



The Crusade Against Plastic Bags

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by Kenneth P. Green and Elizabeth DeMeo

KEY POINTS

An ever-growing number of municipalities are instituting bans on plastic grocery bags in the name of environmental protection;

Studies are mixed regarding whether or not such bans offer significant environmental benefits, but claims of rampant environmental harms are suspect;

Proponents of bag-bans omit the most important consideration, which is what replaces the plastic bags? Other bags (including cloth) have even worse environmental impact profiles, and pose additional risks of cross-contaminating food and spreading dangerous pathogens among those who share the bags.

Increasingly, studies suggest that as with other poorly-thought out environmental intervention; banning plastic grocery bags reduces some harms, while increasing others.

If you're looking to get involved in a heated environmental debate, you need not look further than the grocery store. The recent vote by the Los Angeles City Council to phase out plastic bags in supermarket checkout lines (paper bags cost 10 cents) has breathed new life into a nationwide discussion over the best way to tout one's groceries. We've examined the question before, and though many may be experiencing bag-argument fatigue, the continued recurrence of anti-plastic policies renders it worth further examination. It's in this vein that we pose the question: when it comes to bagging, are you better off forgoing plastic?

Bans On the Books

In the last five years especially, a wash of anti-plastic rhetoric has swept the US, resulting in a rash of state and local policies that make it clear that plastic bags are on the outs. The bans range in severity from New Hampshire's ambiguous "Resolution Encouraging the Use of Reusable Shopping Bags" in 2008 to Washington DC's 5 cent bag tax (which applies to both paper and plastic) to Bainbridge Island's recent ordinance (which outlaws plastic bags as of November 1, 2012 and mandates that stores providing paper ones must charge a 5 cent fee on each bag). Bainbridge Councilmen Bob Scales seemed to sum up the public sentiment when he expressed his belief that, "There's no question plastic bags are convenient.

There’s also no question they’re bad for the environment. People will adapt, and it’s the right thing to do.” To realize that Scales’ words speak for many across the country, one need only consult the map:



Source: http://www.dep.state.fl.us/waste/retailbags/pages/map_USA.htm

Though the map chronicles state and local bans only, national bans are also gaining traction in Congress. If a national ban on plastic bags seems excessive at the moment, consider the fact that many other countries have already implemented nationwide pushing against plastics (see maps of Australia, Asia, and Europe for example). If we use most of the western world as a standard, the US is actually late in entering the plastic bag ban game.

What’s the Rationale?

