# Styrofoam: More Harmful than Helpful

## Banning Styrofoam at Rutgers University

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**Summary**

Going green has become increasingly trendy throughout the nation. From saving plastic bags to replacing plastic water bottles, people have been taking steps to becoming more environmentally aware. The next step is banning polystyrene, better known as Styrofoam, a harmful product still in our society. Banning Styrofoam is easy as replacing canvas bags with plastic ones. Styrofoam is a non-biodegradable substance used for insulation, most commonly found in keeping our beverages hot and storing our leftovers. However, its harmful effects outweigh its cheap and convenient use, drawing significant cause for a ban on polystyrene. In an attempt to make our community greener, we will put forth effort to eliminate use of Styrofoam at Rutgers through communication with the purchasing department and various deans.

What is Polystyrene?

Styrofoam is the trade name for polystyrene foam, a product used for housing insulation. Polystyrene is a petroleum-based plastic made from the styrene monomer. It is light weight, consisting of about 95% air. It has good insulation properties and is used in products such as cups to keep beverages hot, to packing material to keep products safe while shipping.

Why the bad reputation??

Environmental Effects

Due to its commonality, polystyrene has contaminated and effected both the environment and our health. When thrown away as trash, polystyrene cannot biodegrade or breakdown via other means, remaining in the environment for thousands of years. Keep in mind; plastics cover 25-30 percent of space in landfills. Foam polystyrene has been found in water and wind, especially at shores, making up for a considerable amount of marine debris. This also affects animals in the wild, due to broken down bits of polystyrene obstructing their airways, contaminating their resources, and causing cancer and digestive problems.

The polystyrene manufacturing process is the 5th largest creator of hazardous waste. The process of making polystyrene pollutes the air and creates large amounts of liquid and solid waste. Polystyrene is manufactured with HCFC-22, a green house gas that affects the ozone layer, and petroleum, a non-sustainable and highly polluting resource. HCFC-22, a type of CFC, depletes the earth's ozone shield 10 miles or higher in the sky. Polystyrene foam food packaging, which was made with CFCs in the U.S., released 3.9 tons of CFCs in 1985 and nonfood-related polystyrene materials released an additional 3.9 tons. The National Bureau of Standards Center for Fire Research identified 57 chemical byproducts released during the combustion of polystyrene foam. Collected polystyrene cups are not remanufactured into cups, but into other products, such as packing filler and cafeteria trays. This means that more resources will have to be used, and more pollution created, to produce more polystyrene cups.[ix] The use of hydrocarbons in Styrofoam manufacturing releases hydrocarbons into the air at ground level; there, combined with nitrogen oxides in the presence of sunlight, they form ozone, a dangerous air pollutant at ground level.[ix]

Health Concerns

Styrene, a component of polystyrene, poses a threat to human life as well as the environment. Styrene can leech into food from polystyrene food ware. Foam cups lose weight during the time they are at used (meaning styrene is ingested by the consumer), with tea with lemon producing the greatest decrease in weight. In 1991, the Louisiana Agricultural Experiment Station reported that volatile styrene monomers were found in shells of eggs after being stored for two weeks in polystyrene containers at supermarkets. Dishes cooked with these contaminated eggs contained seven times more ethyl benzene and styrene compared to those prepared from fresh farm eggs not packaged in polystyrene. Thus, the use of polystyrene packaging raises suspicion that these dangerous compounds can travel through porous shells and into edible egg portions.

The ubiquity of polystyrene food-ware usage has resulted in traces of styrene being commonly found not only in the food we consume, but in our bodies as well. Styrene has been found in 100

percent of human tissue samples and 100 percent of human nursing milk samples tested. Long-term exposure to small quantities of styrene can cause neurotoxic (fatigue, nervousness, difficulty sleeping), hematological (low platelet and hemoglobin values), cytogenetic (chromosomal and lymphatic abnormalities), and carcinogenic effects. Acute health effects are generally irritation of the skin, eyes, and upper respiratory tract, and gastrointestinal effects. Chronic exposure affects the central nervous system showing symptoms such as depression, headache, fatigue, and weakness, and can cause minor effects on kidney function and blood. Styrene usually exhibits its toxicity to humans as a neurotoxin by attacking the central and peripheral nervous systems. It has even effected menstrual cycles of women exposed to polystyrene.
The manufacturing of polystyrene, resulting in diminished ozone and air quality, impacts human respiratory health as well. According to the EPA, more than 100 million Americans, mostly residing in California, the Texas Gulf Coast, the Chicago-Milwaukee area, and the Northeastern U.S., currently live in areas that do not meet air quality standards for ozone. The EPA say, "Healthy individuals who are exercising while ozone levels are at or only slightly above the standard can experience reduced functioning of the lungs, leading to chest pain, coughing, wheezing, and pulmonary congestion. In animal studies, long-term exposure to high levels of ozone has produced permanent structural damage to animal lungs while both short and long term exposure has been found to decrease the animal's capability to fight infection." In other words, prolonged exposure to atmospheric ozone above legal limits might severely damage the immune system.[x]

