

Anaerobic Digestion and Other Solutions for Wasted Food

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What is Wasted Food?

Wasted Food:

An overarching term to describe food that was not used for its intended purpose and is managed in a variety of ways, including:

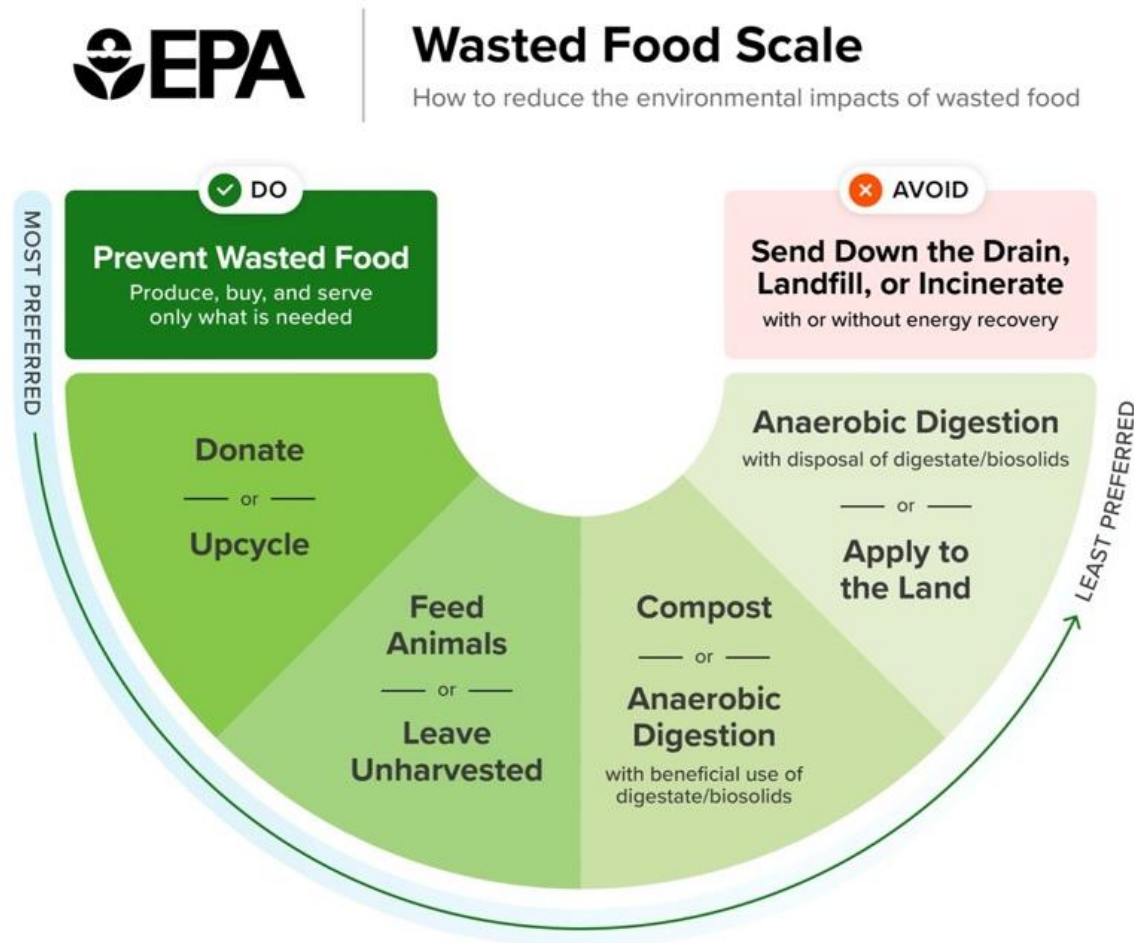
- Donation
- Animal Feed
- Composting
- Anaerobic Digestion
- Landfill or Combustion Facilities



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The Wasted Food Scale



This project
focused
primarily on
“Anaerobic
Digestion”

The most preferred pathways offer the most benefits to the environment, to communities, and to a circular economy

Benefits of Preventing Food Waste



Less (or No) Food in the Trash equals:

Less trash to pay/manage

Trash that is lighter and cleaner

Reduced greenhouse gas emissions from landfills



Consumers Save Money!

Fewer purchase and waste management costs



Fewer Wasted Resources:

Lands, water, energy, labor, manufacturing, packaging, transportation

Less wasted resources = less greenhouse gas emissions



Date Labels \neq Safety!

- Misunderstanding leads to a lot of waste
- The **only federal date label requirement** is for baby formula
- State date label requirements vary by state
 - Connecticut State Law only requires date labels on dairy products
 - New Hampshire State Law only regulates date labels on prepackaged sandwiches
- Dates are determined by their manufacturer – their guarantee of top quality
 - Most foods are safe to eat & top quality well after the labeled date
 - Yogurt & cheese – 7+ days
 - Eggs – 3+ weeks
 - Canned/boxed – 3+ months
 - Lots of other types of foods
- Use the “look & smell” test



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Food Donations



Food Donors

Individuals

Farmers & Gleaners

Grocers

Restaurants

Wholesalers

Manufacturers

Protection From Liabilities



Bill Emerson Good Samaritan Food Donation Act (1996) & amended by Food Donation Improvement Act (2022)



The donor must donate “apparently wholesome food” or an “apparently fit grocery product”



Donations must be made and distributed in “good faith.”

FOOD SAFETY GUIDELINES

Accepted Food Items - Check with local food bank or food rescue operation to find out which foods they accept.

Check with the local or state Dept of Health to find details about safety requirements when donating food.

Refer to Harvard Food Law & Policy Clinic's Fifty-State Survey about food donation requirements.