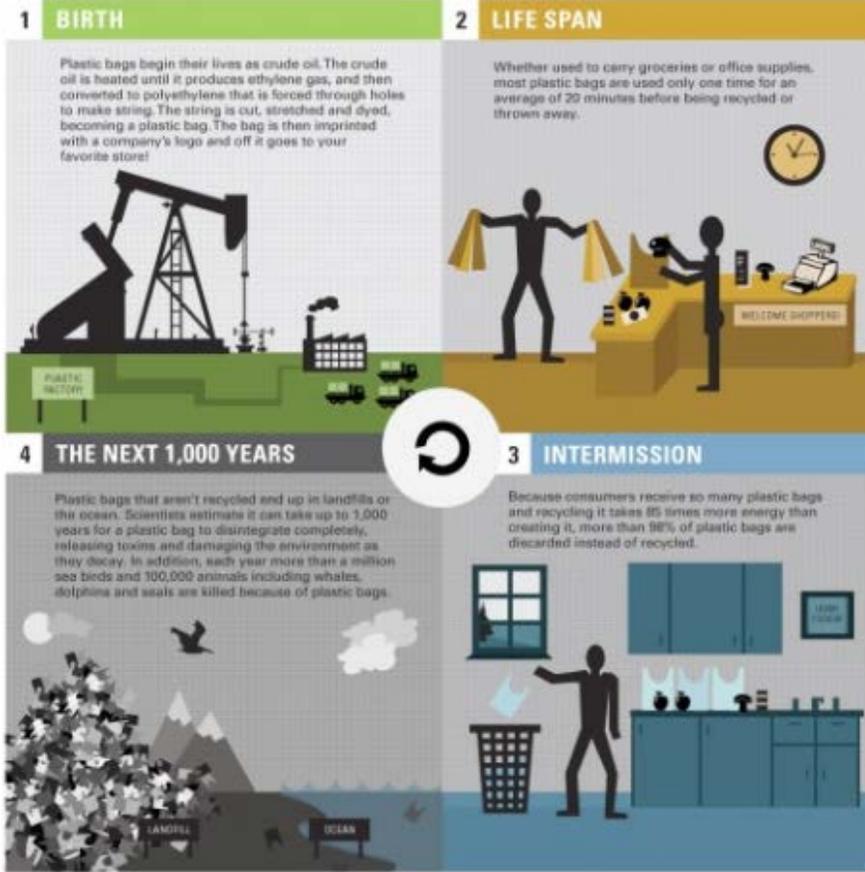
What are the major claims against plastic bags? The three central arguments used against plastic grocery bags are that plastic bags waste oil; plastic bags cause greenhouse gas emissions; and plastic bags are a litter problem, theoretically clogging our lakes, rivers, and oceans. If such arguments hold true, it seems like we should all follow Los Angeles in making sure plastic bags don’t ever see the bright lights of a grocery store checkout line again. But before taking any drastic or disruptive measures, let’s pause and examine the evidence we have at hand.

We’ll begin by evaluating whether or not conventional arguments used to support bag-bans stand up to scrutiny. The infographic below is one example of the anti-bag information circulating on the internet.



AMERICANS THROW AWAY ABOUT 100 BILLION PLASTIC BAGS A YEAR. THAT IS EQUIVALENT TO DUMPING NEARLY 12 MILLION BARRELS OF OIL

5 TRILLION BAGS ARE PRODUCED EACH YEAR. HERE'S A QUICK LOOK AT THE LIFE OF ONE OF THOSE BAGS.



Source: <http://planetsave.com/2012/08/26/life-cycle-of-plastic-bag-infographic/>

Claims 1 and 2: Plastic Bags Waste Oil and Produce Harmful Greenhouse Gases

In recent years, media reports have been flooded with alarming claims about the glut of oil wasted on plastic bag production. According to most plastic bag critics, it takes roughly 12 million barrels of oil to produce the 100 billion plastic bags used in the US each year, as the *New York Times* noted back in 2005. Other estimates are higher. Proclaims one environmental group, “Plastic bags are made from oil: it takes about 430,000 gallons of oil to produce 100 million plastic bags, and the U.S. goes through 380 billion of them a year. A statistics class at Indiana U did the math: more than 1.6 billion gallons of oil are used each year for plastic bags alone. The more we use plastic bags, the more we waste oil.”

Many environmental activists also note that the production and decomposition of plastic bags emits dangerous greenhouse gases and pollutants at every stage of a plastic bag’s life. Typical reports observe that domestic plastic bag production uses heavy amounts of natural gas, petroleum, and coal, while container ships used to transport plastic bags into the US produce high levels of harmful pollutants like sulfur. After they’re used, it seems, the danger only increases, as plastic bags are tossed un-recycled into landfills and left to contaminate our environment further as they decompose. Summarizes Bagsbegone.com “The toxic chemicals emitted during the manufacturing, recycling, and decomposition of plastic bags contaminate our air, water, and soil, and eventually end up in the food we eat.”

While there is undoubtedly some merit to the claims above, it’s critical to note that these arguments against plastic bags don’t at all tell the most important part of the story, as they don’t consider the environmental costs and benefits of plastic bags *relative to proposed alternatives*.

