**What is food waste?** Food waste is food that ends up in landfills as unused produce, cooking scraps, or any other way. This definition includes food that was served but not eaten or inedible food like fruit rinds and expired food. Food waste is not inherently bad, but it often leads to environmental impacts. This impact comes from harmful fossil-fuel emissions associated with its entire life cycle.

It takes a lot of energy and natural resources to farm, process, store, transport, sell, serve, the food we need. We don't want to use more energy and resources than we need to. We also don't want to create more problems by sending whatever ends up as waste to landfills. Food decomposing underground in landfills creates and releases methane, a powerful greenhouse gas.

**What are greenhouse gases?** Greenhouse gases (GHG) are important chemical molecules (gases) in the atmosphere that help keep our planet warm. These gases include water vapor, carbon dioxide, methane, and others. The gases form a heat-trapping layer in our atmosphere. The sun's energy passes through this layer and warms the planet. Some of that extra heat then passes back through the gases and out into space. By trapping some but not all of the heath, these gases create a helpful greenhouse effect, which keeps the Earth within the liveable zone.

**What is the greenhouse effect?** The greenhouse effect is a process that creates life-sustaining temperatures on Earth. Recent human activities, however, have led to a problem. The amount of greenhouse gases in the atmosphere is now out of balance. The excess greenhouse gases trap more of the sun's reflecting heat than they should. They are like a too-thick blanket, causing an overall rise in global temperature.

Changes to the Earth's "thermostat" impacts other earth systems, including those that regulate climate. Climate disruptions impact weather, growing seasons, wildlife, and more. Nations around the world are tackling this problem: the main need is to reduce the level of greenhouse gases in the atmosphere as soon as possible. Human-caused greenhouse gases include carbon dioxide, methane, and nitrous oxide. Most of the emissions come from burning fossil fuels to power our world, but about 10% of emissions come from methane. It is important to change what we do in our daily lives so we can cut these emissions.

**What is methane?** Methane is a colorless and odorless gas that can be created when organic material decomposes. The natural gas many of us use for cooking is mostly methane derived from the ancient decay of plants and animals buried deep and long ago in the Earth. Naturally-occuring process today can also create methane, however, such as what occurs when food rots in landfills.

**What are some major sources of methane gas emissions?** Human activities are responsible for 50-65% of methane emissions today. The greatest sources of methane emissions today are from:

- agriculture: from the digestive processes of ruminant animals like cows and from stored manure
- natural gas and petroleum systems: from production to distribution and/or storage of these materials, and
- solid waste decomposing in landfills and wastewater treatments.

**How impactful is methane as a greenhouse gas relative to other greenhouse gases like carbon dioxide?** According to the US EPA, methane is 25 more times powerful than carbon dioxide ($CO_2$) in trapping heat in the atmosphere. In contrast to $CO_2$, methane stays in the atmosphere for just twelve years, whereas $CO_2$ can remain in the atmosphere for thousands of years.

High levels of $CO_2$ in our atmosphere is a problem with very long-term consequences and urgent efforts are underway to reduce this level. At the same time we also need to cut methane emissions since the impact for doing so is immediate and significant. Less methane in the atmosphere will be good for our planet, and for us. Interested in finding out more? If you are a kid, or a kid at heart, check out these easy to understand articles (with graphics) from NASA: https://climatekids.nasa.gov/search/greenhouse/

**Why are landfills a source of methane?** Landfills release methane when food waste rots underground. It is a two-step process. The first step produces only a small amount of methane as bacteria break down the food through aerobic (oxygen-rich) processes. Landfills, however, bury tons of waste deep in the ground. In less than a year, food waste starts to decompose under anaerobic (oxygen-free) conditions because the oxygen has been used up by the aerobic microbes. At this point, methane-producing bacteria begin to decompose the waste, thus creating the methane that is the problem.

