

Cigarette butts are toxic plastic pollution. Should they be banned?

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Smokers around the world buy roughly 6.5 trillion cigarettes each year. That's 18 billion every day. While most of a cigarette's innards and paper wrapping disintegrate when smoked, not everything gets burned. Trillions of cigarette filters—also known as butts or ends—are left over, only an estimated third of which make it into the trash. The rest are casually flung into the street or out a window.

"There's something about flicking that cigarette butt," says Cindy Zipf, executive director of Clean Ocean Action. "It's so automatic."

Cigarette filters are made of a plastic called cellulose acetate. When tossed into the environment, they dump not only that plastic, but also the nicotine, heavy metals, and many other chemicals they've absorbed into the surrounding environment.

A recent study found that cigarette butts inhibit plant growth. They also routinely get into waterways, and eventually oceans.

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Zipf said cigarette butts have long been at or near the top of the list of items her organization finds during beach cleanups. The billions more that remain in the water are hazardous to marine animals, which can eat them, she said.

"They look a lot more like a morsel of food on a sea surface," says Zipf.

The pollution problem has only gotten worse in recent years as e-cigarettes have become more popular, she said, because those too are largely made of plastic.

"It's becoming so pervasive," says Zipf, of both e-cigarette use and the accompanying plastic waste. "It's just a different form of the same thing."

From tobacco to plastics

People have been smoking or chewing tobacco for millennia. By the 1800s paper cigarettes had joined cigars, pipes, and snuff as common forms of tobacco consumption. But the invention of the cigarette rolling machine at the end of the century—which drastically increased production—started the cigarette on its path to popularity.

The 20th century saw an explosion of smoking. In 1900 American adults smoked an average of 54 cigarettes per year. By 1960, that number had climbed to more than 4,000. For most of that period, cigarette filters were nonexistent. But, slowly, the health impacts of smoking became clear.

Starting in the late 1930s, scientists began making connections between cigarettes and public health risks. In 1957 the Surgeon General officially declared a causal link between smoking and lung cancer. By 1964 the agency had commissioned and released a comprehensive report highlighting “a 70 percent increase in the mortality rate of smokers over non-smokers.”

As public concern mounted, the tobacco companies scrambled for solutions, one of which was cigarette filters.

“There was this whole attempt to reduce tar and nicotine,” says Tom Novotny, an epidemiologist at San Diego State University who was one of the first people to research the environmental impacts of cigarettes.

By the late 1950s, sales of filtered cigarettes had overtaken those of unfiltered cigarettes.

Tobacco companies, Novotny said, tried a variety of different filter materials, such as cotton, charcoal, and food starch, before landing on a plastic fiber called cellulose acetate, which remains the polymer of choice today.

“There's still widespread misunderstanding about what [filters] are made of,” says Novotny. “A lot of smokers think it's biodegradable already.”





Filters store some of the chemicals that smokers inhale—not really enough to help smokers' health, but enough to kill fish that live near discarded butts leaching toxins.

Filters can take years to degrade and, even as they do, they break down into tiny pieces of plastic, called microplastics, which are an increasing hazard in waterways and oceans. Cigarette butts also carry a heavy load of toxic materials that can be harmful to nearby marine life, a threat that Novotny tested in the lab.

“One cigarette butt in a liter [of water],” he said of his findings, “kills half the fish.”

A new plastic washes up

When Cindy Zipf goes out on her beach cleanups, it's normal for her to find cigarette butts. But about five years ago Zipf started to see a new kind of plastic item: e-cigarettes.

"They're hard plastic all around," she says. "They look like little drives for computers."

Electronic cigarettes generally consist of four components: the cartridge or pod that holds the "e-juice" solution, a heating element, a battery, and a mouthpiece. While the pods are now replaceable, at first the whole contraption was entirely single-use. The plastic and circuitry all went straight into the garbage—or the street.

The use of e-cigarettes has skyrocketed. The leading manufacturer, Juul, for example, saw its sales increase nearly sevenfold between 2014 and 2017. The FDA called the rise in use among youth especially "startling." Today, more than 10 million Americans use e-cigarettes.