A study released in February, 2011 by the Environmental Agency of England helps to put the aforementioned claims in perspective. Entitled *Evidence: Life Cycle Assessment of Supermarket Carrier Bags*, the study offers a “cradle to grave” review of seven different types of grocery store bags: conventional lightweight bags made of high-density polyethylene (HDPE); an HDPE bag doped with a chemical to speed its degradation; a lightweight bag made from a biodegradable starch-polyester blend; a regular paper bag; a heavy-duty “bag for life” made from low-density polyethylene (LDPE); a heavier duty polypropylene bag; and a cotton bag. The bags examined are illustrated in this table:

Table 1.1 Carrier bag types used in UK supermarkets included in this study.

Bag type	Picture example	Weight* [g]	Volume capacity* [litres]
Conventional HDPE bag		7.5 – 12.6	17.9 – 21.8
HDPE with prodegradant additive		5.9 – 8.2	16 – 19.6
Heavy duty LDPE bag ('bag for life')		27.5 – 42.5	19.1 – 23.9
Non-woven PP bag		107.6 - 124.1	17.7 – 21.8
Paper bag		55.2	20.1
Biopolymer bag		15.8	18.3
Cotton bag		78.7 – 229.1	17 – 33.4

* Some supermarkets have supplied data, others are based on measurements by the authors (see annex B).

Source: http://www.biodeg.org/files/uploaded/Carrier_Bags_Report_EA.pdf

Researchers compared the environmental damage done by the bags above using a number of mechanisms, including global warming potential; abiotic depletion; acidification; eutrophication; human toxicity; fresh water aquatic ecotoxicity; marine aquatic ecotoxicity, and petrochemical oxidation. Their key conclusions included:

- The conventional HDPE bag had the lowest environmental impacts of the lightweight bags in eight out of nine impact categories;
- The biodegradable HDPE bag had larger environmental impacts than the regular kind;
- The starch-poly bag (similar to HDPE bags, but made of a mixture of starch and polyethylene) was worse yet, with the highest environmental impact rankings on seven of the nine categories examined;
- The heavy-duty LDPE bag must be used five times in order to get its global warming potential below that of a conventional HDPE bag;
- The non-woven polypropylene “bag for life” had to be used 14 times to get its global warming potential down to that of HDPE;
- Paper bags performed poorly on the environmental impact tests, and must be used four or more times to match the global warming potential of the HDPE bags; and, finally,
- Cotton bags were found to have greater environmental impacts than the conventional HDPE bag in seven of nine categories, even when used 173 times, which is needed for its global warming potential to drop down to that of HDPE.

As we noted elsewhere, “The performance of alternatives to HDPE looks even worse when you consider that many people recycle HDPE bags as trash bags. The table below shows how many times that non-HDPE bags must be reused in order to bring their global warming potential down to that of an HDPE bag under a range of assumed reuse rates. The first column, for example, shows that you have to reuse a paper bag three times to reduce its global warming potential to that of the HDPE bag, while you have to use an LDPE bag four times, a non-woven polypropylene bag 11 times, and a cotton bag a whopping 131 times to achieve the same end.”

Type of carrier	HDPE bag (No secondary reuse)	HDPE bag (40.3% reused as bin liners)	HDPE bag (100% reused as bin liners)	HDPE bag (Used 3 times)
Paper bag	3	4	7	9
LDPE bag	4	5	9	12
Non-woven PP bag	11	14	26	33
Cotton bag	131	173	327	393

Source: <http://www.american.com/archive/2011/march/a-punching-bag-no-more>

As we further observed, “The Environment Agency study also did not include the energy requirements of washing cloth bags in hot soapy water or bleach to sanitize them.”