**How much methane in tons do US landfills release into the atmosphere each year?** In 2010, U.S. methane emissions from landfills were recorded at 129.7 million metric tons of $CO_2$ equivalents. In 2018, U.S. landfills emitted 110.56 million metric tons of $CO_2$ equivalents (greenhouse gases, not methane specific).

**Why does rotting organic matter emit methane when it goes to landfills but not in my backyard composter? (Or does it?)** Landfills establish anaerobic (oxygen-less) conditions fairly quickly, in which only anaerobic microbes can survive. These microbes keep breaking down the food waste, but in the process they generate methane gas. Backyard composting occurs in aerobic (oxygen-rich) environments. Aerobic bacteria that break down your food wastes in these conditions do not produce methane. To put it simply, sending your food waste to the landfill causes many problems. Diverting or composting it at home brings many benefits.

**What are community solutions for reducing methane emissions from landfills?** Many communities are reducing food waste input to landfills by setting up local composting programs. At the personal level, there's a lot you can do to reduce how much waste your household sends to the landfill. First, only buy food that you know you will consume. Second, compost the scraps at home (which you are doing now, great job!). See next question for more tips for reducing your personal food waste.

## How can I reduce food waste at home?

- Check the food that you have in your refrigerator before buying groceries.
- Buy only the food that you expect to use to make meals for the week.
- Plan out your meals for the week and keep a list of the ingredients needed.
- Buy food in bulk thoughtfully, when it makes sense to do so. Bulk purchases are a great way to reduce packaging (and cost) but they increase food waste if you can't use the food before it expires.
- Freeze food that you can't eat before it spoils, like bread and fruit.
- Some fruits like bananas, apples, and tomatoes produce natural gases, making nearby fruit spoil faster. Keep these fruits separated from other fruit.
- Plan to eat leftovers from your meals throughout the week.

For more ways reduce food waste check out this excellent resource: https://www.epa.gov/recycle/reducing-wasted-food-home

## Boxerwood intern, Belen Delgado Mio, consulted the following resources in the creation of this FAQ:


"AGA Homepage." AGA American Gas Association, American Gas Association. www.aga.org/natural-gas/energy-education/.

Brooksbank, Kim. "Composting to Avoid Methane Production." Agriculture and Food, Department of Primary Industries and Development, 23 July 2018.

"Eight Ways You Can Reduce Waste in Your Life and Home." The Nature Conservancy, The Nature Conservancy, 13 Sept. 2018. www.nature.org/en-us/about-us/where-we-work/united-states/delaware/stories-in-delaware/delaware-eight-ways-to-reduce-waste/.

"Greenhouse Gas Inventory Data Explorer." EPA United States Environmental Protection Agency, Environmental Protection Agency, cfpub.epa.gov/ghgdata/inventoryexplorer.

"Importance of Methane." EPA United States Environmental Protection Agency, Environmental Protection Agency, www.epa.gov/gmi/importance-methane.

"Landfill Gas Primer - An Overview for Environmental Health Professionals." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, Nov. 2001. www.atsdr.cdc.gov/hac/landfill/html/ch2.html.

"Landfill Methane: Reducing Emissions, Advancing Recovery and Use Opportunities." Global Methane Initiative, Global Methane Initiative. www.globalmethane.org/documents/landfill_fs_eng.pdf.

"Overview of Greenhouse Gases." EPA United States Environmental Protection Agency, Environmental Protection Agency., www.epa.gov/ghgemissions/overview-greenhouse-gases.

"Reducing Waste: What You Can Do." EPA United States Environmental Protection Agency, Environmental Protection Agency., www.epa.gov/recycle/reducing-waste-what-you-can-do.

"Reducing Wasted Food At Home." EPA United States Environmental Protection Agency, Environmental Protection Agency, 13 Nov. 2019. www.epa.gov/recycle/reducing-wasted-food-home

"Sustainable Management of Food Basics." EPA United States Environmental Protection Agency, 19 June 2020. www.epa.gov/sustainable-management-food/sustainable-management-food-basics