How is it Made?
Polystyrene is extracted from oil. Thousands of small units of styrene, called monomers, link together to form large molecules of polystyrene by a process called polymerization.
The Styrofoam we come in contact with is expanded polystyrene. It starts as small spherical beads with a typical diameter of 0.5-1.5mm. They contain an expanding agent; a pure hydrocarbon.

When the beads are heated with steam, the agent starts to boil, the polymer softens and the beads expand to about forty times their initial size. After a period of time, the pre-foamed beads, which now have a closed cellular foam structure, are then placed in a mold and again reheated with steam.
The mold the polystyrene is set to varies according to what the consumer requests. The pre-foamed beads expand further, filling the mold cavity and fuse together. When molded, nearly all of its volume is air, causing it to be lightweight and buoyant.
Where is it found?
Uses and Forms of Styrofoam
Styrofoam is used for many things such as insulation, packing materials, egg cartons, meat trays and even school projects. The most common use is for drinking cups, plates, and take-out containers. The packing Styrofoam usually comes in loose forms called peanuts. Peanuts are used in shipping fragile items and to eliminate any products to move around during shipping. Since we are all consumers, we use these almost every single day, and with the increase in internet shopping there has been an increase in peanut use.

Architects use Styrofoam in concrete forms because it has air pockets and is great as an insulator.

It can also be used for roofs and slabs in a lightweight panel form. These Styrofoam panels help keep the natural elements from entering the interior. Styrofoam is not just a good insulator for temperature. It is also a good sound barrier and used in making home theaters and recording studios.
However, many companies have changed to using more environmental means to replace Styrofoam; it is still largely used for coffee cups and take-out containers. It is cheap and convenient.

How can we deal with Styrofoam?

Recycling Styrofoam

Styrofoam in not biodegradable but there are a few ways you can recycle it.

- Use it for packaging
    - Bring it to craft shops or schools for projects
    - Earth911.org: If you go to the website and type in polystyrene and enter your location. It will give you a list of places you can take your Styrofoam.
    - Use it for insulation if building a wall
    - Contact your local waste management agency and ask them about their recycling polystyrene locations
    - Take your peanuts to a UPS store or other mailing centers (except USPS)

Because there is no mass scale of recycling for Styrofoam, it is often discarded in regular trash. This gets disposed of in landfills creating waste, and does not get broken down! Also, when it is recycled, polystyrene is often recycled to be used in single use products. For example, another foam cup, or more packing material. This requires more resources and energy to recreate these products. Some people choose to burn polystyrene in order to dispose of it. The thought behind this is that chloro-fluoro hydrocarbons were eliminated from expanded polystyrene over a decade ago. Therefore, believing it was safe to do so. However, the burning of polystyrene releases styrene gas which can effect the nervous system. Also, as it usually burns with a sooty flame. This indicates that combustion isn't complete and a complex mixture of toxic chemicals is produced by the relatively low temperature of a backyard burn. This causes even more harmful affects.

Alternatives to Styrofoam

Products such as post-consumer recycled paper, bamboo, and corn plastic are easily renewable resources. All of these products biodegrade when composted.
An alternative could be to use paper or cardboard products which can be recycled and are not as nearly as harmful to the environment and living things.
A company called Ecovative developed a packaging product that is organic. It is made from a combination of fungus, recycled paper and agricultural wastes.
Another alternative is made from sugar cane. Instead of throwing out unused sugarcane stalks, the pulp is used to make a paper like product called Bagasse that is excellent to use to hold food. Bagasse has a high heat tolerance and can be put into the microwave, hold liquid and hold grease.
Cornstarch products are another option. The starch replaces the petroleum that is used to make plastic containers. Also using reusable containers is always an option on the individual level.
A 9 x 6 x 2.5 Bagasse take out container costs about 18 cents compared to a 9 x 6 x 3 Styrofoam take out container costs less than 5 cents. In long run that can become costly. However it may be

worth it in order to lower the amount of waste we produce. Once a lot more companies start using alternatives the price should go down because it will be more in demand.
Paper products can be recycled properly at most people's doorstep where community recycling is in place, providing a convenient alternative.
In 1995, 40% of all US paper was recycled, including 32.6 million tons of paper & paperboard. (EPA)
Every ton of 100% Post-consumer waste recycled paper products you buy saves:

