

- [It's Plastic](#)
- [Decoding Plastics](#)
- [Disposing of Plastic](#)
- [Recycling Plastics](#)
- [How Plastic is Recycled](#)
- [Energy from Plastic](#)
- [Paper or Plastic?](#)
- [Degradable Plastic](#)

IT'S PLASTIC!



Americans seem to have a love-hate affair with plastic. We look down on plastic imitations of natural products and fibers. They are cheap, we say. We all want real leather, for example, rather than imitation plastic.

Yet we are using plastic products more than ever before. We cover our food in plastic wrap, drink coffee from Styrofoam® cups, wear clothes made from man-made fibers like nylon, polyester, and rayon, and even buy our plastic things with plastic credit cards! We use plastic hundreds of times every day.

Plastic is a versatile product. Plastic can be flexible or rigid; transparent or opaque. It can look like leather, wood, or silk. It can be made into toys or heart valves. Altogether there are more than 10,000 different kinds of plastics. The basic raw materials for plastic are petroleum and/or natural gas. These fossil fuels are sometimes combined with other elements, such as oxygen or chlorine, to make different types of plastic.

Plastics are not the waste and energy culprits that some people think they are. Plastics are really very energy efficient. It takes 20-40 percent less energy to manufacture plastic grocery bags than paper ones. And, since plastics are lightweight and take up so little space, it is much more efficient to transport them. It takes seven trucks to deliver the same number of paper bags as can be carried in one truckload of plastic bags.

DECODING PLASTICS



PET Polyethylene Terephthalate

Two-liter beverage bottles, mouthwash bottles, boil-in-bag pouches.



HDPE High Density Polyethylene

Milk jugs, trash bags, detergent bottles.



PVC Polyvinyl Chloride

Cooking oil bottles, packaging around meat.

**LDPE Low Density Polyethylene**

Grocery bags, produce bags, food wrap, bread bags.

**PP Polypropylene**

Yogurt containers, shampoo bottles, straws, margarine tubs, diapers.

**PS Polystyrene**

Hot beverage cups, take-home boxes, egg cartons, meat trays, cd cases.

**OTHER**

All other types of plastics or packaging made from more than one type of plastic.

DISPOSING OF PLASTIC

Is plastic trash choking the Earth **ANOTHER look**

with Styrofoam® cups and fast-food plates? Not really. That's just another misconception. By weight, plastics make up about 11 percent of America's municipal solid waste. In comparison, paper makes up about 35 percent.

Of course, plastics are generally very lightweight. When plastics are buried in a landfill, they occupy about 25 percent of the space. Putting plastics into landfills is not always the best disposal method. There are two other alternatives: recycling and incineration.

These methods recover some of the value from the plastic. Recycling recovers the raw material, which can then be used to make new plastic products. Incineration recovers the chemical energy, which can be used to produce steam and electricity. Landfilling plastics does neither of these things. The value of landfilled plastic is buried forever.

RECYCLING PLASTICS**PLASTICS RECYCLING IN AMERICA**

Today, Americans recycle only 5 percent of all the plastics produced in this country. Why aren't we recycling more? There is no simple answer.

Part of the issue in recycling plastics is the cost. To remain competitive in the global marketplace, manufacturers usually choose the cheapest option for making products. New plastic resin, or virgin resin, often costs less than recycled plastic. Until recently, when the U.S. experienced massive hurricanes, virgin resin was cheaper than recycled plastic. After the hurricanes in 2005, supplies of oil and natural gas--the building blocks of virgin resins--became limited and more expensive. Prices for virgin resin soared, and the demand for recycled plastics increased.

Another important consideration is human behavior. Surveys conducted by Proctor & Gamble and other companies show that while most people expect their plastic to be recycled, they won't go out of their way or pay a few cents more to buy products made of recycled plastic.

