BAG QUANTITY ASSUMPTIONS

BEACON Single Use Carryout Bag Ordinance

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Plastic Carry Out Bags

The BEACON Single Use Carryout Bag Ordinance Draft Environmental Impact Report (EIR) assumes that Californians use 20 billion plastic carry out bags per year or 531 bags per capita (Draft EIR, paragraph 2.3.1.a and 2.3.1.b) . While this number is widely accepted by proponents of the plastic carry out bag bans it is important to determine if this number is reasonable and in the ball park. The quantity of plastic carry out bags used in the EIR will affect a number of assumptions and environmental calculations throughout the document. If the quantity is understated or overstated and outside the ballpark the quantitative results in the EIR will be skewed and the document will be of little value since the numbers would be bogus. Decision makers will then make decisions based on bogus data that potentially could result in further harming the environment. My contention is that this number is unreasonable and overstated and needs to be changed to a more reasonable number.

Is 20 Billion Plastic Carry Out Bags A Reasonable Number?

First, let's do a quick sanity check. The draft EIR assumes that Californians use 20 billion plastic carryout bags per year or 531 plastic carryout bags for every man, women, and child. A family of four would use 4 x 531 or 2,124 bags per year or about 41 plastic carry out bags per week. This number is simply too large. A more appropriate number might be in the range of 15 to 20 bags per week. Especially, if the family does most of their shopping at the big box stores, like Costco and Sam's Club. So, the 20 billion number does NOT pass the quick sanity check.

Where Does The 20 Billion Plastic Carry Out Bag Number Come From?

Many people will be surprised to learn that the 20 billion plastic carry out bag number comes straight from the landfill. The California Integrated Waste Management Board (CIWMB), a now defunct agency, published a report titled "California 2008 Statewide Waste Characterization Study" wherein they identified the composition of material dumped in California's landfills by different material classes. The material class we are interested in is called "Plastic Grocery and Other Merchandise Bags." The weight of material in each class was determined by sampling and extrapolating the results to the weight of all material dumped in the landfill during the reporting period. The report contains tables for overall, residential, commercial, and various miscellaneous categories such as self-haul, etc.

How The Quantity Of Plastic Carry Out Bags Are Determined

Table 1, below, shows the quantity of plastic carry out bags calculated for both California and United States as a whole. The California data was obtained from CIWMD and the United States data was obtained from a report published by the United States Environmental Protection Agency (EPA). The

quantity of bags is calculated by dividing the estimated weight in landfills by the weight per bag. The weight per bag used is the average weight of an HDPE plastic carry out bag. As you can see, for California in the Overall Category a quantity of 20,347,073,372 plastic carry out bags are calculated for a per capita quantity of 535 bags. These number are very close to the quantities assumed in the Draft EIR.

Table 1. Plastic Carry Out Bags Calculated From Landfill Contents

Jurisdiction	Category or Sector	Estimated Weight (tons)	Weight Per Bag	Quantity	Population (2012)	Bags Per Capita
California[1]	Overall	123,405	0.01213 lbs.	20,347,073,372	38,041,430	535
	Residential	77,736	0.01213 lbs.	12,817,147,568	38,041,430	337
	Commercial	45,669	0.01213 lbs.	7,529,925,804		
	Grocery Store	54,298	0.01213 lbs.	8,952,679,307	38,041,430	235
USA[2]	Overall	770,000	0.01213 lbs.	126,958,000,000	313,914,040	404

Similarly, for the United States a quantity of 126,958,000,000 plastic carry out bags are calculated for a per capita quantity of 404 bags.

Are The Quantities Calculated From Estimated Landfill Weights Accurate?

In Table 1, the estimated weight for the California "Overall" category is derived from the "Plastic Grocery and Other Merchandise Bags" material class in the California 2008 Statewide Waste Characterization Study. The "Plastic Grocery and Other Merchandise Bags" material class is defined in the Waste Characterization Study as follows:

> *Plastic Grocery and Other Merchandise Bags means plastic shopping bags used to contain merchandise to transport from the place of purchase, given out by the store with the purchase.* ***This type includes dry cleaning bags intended for one-time use****. Does not include produce bags.*

In other words, the estimated weight of 123,405 tons for the "plastic grocery and other merchandise bags" material class is corrupted by the inclusion of the weight of dry cleaning bags! Since the proportion of dry cleaning bags cannot be determined, there is no way to adjust the estimated weight to remove the effect of the dry cleaning bags. Since dry cleaning bags are not regulated in the proposed ordinance or alternatives, and since dry cleaning bags weigh more than HDPE plastic carry out bags, the result of any calculation will result in an inflated and skewed number of plastic carry out bags.