Claim 3: Plastic Bags Destroy Marine Life

Another frequently recited argument in favor of banning plastic is that we face a crisis of plastic-encrusted waterways. Environmental groups paint horrific pictures of plastic pollution like the Great Pacific Garbage Patch, which purportedly spans twice the size of Texas. In a recent interview, Chair of the Washington DC chapter of the Surfrider Foundation Julie Lawson cautioned that, “Plastics, especially once they get into the marine environment, are pervasive. They have dramatic effects on marine life.” Surfrider’s John Weber added elsewhere that U.N. estimates hold plastics (note that this include all plastics, not just bags) accountable for the annual demise of 100,000 marine mammals and upwards of 1 million seabirds. For those who respond better to visual imagery, the environmental blogosphere is rife with photos of the damage plastic bags are doing to aquatic and marine life (see [here](#), [here](#), and [here](#)).

Though it’s certainly true that plastic bags can be harmful to all things aquatic, it’s important to again put such claims in perspective. As assistant professor of Oceanography Angelique White reports, the claims about the size of the Great Pacific Garbage Patch are simply wrong. She explains, “The amount of plastic out there isn’t trivial, but using the highest concentrations ever reported by scientists produces a patch that is a small fraction of the state of Texas, not twice the size.” Moreover, “There is no doubt that the amount of plastics in the world’s oceans is troubling, but this kind of exaggeration undermines the credibility of scientists. We have data that allow us to make reasonable estimates; we don’t need the hyperbole.” One way to follow White’s advice is to again remember that estimates like Weber’s include all of the plastics in the ocean, not just plastic bags. As a recent article reminds us, said plastic ocean debris includes fishing lines, PET bottles, polyester clothing, detergent bottles, plumbing pipes, drinking straws and toothbrushes. Furthermore, environmental group Grow NYC estimates that only “7.5% of our waste stream consists of plastic film such as supermarket bags.” When considering such debris in the context of environmental harm, it’s therefore important not to place disproportionate blame on plastic bags alone.

What does the analysis above ultimately demonstrate when it comes to plastic bags? It means that when we’re looking at plastic, we’ve got to look at the whole picture when doing any sort of cost/benefit analysis. Though there is of course merit in examining the harms of plastic, it’s made considerably more valuable when considered in comparison to proposed alternatives. And as we’ve shown above, doing such comparisons proves that plastic bags are not only less dangerous, but actually better in many ways for the environment than paper, cotton, or hybrid alternatives.

Furthermore, proposed alternatives to plastic bags often present new dangers in and of themselves.

Dangers of Alternatives

Eco-friendly cloth bags seem to be the Asgardian hammers of today’s environmentally-conscious crusaders: blog posts, news reports and advocacy groups all espouse their pollution-fighting power and necessity at every turn. But a closer look proves that cloth bags are not only less effective as described above, but harmful in their own right. In June, 2010, Charles Gerba and colleagues at the University of Arizona and

Loma Linda University released a study on contamination of reusable bags. As they explain in *Assessment of the Potential for Cross Contamination of Food Products by Reusable Shopping Bags*:

Large numbers of bacteria were found in almost all bags and coliform bacteria in half. *Escherichia coli* were identified in 12% of the bags and a wide range of enteric bacteria, including several opportunistic pathogens. When meat juices were added to bags and stored in the trunks of cars for two hours, the number of bacteria increased 10-fold indicating the potential for bacterial growth in the bags.

While some critics dismissed the study due to its partial funding by the American Chemistry Council (which supports manufacturers of disposable plastic bags), real world examples corroborate Gerbera's results. In October 2010, for example, a teenaged soccer player in Oregon fell mysteriously ill, kicking off a nasty strain of norovirus that spread to her teammates like wildfire and left scientists puzzled. Epidemiologists ultimately uncovered the bizarre yet treacherous culprit: a contaminated cloth grocery bag from the soccer player's hotel room. An NBC report explains, "The girl had been very ill in the hotel bathroom, spreading an aerosol of norovirus that landed everywhere, including on the reusable grocery bag hanging in the room. When scientists checked the bag, it tested positive for the bug, even two weeks later."