There are success stories in plastics recycling, nonetheless. Soft-drink bottles made of polyethylene terephthalate (PET) can be melted down and made into carpet, t-shirts, stuffing for

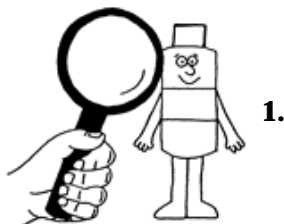
Recycling plastics is easy. First, you should learn what types of plastics can be recycled and only give your collector those types of plastics.

Resist the temptation to slip plastics that recyclers don't want into the recycling bin. Plastics have different formulations and should be sorted before they are recycled to make new products. Mixed plastics can be recycled, but they are not as valuable as sorted plastics because the recycled plastic's physical properties, such as strength, may vary with each batch.

Once you know what kinds of plastics your recycler wants, you should follow the wash and squash rule—rinse the container and squash it. You may leave the paper labels on the container, but throw away the plastic caps. Plastic caps are usually made from a different type of plastic than the container and cannot be easily recycled.

HOW PLASTIC IS RECYCLED

A recycling plant uses seven steps to turn plastic trash into recycled plastic:



Inspection

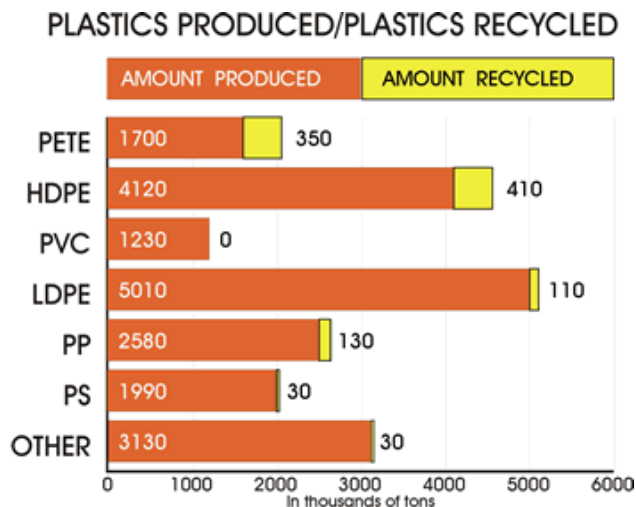
Workers inspect the plastic trash for contaminants like rock and glass, and for plastics that the plant cannot recycle.



2. Chopping and Washing

The plastic is washed and chopped into flakes.

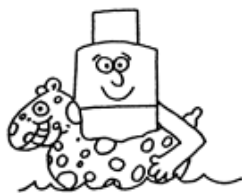
ski jackets, or molded into bottles again. In 1999, Ford Motor Company used more than 60 million 2-liter plastic soda bottles (7.5 million pounds) to make grille reinforcements, window frames, engine covers and trunk carpets for its new vehicles.



In recent years, several plastics recycling companies have closed their doors. They claimed they could not sell their products at a price that would allow them to stay in business. Thanks to the relatively low cost of petroleum today, the price of virgin plastic is so inexpensive that recycled plastic cannot compete. The price of virgin resin is about 40 percent lower than that of recycled resin.

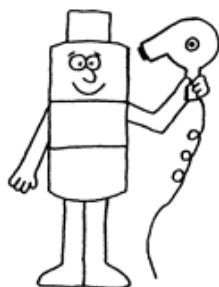
Because recycled plastic is more expensive, people aren't exactly lining up to buy it. Surveys conducted by Procter & Gamble and others show that while most people expect their plastic to be recycled, they won't go out of their way or pay a few cents more to buy a bottle made of recycled plastic. Recyclers say plastics recycling won't be profitable until we close the loop by creating more demand for recycled plastics.

Soft-drink bottles, however, are one success story in plastics recycling. Made of polyethylene terephthalate (PETE), they can be melted down and made into carpet, t-shirts, stuffing for ski jackets, or molded into bottles again. When a soft-drink bottle is recycled into another soft-drink bottle, the loop is closed.



3. Flotation Tank

If mixed plastics are being recycled, they are sorted in a flotation tank, where some types of plastic sink and others float.



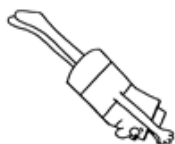
4. Drying

The plastic flakes are dried in a tumble dryer.