[1] California Integrated Waste Management Board, August 2009. "California 2008 Statewide Waste Characterization Study". Produced by: Cascadia Consulting Group. Available at: http://www.calrecycle.ca.gov/Publications/Documents/General%5C2009023.pdf

[2] United States Environmental Protection Agency, December 2011. "Municipal Solid Waste Generation, Recycling, and Disposal in the United States Tables and Figures for 2010". Available at: http://www.epa.gov/osw/nonhaz/municipal/pubs/2010_MSW_Tables_and_Figures_508.pdf

Other Factors That Undermine Calculating Bag Quantities From Landfill Weights

First, the estimated weight for the "plastic grocery and other merchandise bags" material class represents less than 0.3% of the total weight of all material deposited in the landfill in 2008. Therefore, the number's accuracy should be questioned even though the CIWMB report claims a 90% confidence factor.

Second, the "plastic grocery and other merchandise bags" material class contains not only grocery store bags but also other plastic merchandise bags from other retailers. These bags are made not only from different plastic resins but also have different weights. For example, Target's LDPE bag weighs 9.3 grams and HDPE bags from a variety of grocery stores and retailers can weigh between 4.0 and 6.5 grams each. The average weight of an HDPE bag is 5.5 grams. The average weight of plastic carry out bags in the landfill is unknown. Therefore calculating the quantity of bags from landfill weights using the average weight of an HDPE bag will provide an inflated and incorrect quantity.

Third, from Table 1, we see that California has 12% of the nation's population and yet uses 16% of the nation's plastic carry out bags. Again this is an indication that this methodology does not provide a reasonable quantity.

Fourth, if you compare the quantities calculated for the residential sector to the commercial sector you will find that for every 5 plastic carry out bags used by the residential sector, the commercial sector uses 3 bags. This does not make sense. Again, this is an indication that the data from the California Integrated Waste Management Board (CIWMB) is not a reliable source of information to use in determining a reasonable quantity for the total number of carryout bags used by Californians.

How To Determine A Reasonable Number Of Plastic Carryout Bags

In 2006, the California legislature passed AB 2449. AB 2449 among other things, required grocery and retail stores subject to AB 2449, to report the total weight of plastic carry out bags purchased and the total weight of plastic carry out bags that were recycled on annual basis. CalRecycle then compiled the data submitted and published it. Table 2 contains the weight of bags purchased and the number of bags was calculated in a manner similar to what was done above. Note the quantities are much more reasonable.

Table 2. Quantity of Bags Purchased

Year	Bags Purchased (tons)	Weight Per Bag	Bags Purchase
2007 (1 Jul to 31 Dec)	24,600	0.01213 lbs.	4,056,059,357
2008	54,000	0.01213 lbs.	8,903,544,930
2009	53,000	0.01213 lbs.	8,738,664,468
2010	39,570	0.01213 lbs.	6,524,319,868
2011	31,258	0.01213 lbs.	5,153,833,471

It should be noted that in Table 2 the quantity of plastic carry out bags purchased in 2008 is very similar the quantity of plastic carry out bags in the Table 1 Grocery Store category. It should be noted that the Table 1 grocery store category was derived from a comment in the California 2008 Statewide Waste Characterization Study denoting the fractional part that denoted grocery store bags.

If we use the 8.9 billion bag figure from Table 1 with 235 bags per capita, a family of four would use 940 bags per year or 18 bags per week. This number is more reasonable and corresponds closely with reality.

Even if the number was bumped up to 10 billion plastic carry out bags per year, in order to ensure that all bags were accounted for by retailers not subject to AB 2449, the per capita quantity would compute to 263 bags. For a family of four this would mean 1052 bags per year or 20 bags per week. This number is more reasonable than the 20 billion bags estimated from landfill quantities.