- 12 trees
  - 1,087 pounds of solid waste
  - 1,560 kilowatts of energy (2 months of electric power required by the average US home)
  - 1,196 gallons of water
  - 1,976 lbs. of greenhouse gases (1,600 miles traveled in the average US car)
  - 3 cubic yards of landfill space
  - 9 pounds of HAPs, VOCs, and AOXs combined
  - 390 gallons of oil

About 100 cities across the United States have eliminated Styrofoam usage for take-out containers. Among them are Portland, Berkeley, and San Francisco. Banning Styrofoam has mostly been due to citizen complaints. In San Francisco if a food vendor gets one warning they will have to pay a fine anywhere from $100-$500. Owners have said that the cost is a little different in San Francisco but not enough to put places out of business. We understand that this isn't California and price will definitely be the biggest problem. Maybe restaurants can make deals with companies that only use biodegradable products and work something out with the town as an incentive. Our waste problem is alarming, especially in urban areas. We need to act in some way now. Most cities allowed a grace period for the restaurants to use up their Styrofoam containers before switching over to something biodegradable. If around 100 cities could it, why can't we?

**The Service Project**

<u>How should we take action against Styrofoam usage?</u>
Since Rutgers is a large and renowned university, it is important for Rutgers to maintain a positive and forward-thinking image. The large amount of students, faculty, and staff, who are involved at Rutgers University, invest their time, work, and money into an institution they hope to trust. Therefore, it is vital that Rutgers seriously considers becoming a Styrofoam free campus to protect the health and environment of members within its community. If other universities and cities have accomplished banning Styrofoam, then Rutgers should do so as well without fear of positive changes.
Knowing the harmful effects of Styrofoam, it is important to eliminate its usage at Rutgers. Our goal is to eliminate the use of Styrofoam and spread the awareness about how it destroys the environment and consumer health. In order to properly eliminate use of Styrofoam, our plan included talking to those who are in charge of making executive decisions. We wrote letters informing them of the negative effects of Styrofoam and alternative possibilities to Styrofoam. Another goal we hope to achieve is discontinue the hiring of catering services that use Styrofoam on campus. We hope that Rutgers University will only employ caterers who carry alternative options. We will stress our hope to forbid the use of Styrofoam products by outside organizations

for fundraisers or meetings.
First, we wrote a letter to President McCormick, the dean of each university, and the surrounding dining services and eateries, exclaiming the need to ban Styrofoam due to the various detrimental environmental and health effects associated with the use of the product .We also included information about alternative uses to Styrofoam, the costs of these products versus Styrofoam, how much Styrofoam is used on campus, and the high percentage of landfills that Styrofoam is part of.
After sending our letters, only two people responded, one from purchasing, and one from dining services. Both stressed to us that cost was a major factor in the products purchased for use at Rutgers. The purchasing department indicated that the first steps toward banning Styrofoam would require talking to students about the issue, whether they would increase their tuition for alternatives, and draw out petitions for students, faculty and staff to sign. The purchasing department hinted that with enough response from students, perhaps Styrofoam could be banned from campus. This response confused us. We believe that those who work for Rutgers have a more influential impact then we do. We believe that the cost of the product should not be the factor. The environment is much more important. We believe each person's tuition by $5 would be more than enough to cover the switch to alternatives. Therefore, their argument is not justifiable. We responded with our feelings on the subject.
If we had more time with the project, we would have had face-to-face interviews with the purchasing department, deans, faculty, student organizations, and the president of the university. This kind of raw exchange would have allowed us more freedom to be confrontational, ask more questions, get more information, and receive uncensored response from leaders at Rutgers University. Also, it might be helpful if we get student feedback on banning Styrofoam. Surveys and interviews would help us understand who feels as passionate as we do, and if money really is a factor for them. After all, the students are the ones using the products, we should have a say in what is purchased.

**References**