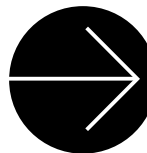


# CUP VS. CUP

**EACH YEAR AMERICANS TOSS MORE THAN 80 BILLION SINGLE-USE CUPS. BUT IS THE MOVEMENT URGING PAPER OVER POLYSTYRENE FOAM ACTUALLY HELPING THE ENVIRONMENT?**

By Elizabeth Gehrman



BROOKLINE'S ban of polystyrene food and beverage containers in late 2013 came just before a council vote in New York City to do the same. More than 75 cities and counties in California already have similar restrictions, and more local governments around the country are considering them.

But are paper cups really any better?

"There are trade-offs," says Tim Greiner, managing director of Pure Strategies, a sustainability consultancy in Gloucester with a focus on product design. "We find this often when we compare different types of products for similar use." In the case of paper vs. polystyrene, he says, "one is better on climate change and water" — that would be foam — "one is better on toxicity, and neither is great on recyclability."

A 2006 study done in the Netherlands compared the materials side by side. It concluded that paper cups were less polluting in five of 10 categories and that polystyrene was better in the other five. And trying to rate the categories is a losing battle. "There's no scientific method for saying one environmental impact is more or less important than the other," Greiner says.

But there is a third option. "Take your own mug with you," he says. "We know that reusing that mug hundreds of times is a better choice."

## RAW MATERIALS

### FOAM

Polystyrene is derived from **petroleum and natural-gas** byproducts; **4,748 gallons of water** are used to make 10,000 foam cups.



### PAPER

**Twenty million trees** (a renewable resource) are cut down annually to manufacture paper cups, most of which are coated with a **fossil fuel-derived plastic** called polyethylene. The paper industry uses chemicals, including chlorine dioxide, which can cause harm if it leaves a factory in waste water. Moreover, **8,095 gallons of water** are used to make 10,000 paper cups with sleeves.



## HEALTH



### FOAM

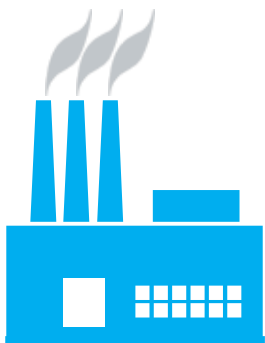
**Toxic chemicals**, including benzene, leach out of polystyrene containers into the food or drink inside them, especially when heated in a microwave.

### PAPER

There are **no known health harms** from paper cups.

## IF CUPS ARE MADE OF POLYSTYRENE, THEN WHAT IS STYROFOAM?

STYROFOAM IS THE TRADEMARKED NAME OF STYRENE FOAM, WHICH WAS INVENTED IN THE EARLY 1940S BY DOW CHEMICAL SCIENTIST RAY MCINTIRE, WHO WAS TRYING TO MAKE A FLEXIBLE ELECTRICAL INSULATOR. STYROFOAM IS NOT ACTUALLY USED IN CUPS BUT IN RIGID FOAM BUILDING INSULATION.



## MANUFACTURING

### (ENERGY)

#### FOAM

The net expended energy that goes into making 10,000 16-ounce polystyrene cups is 5.4 million BTUs, about the same as burning **450 pounds of coal.**

#### PAPER

For 10,000 16-ounce polyethylene-coated paper cups, it's 6.5 million BTUs, equivalent to **542 pounds of coal.**

### (TRANSPORTATION)

#### FOAM

Factoring in moving the raw materials to the manufacturer, it takes **3.2 grams of petroleum** to produce and ship one polystyrene cup.



#### PAPER

Getting a paper cup made takes **4.1 grams of petroleum per cup,** more if it has a plastic coating.

### (POLLUTION)

#### FOAM

The manufacture of 10,000 polystyrene cups causes about **680 pounds of greenhouse gas emissions;** that's equivalent to emissions from 34.5 gallons of gas.

#### PAPER

For paper cups, it's **500 pounds,** or 25.5 gallons of gas, but when you add a sleeve, the emissions exceed those for polystyrene.

## SHOULD WE BAG BAGS?

**I**N NOVEMBER, along with polystyrene foam food containers, the town of Brookline banned disposable plastic bags. They are a petroleum product, and because they're so lightweight, many millions of discarded bags wind up as litter and are blown into drains, rivers, and oceans, where they foul public works, leach chemicals, and harm wildlife. Other nearby communities either have or are considering a ban. And Representative Denise Provost of Somerville has introduced legislation to "reduce plastic bag use through regulations and incentives" statewide. (Here's an incentive: A ban on plastic bags and a 20-cent fee on paper bags imposed by Aspen, Colorado, a town one-hundredth the size of Boston, netted more than \$44,000 for public coffers in its first 17 months.) If the bill were to pass, Massachusetts would be the first state to enact such restrictions, though other cities in the United States and elsewhere and even entire countries have imposed limits and bans.

So, what would people use instead? Grocery stores in Brookline still give out free paper bags, which are in many respects like paper cups — certainly not carbon-free but made from a renewable resource and easily recycled. Sure, many reusable bags contain plastics, and transporting them — sometimes from overseas manufacturers — increases their carbon footprint, but on the



**1 TRILLION**

Number of plastic bags used annually worldwide

**400-1,000**

Number of years scientists estimate plastic bags last in the environment

**12%**

Portion of plastic bags recycled today in the United States

upside, they are often kept for several years rather than used for 20 minutes, as disposable bags often are.

Some environmentalists contend that banning plastic bags is not the solution, but that creating cheap biodegradable alternatives — and getting them into stores — is. The Cambridge-based company Metabolix is one that's working on the problem: Its plastic bags can be composted. "The bags we make now are strong bags, and I believe [our] competitors also make strong bags," says spokeswoman Lynne Brum. "There's quite a bit coming into the public domain."

## DISPOSAL

#### FOAM

It can take **more than a million years** for a polystyrene foam product to decompose in a landfill, according to the EPA, and 50 years in a marine environment (where it can cause serious harm to animals).

Boston, Cambridge, and Brookline do not accept polystyrene for recycling — and that's not unusual. The low weight-to-volume ratio of polystyrene makes large-scale pickup for recycling impractical. At least two local private companies do accept polystyrene, but you have to get it to them: ReFoamIt in Leominster (508-872-2323, refoamit.com) and Charlestown's Save That Stuff (617-241-9998, savethatstuff.com).

FEW FOAM CUPS GET RECYCLED



#### PAPER

A paper cup takes **more than 20 years** to decompose in a sealed landfill and a few days in a lake or the ocean. Paper cups, even polyethylene-coated ones, can be recycled (both Boston and Cambridge accept curbside, but Brookline does not).