Plastic Bag Quantity Recommendation

It is recommended that BEACON revise the assumption for the quantity of plastic carry out bags used by Californians. A number such as **9** or **10 billion** would be more in the ball park than 20 billion.

Paper Bags

The study area has a population of 1,239,626 who use 658,241,406 plastic carry out bags per year based upon 531 bags per capita (Draft EIR page 2-7). The Draft EIR assumes that 30% of these bags would be replaced on a one for one basis by paper bags or a total of 197,472,422 paper bags.

By revising the total number of plastic carry out bags for California, as discussed above, to a reasonable and lower number, the number of paper bags estimated in the EIR will also be decreased to around 97,806,492. This would be beneficial to the environment.

Reusable Bags

The study area has a population of 1,239,626 who use 658,241,406 plastic carry out bags per year based upon 531 bags per capita (Draft EIR page 2-7). The proposed ordinance assumes that 65% of the plastic carry out bags in the study area would be replaced by reusable bags. The number of reusable bags is calculated by multiplying the number of plastic carry out bags in the study area by 65% and then dividing by 52 yielding a quantity of 8,228,018 reusable bags in the study area.

Is The Number Of Reusable Bags Correct?

Let's do a quick sanity check on this number. If 100% of the plastic carry out bags are used by 100% of the study area population, then it follows that 65% of the plastic carry out bags would be used by 65% of the study area population or 805,757 people. This means that the 8,228,018 reusable bags would be used by 805,757 people or 10.2 reusable bags per capita. For a family of four this would equate to 41 reusable bags. Again, the number is unreasonable since a family of four would have 8-15 reusable bags. Hence the number cited in the Draft EIR is **unreasonable**.

Assumptions From The Initial Study

In the Initial Study for the Single Use Carryout Bag Ordinance located in Appendix A of the Draft EIR, the number of reusable bags is calculated by dividing 65% of the estimated plastic carry out bags used in the study area by 52 resulting in 8,228,018 bags. The Initial Study then assumes that the 8,228,018 reusable bags are used by the study area population of 1,239,626 people for approximately 6.6 or 7 bags per capita. In addition, the assumption is made each person in the study area would purchase 7 reusable bags per year. So that begs the question "If everyone in the study area is using reusable bags, then who is using the 197, 472,422 paper bags?" Overlooking that conceptual error, the question is the total quantity of reusable carryout bags and the number of bags per capita reasonable? Again for a quick sanity check, a family of four would use 4 x 7 or 28 reusable bags per year. Again, the number is unreasonable since a family of four would have 8-15 reusable bags. Hence the number and assumptions cited in the Initial Study are **unreasonable** as well.

How To Determine A Reasonable Number Of Reusable Bags

The proper way to determine the number of reusable bags is to tie the quantity to the number of household in the study area. For the proposed ordinance it was assumed that 65% of the study area population or 805,757 people would use reusable bags. The average household size in California is 3 people (2.91 persons rounded up). We then calculate the number of households by dividing 805,757 by 3 and then multiplying by the average number of reusable carryout bags per household. The average number per household is between 8 and 15 reusable bags. If you assume that the average number is 12 then you would obtain a quantity of 3,223,028 reusable bags. If we convert that household of 3 people to bags per capita we would obtain 4 bags per capita and then that means are family of four would have 16 reusable bags. This number is more reasonable and the lower number will have a beneficial impact on environmental calculations in the EIR.

Summary

Using the number of 20 billion plastic carry out bags used by Californians is unreasonable. As stated, the origin of the number as calculated from the estimated weight of plastic bags in the landfill is fraught with error of one type or another. Only the weight of plastic carry out bags purchased by California grocery and retail stores under AB 2449 provides a reasonable ball park estimate for the total number of plastic carry out bags purchased and distributed by retailers in California.

Once the EIR reduces the number of plastic carry out bags assumed to be used by Californians the number of paper bags in the study area will also be reduced.

The methodology used to determine the number of reusable bags in the study area must be modified as noted above to produce a more reasonable number.

Using smaller bag quantities will be beneficial to the environmental calculations in the EIR. The smaller quantities will ripple throughout the EIR including the proposed ordinance and the recommended alternatives.