To avoid such dangers, epidemiologist Kimberly K. Repp (whose report on the mystery above appears in the *Journal of Infectious Diseases*) rightly advises that, "we wash our clothes when they're dirty; we should wash our bags too." Unfortunately, however, Gerbera et al found that 'reusable bags are seldom if ever washed and often used for multiple purposes.'

Economic Impacts

Many proponents of the plastic bag ban spend the majority of their time on environmental benefits, and offer little substantive analysis as to the economic impacts of a plastic bag ban or tax. However, no analysis of the ban would be complete without at least a bit of further inquiry into whether or not such policies make economic sense. As it turns out, the economic case for plastic bag bans and /or taxes is less than airtight. A 2011 Impact Report from the Office of Economic Analysis studied the ban on plastic checkout bags in San Diego, and revealed some startling results. Among the report's principal findings:

- After conducting an economic impact analysis, the OEA estimates that the legislation will have a very slight positive impact on the economy, with job creation of less than 25 jobs per year on average, under a wide range of assumptions
- The OEA expects the legislation to substantially reduce the use of checkout bags in San Francisco. Similar charges or fees in other cities and countries have had powerful impacts on consumer behavior. Nevertheless, some consumers will continue to request single-use bags. The OEA estimates that these San Francisco consumers will be spending \$20 million annually in checkout bag charges by 2014, although retail prices will also fall, benefitting consumers. In addition, consumers will be spending more on reusable bags, and on home garbage can liners.

- The legislation will have the environmental benefits of reducing litter, and reducing waste and recycling costs. The benefits from the plastics ban cannot be fully quantified, because the economic value of future environmental benefits cannot be estimated with certainty. Most of the benefits from the bag charge are easier to quantify. It is likely that the costs to consumers of the bag charge will exceed the City's savings in litter and waste disposal costs.
- Retailers will be the prime financial beneficiary of the legislation. They will retain the bag charge as higher profits. In addition, the reduction in plastic and paper bag use will reduce retailers' overhead costs, also directly increasing their profits. However, the OEA's modeling suggests that competition will force down retail prices, and roughly half of this higher profit will be returned to consumers in the form of lower prices. When this reduction in prices is taken into effect, the net cost to consumers is projected to lie in the \$10-12 million range annually by 2014.

Research from other cities only paints a darker picture. A report released in January 2011 by the Suffolk University's Beacon Hill Institute conjectures that Washington, DC's bag tax, "will eliminate a net of 101 local jobs. The job losses will cause annual wages to fall by \$18 per worker and aggregate real disposable income to fall by \$5.64 million. The wage and income losses will combine to lower income tax collections." A recent study from the National Center for Policy Analysis also found that plastic bags cost jobs:

The NCPA surveyed store managers in Los Angeles County where a ban of thin-film bags took effect in July, 2011, to determine the ban's impact on revenues and employment. Over a one year period before and after the ban, stores that fell under the bag ban experienced a 10 percent reduction in employment, while employment in stores outside of the ban slightly increased.

Moving Forward

As the evidence above has shown, the panic surrounding plastic grocery bags is largely unfounded. Despite extensive state and local legislation that would seem to demonstrate the evils of plastic bags, the evidence shows that they're less likely to be contaminated, typically save more energy than paper or cloth alternatives, and are less hazardous to dolphins than is commonly conjectured. For educators, legislators, and grocery store shoppers alike, such information sends a clear signal that we need to exercise more prudence before sounding the death knell on plastics.

Broadly speaking, the plastic bag myths discussed above also illustrates an all-too common public policy misconception: to assume that just because something's bad now, it won't get better in the future. If we continue to study the issue further (as is happening in a forthcoming research from Clemson University) and push for ways to continually improve plastic in our labs (GXT, for example, has just released a potentially viable solution in the form of EcoGrade Photo-Degradable Plastic Bags), and our supermarkets, there's no reason to think that we ought to bag it on plastics.

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