

Scenario

In 2018, U.S. households generated over approximately 12.4 million school buses (146 million tons) worth of household solid waste.* The overwhelming majority of this waste ends up in one of over 2,000 designated landfills across the country. Landfill sites require a large amount of land and are typically located outside of more densely populated and built cities. As a consequence, large areas of natural habitat are destroyed and will continue to be destroyed to accommodate the increasing amount of waste that will be generated in the U.S. In fact, some communities have already run out of space and are shipping their waste to other communities, either out of state or out of the country.

Additionally, as the waste degrades in a landfill, it creates toxic byproducts that negatively impact local air, water, and soil quality. Of particular concern are the greenhouse gases and chemical irritants that contribute to climate change and poor health outcomes for communities.

One way to reduce the need for landfills and minimize their environmental impact, is for individuals and communities to decrease the amount of waste they send to the landfill. In this Challenge, you will leverage your STEM knowledge and ingenuity to turn waste destined for the landfill into a socially responsible and sustainable product. By completing this challenge, you'll be doing your part in moving your community, country and planet towards reaching the Zero Waste goal.

Challenge

Entrepreneurs are exploring ways to use waste destined for the landfill to build new products. Your challenge is to create a product for a target customer using existing waste items in a different way from their original purpose.

Your solution should:

1. **Use waste.** Use materials sourced from a list of potential waste items.
2. **Minimize environmental impact.** Describe the amount of waste material used in your product. Your product should have a neutral or net positive environmental impact.
3. **Include models of the product.**
 - a. Create a composite figure with slices from the original objects or parts of objects.
 - b. Create a 3D model using a digital tool or recycled paper.
 - c. Create scaled 2D diagrams using the 3D model from multiple perspectives (top, side, bottom) and describe all relevant specifications of your product.

* <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials>

Design Materials

Waste Items:

Sports cones/traffic cones
Coffee cans
Pill bottles
(Single-use and reusable) water bottles
Tires
Pots
Water jugs
Toilet brush holders
Soccer balls, basketballs, tennis balls
Tennis ball cans
Playdough containers
Basketball nets
Soda Cans
PVC or metal pipes (not including lead)
Buckets (metal or plastic)
Hub caps
Yogurt containers
Bicycle tires
K-cups
Other cylinders, spheres, or cone-shaped waste

Look at the items on this list. What do they have in common? What shapes comprise them? Can you think of other objects in your community that share these characteristics? Consult with your teacher. Go through the recycling and trash and see what you can find! Do not buy new objects for this project.

