



Regulating the Use of Polystyrene Food Service Items

Background information on laws and bylaws proposing a ban.

The Massachusetts Sierra Club supports laws that ban polystyrene food service items. Polystyrene comes in two forms: rigid and foam. The rigid form is used for clear food containers, plates, bowls, beverage cups and lids, utensils, and straws. The foam form is used for plates, insulated beverage cups and bowls, clamshell food containers, and trays. Some laws also limit service items made of other materials that are not compostable or recyclable; and ban polystyrene items offered for sale (usually in bulk).

Polystyrene is cheaper than some alternatives. However, the environmental expense of polystyrene far exceeds the cost restaurants and grocery stores are currently paying to provide them. There is no need for this because there are many alternatives that are readily available. Polystyrene food service items should be limited because:

- Polystyrene is based on styrene, a neurotoxin and probable **carcinogen**.¹ Polystyrene is the only plastic used in food packaging that is based on a carcinogen. Polystyrene resin usually contains a small percentage of residual styrene.² Styrene leaching increases with temperature and with certain foods (alcohol, oils or fat).³ The manufacturing of polystyrene can potentially cause much greater harm to workers, and to the general population through chemical releases in the environment. Polystyrene manufacturing involves many other highly toxic materials such as benzene and naphtha. Some scientists have called for polystyrene to be classified as a **hazardous material**.⁴
- Polystyrene food items are a **major litter problem**. The foam form is very light so that, even when properly disposed of, they often blow away. Polystyrene foam easily breaks down into small pieces that can escape from the garbage truck, landfill, boat, and average consumer's hands – and are then carried into lakes and waterways, and eventually into the ocean. Polystyrene items make up the fifth through seventh largest type of litter from land-based sources found on U.S. coasts.⁵
- **Polystyrene items harm wildlife**. The foam form in particular is often mistaken as food by both domesticated and wild **animals**.^{6 7} Birds may also use foam for nesting material.⁸ Untold numbers of animals die per year by ingesting polystyrene and other plastic items.
- **Polystyrene does not biodegrade** and although they do fragment through mechanical action and photodegradation in the presence of light, these processes are slow taking an estimated 200+ years to complete. When a polystyrene item kills an animal, the item may go on to kill again. When polystyrene items finally do break down, they do not dissolve into benign substances: they just fracture into smaller and smaller bits called "microplastics." These small particles present the greatest long-term danger, as these particles **displace food supplies in the world's oceans**. Once microplastics enter our oceans, they will stay there virtually forever, because they persist and their removal is not possible.
- Another issue is recycling, because polystyrene is almost never recycled due to its low value.⁹ The bulky foam form is not accepted in curbside recycling programs. The rigid form even when collected curbside is never recycled. But even if the recycling rate were significantly increased, the end result would still have an unacceptably large negative impact.
- Polystyrene is made from **non-renewable fossil fuels (oil and natural gas)**. The cost of natural gas, is relatively lower cost because of hydrofracking, which causes many environmental and health problems.

The Problem of Microplastics

Rather than eventually breaking down, polystyrene fractures into small plastic particles (microplastics), which persist in the environment. Another danger is accidental releases of raw polystyrene resin spheres.¹⁰ All these tiny particles, 5 mm or smaller,¹¹ pose a serious risk to marine and land animals. Animals from shellfish to whales can ingest them. This can displace space in an animal's stomach or block their digestive tracks,¹² and then cause animals to die from starvation.

Readily available substitutes

The best alternatives to polystyrene are biodegradable, compostable bioplastics or paper; or highly recyclable aluminum. Other common plastic resins based on fossil fuels are also allowed under most proposed laws although these are difficult to recycle. Restaurants and cafeterias can always offer traditional reusable items that are washable.

Polystyrene items are being Banned Worldwide

Polystyrene has a history of environmental problems. The foam form formerly used chlorofluorocarbons (CFCs) as a blowing agent. CFCs deplete the planet's protective ozone layer. Most CFCs have been removed worldwide following local and then national bans in the late 1980s.

Modern bans on polystyrene food items that address current problems have been put in place all over the world: in major cities such as Oakland, San Francisco, and New York City; and countries such as China, India, and Taiwan. Some of these places and others here in Massachusetts (Nantucket, Williamstown, Great Barrington and Brookline) have very extensive polystyrene bans.

This list is proof that polystyrene food items bans can be implemented successfully.

Conclusion

Polystyrene food items are contributing to serious environmental and public health issues facing the Commonwealth, the United States, and the world. Tackling these issues will require the culmination of many small actions to bring about large change. Banning polystyrene food items is an important and easily implemented step towards meaningful change.

¹ U.S. Department of Health and Human Services, "Styrene", *Report on Carcinogens*, Twelfth Edition, 2011, p. 383- 391, <http://ntp.niehs.nih.gov/ntp/roc/twelfth/roc12.pdf>

² The legal limit in the U.S. is 1% and 0.5% for fatty foods. Source: Code of Federal Regulations 21CFR177.1640 ³ M. S. Tawfika & A. Huyghebaerta, "Polystyrene cups and containers: Styrene migration", *Food Additives & Contaminants*, Vol. 15, Issue 5, 1998, pages 592-599. <http://www.tandfonline.com/doi/abs/10.1080/02652039809374686>
Some foods often served in foam such as take out food or hot chocolate are both hot and high in fat.

⁴ *Nature*, "Classify plastic waste as hazardous", vol. 494, p. 169-71

⁵ Ocean Conservancy, "International Coastal Cleanup 2013 Report", p. 14
<http://www.oceanconservancy.org/our-work/international-coastal-cleanup/2013-trash-free-seas-report.pdf>

⁶ Olivia Feinstein* & Peter Hodum University of Puget Sound, Tacoma WA "Northern Fulmars (*Fulmarus glacialis*) as bio-indicators of endocrine disrupting plasticizers in the marine surface environment"
http://soundideas.pugetsound.edu/cgi/viewcontent.cgi?article=1168&context=summer_research

⁷ <http://www.backyardchickens.com/t/23861/chickens-are-eating-styrofoam-help>

⁸ http://www.seaside-sun.com/news/local_news/seaside-feathers-ospreys-nest/article_18c80844-eace-11e0-b1a7-001cc4c03286.html

⁹ Only 0.2% of polystyrene food service packaging in California is recycled according to California Integrated Waste Management Board (December 2004), "Use and Disposal of Polystyrene in California: A Report to the California Legislature," Table 4, Page 14.

¹⁰ Slip, D. J. et al. (1990) "Ingestion of anthropogenic articles by seabirds at Macquarie Island." *Marine Ornithology* 18: 74-77

¹¹ Le, Phuong, "New ocean concern: tiny plastic pollutants; Study under way at UW Tacoma; Measuring volume is seen as a first step." *The Seattle Times*, 2010-06-12. http://seattletimes.com/html/localnews/2012102451_microplastics13.html

¹² Thompson, Richard C. et al. *New directions in plastic debris*. *Science* 310 (2005-11-18), p. 1117