As the prevalence of e-cigarettes has grown, so has the need to get rid of the waste. But their mix of electronic components and nicotine puts them in a grey area for disposal, said Yogi Hendlin, a professor at the University of California, San Francisco and one of the leading researchers on the subject.

"E-cigarettes are viewed both as hazardous waste and e-waste," he explains, noting that when he goes to high schools, he often finds "hundreds" of Juul pods in the parking lot. "From the regulatory side we haven't been able to find a way to deal with this."

The effects of e-cigarette waste on the environment are only starting to be studied. Novotny, for instance, has begun looking into the toxicity to marine life, as he did with cigarette butts.

On beaches, Zipf said the plastic pods were piling up so fast that her organization was considering making them a permanent fixture of the collection scorecard that volunteers take with them as they tally items.

Zipf says: "We seem to keep coming up with new and different uses—wasteful uses—for plastic."

planet or plastic?

Three things you can do to be part of the solution:

1. Quit smoking.
2. Roll your own.
3. Don't use e-cigarettes unless they can be recycled.

Ban the butt?

The city of San Francisco spends some \$7.5 million a year cleaning up cigarette butts, and is far from the only municipality dealing with such waste.

"It's the last remaining acceptable form of littering," says Novotny. "People are more likely to pick up their dog poop than cigarette butts."

Novotny proposes a radical solution: Ban cigarette butts altogether.

Filters, he said, haven't been shown to improve health outcomes. They may even be making the problem worse because they make smoking a less harsh experience and give people a sense that they are doing less harm. He also notes the environmental benefits, and has argued for a ban on single-use plastic filters, a step that the California state senate is currently considering.

"It's a major intervention that I think could work," he says.

Hendlin agreed that change was only likely to come through legislative pressure. He pointed to documents showing that the R.J. Reynolds tobacco company was exploring biodegradable filters as far back as the 1970s, yet cellulose acetate remains the standard today. Most companies, he says, have also explored alternative filter materials, but "haven't pulled the trigger because they haven't been forced."

"They are ready, if unwilling," says Hendlin.

Companies argue that filters are key to keeping emissions in line with regulations and that it's consumers who are holding up adoption of filter replacements.

Imperial, one of the largest tobacco brands in the country, tested paper filters in France, but according to a spokesperson, "Sadly, it was commercially unsuccessful." Consumers, he said, didn't like the taste.

As Simon Cleverly, with British American Tobacco, puts it: "There is currently no feasible alternative to cellulose acetate for filters."

A number of companies claim to make more environmentally friendly products, such as Smokey Treats and Greenbutts. The president of Greenbutts, Tadas Lisauskas, says the company is in negotiations with major manufacturers to implement their filters. But both Novotny and Hendlin are skeptical that startups like these address the root of the problem: people's proclivity to litter cigarette butts.

E-cigarettes pose a similarly vexing plastic problem. The pods must be rinsed before being thrown in the normal trash and as of 2018, Juul tweeted, it didn't "currently have a recycling program available."

Hendlin says reengineering e-cigarettes to use less, or no, plastic would be an expensive proposition that companies seem loathe to undertake. He suggests that a deposit system, such as the one for propane canisters, might be a better route.

“When you went to buy your next set of pods,” he says, “you exchange your old cartridges for your new ones and you get your [money] back.”

A spokesperson for Juul Labs says the company is already exploring a similar option and testing it internally. “We are committed to responsible stewardship and environmental sustainability,” he says in an email. “We take environmental impact seriously.”

There have been some steps toward addressing the plastic hazards that cigarettes pose. In 2016 India banned the use of plastic packaging for tobacco products. This year in New Jersey, a law went into effect that limits smoking and vaping in public parks and on beaches. But Zipf says many people will probably continue to flick their butts or drop their pods—and the plastics that accompany them—where they aren’t supposed to.

“I think it’s ignorance of convenience,” she says. “There’s really no excuse for it.”