5. Melting

The dried flakes are fed into an extruder, where heat and pressure melt the plastic. Different types of plastics melt at different temperatures.



6. Filtering

The molten plastic is forced through a fine screen to remove any contaminants that slipped through the washing process. The molten plastic is then formed into strands.



7. Pelletizing

The strands are cooled in water, then chopped into uniform pellets. Manufacturing companies buy the plastic pellets from recyclers to make new products. Recycled plastics also can be made into flowerpots, lumber, and carpeting.



ENERGY FROM PLASTIC

Because plastics are made from fossil fuels, you can think of them as another form of stored energy. Pound for pound, plastics contain as much energy as petroleum or natural gas, and much more energy than other types of garbage. This makes plastic an ideal fuel for [waste-to-energy](#) plants.

[Waste-to-energy plants](#) burn garbage and use the heat energy released during combustion to make steam or electricity. They turn garbage into useful energy.

So, should we burn plastics or recycle them? It depends. Sometimes it takes more energy to make a product from recycled plastics than it does to make it from all-new materials. If that's the case, it makes more sense to burn the plastics at a waste-to-energy plant than to recycle them. Burning plastics can supply an abundant amount of energy, while reducing the cost of waste disposal and saving landfill space.

PAPER OR PLASTIC?

A paper cup or a plastic cup? Should you choose paper cups over plastic cups since the paper cups are made from natural wood products and will degrade? Not if the plastic cup is polystyrene (another name for Styrofoam®).

A study by Canadian scientist Martin Hocking shows that making a paper cup uses as much petroleum or natural gas as a polystyrene cup. Plus, the paper cup uses wood pulp. The Canadian study said, "The paper cup consumes 12 times as much steam, 36 times as much electricity, and twice as much cooling water as the plastic cup." And because the paper cup uses more raw materials and energy, it also costs 2.5 times more than the plastic cup. But the paper cup will degrade, right? Probably not. Modern landfills are designed to inhibit degradation so that toxic wastes do not seep into the surrounding soil and groundwater. The paper cup will still be a paper cup 20 years from now. Learn more about [how long it takes buried trash to disappear](#).

DEGRADABLE *plastic*

Degrade is another word for rot. It's nature's way of getting rid of dead plants and animals or the things made from them. Of course, plastics are man-made materials, but scientists have figured out two ways to make plastics degrade: biodegradation and photodegradation.

Biodegradable plastics are made with five percent cornstarch or vegetable oil. The idea is that hungry bacteria will devour the starch or oil in the plastic, causing the plastic to disintegrate into a fine dust. That is the idea, but does it really work?

No, say both environmentalists and plastics manufacturers. Nothing degrades quickly in a modern landfill, not even organic wastes like paper and food scraps, so there is no reason to think that the corn starch in biodegradable plastics will disappear overnight either. Modern landfills are designed to inhibit degradation, not promote it. The idea is to keep wastes in, so landfill contaminants do not seep into the surrounding environment. In addition, biodegradable plastics cannot be recycled because the starch or oil additive compromises the quality of recycled plastics.

Photodegradable plastics are a different matter. They use no organic additives. They are made with a special type of plastic that breaks down and becomes brittle in the presence of sunlight. Of course, that means photodegradable plastics do not break down when they are covered by leaves or snow, or when they are buried in a landfill.

The maker of the plastic six-ring carrier that is used to attach six cans of soda, beer, and other beverages, says its photodegradable carrier loses 75 percent of its strength when exposed to sunlight after just a few days, and totally disintegrates within a matter of weeks. This means if an animal were to become entangled in the six-ring carrier, it could rip through the weakened pack to free itself. Since photodegradable plastics contain no organic additives, they can also be recycled, unlike their biodegradable cousins.



Last Revised: September 2006

Source: National Energy Education Development Project, *Museum of Solid Waste*, 2006

[EIA Main Home Page](#) • [Related Links](#) • [Kid's Page Privacy](#) • [Contact Us](#)