact of a plastic carryout bag ban will result in about **3.5 times as much** material deposited in the landfill Post Ban as Pre-Ban. Even if one were to assume that the lifespan of reusable bag is two years vice one year, the Post Ban/Pre Ban Ratio will not change substantially. If you ignore paper bags and consider only the remaining material, you still will have more material going into the landfill after the ban than before. If you consider the potential impact of double bagging paper bags and reusable bag proliferation the amount of material going to the landfill would be much more! **Since the plastic carryout bag ban intended to reduce the amount of material going to the landfill, the opposite has occurred instead. This is clearly a perverse unintended consequence.**

Recommendations. **Drop the plastic carryout bag ban effort**. Instead, focus on solving several recycling issues:

1. Recycling of plastic bags and film in curbside recycling barrels.
2. Establish recycling facilities for reusable bags.