Using Wasted Food For Animal Feed

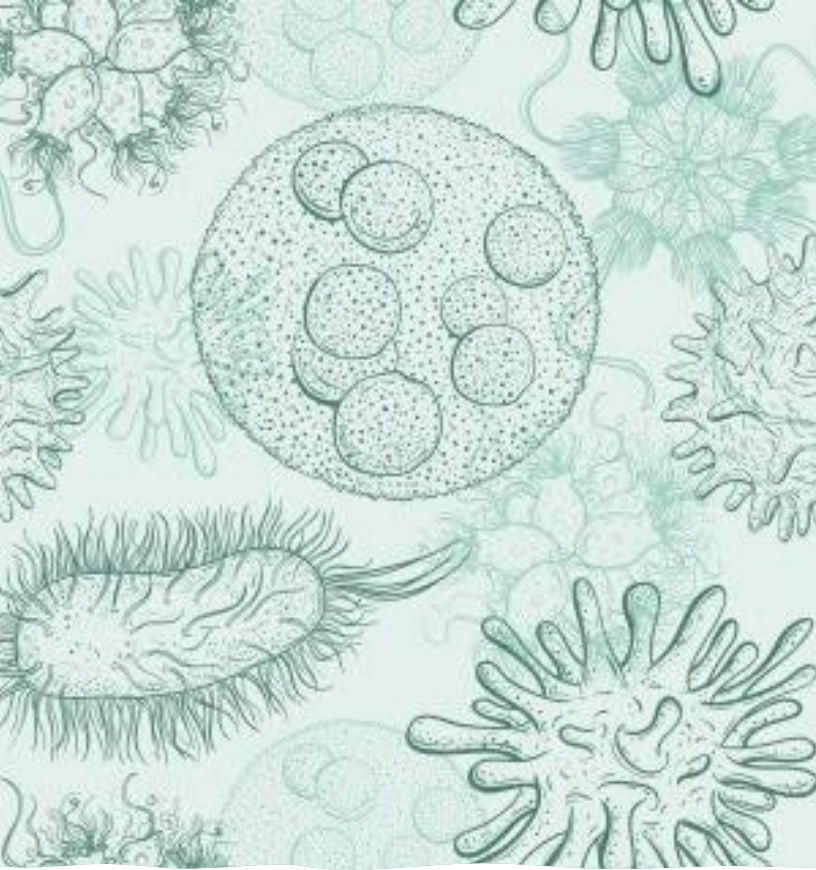
Composting Benefits

- Removes food from trash so there is lighter, cleaner, and less trash
- Composting preserves nutrients & returns it to the soil which reduces the need for chemical fertilizers
- Methane-producing microbes are not active during aerobic decomposition
- Removes food waste from landfills which reduces:
 - Methane gas generation
 - Moisture (reduces the quantity of leachate)
 - Attraction of unwanted wildlife
 - Quantity of gases requiring management



Anaerobic Digestion: The Basics





Anaerobic Digestion (AD)

Topics:

- Why AD?
- Basics of how AD works
- Types of facilities
- Opportunities for wasted food





Why AD?

When there are other more preferred ways to deal with wasted food



Although reduction is best, there will always be waste



Commercial-scale facilities can fit in smaller footprints for urban locations



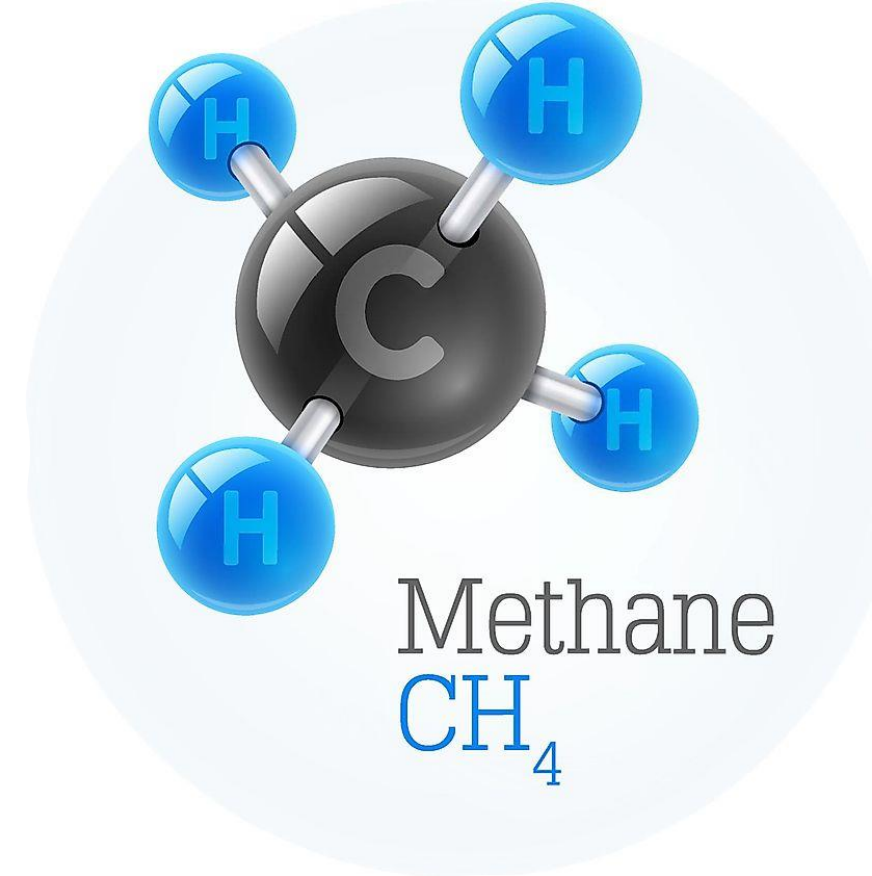
Uses same model as our current waste management system (trucking to a large facility)



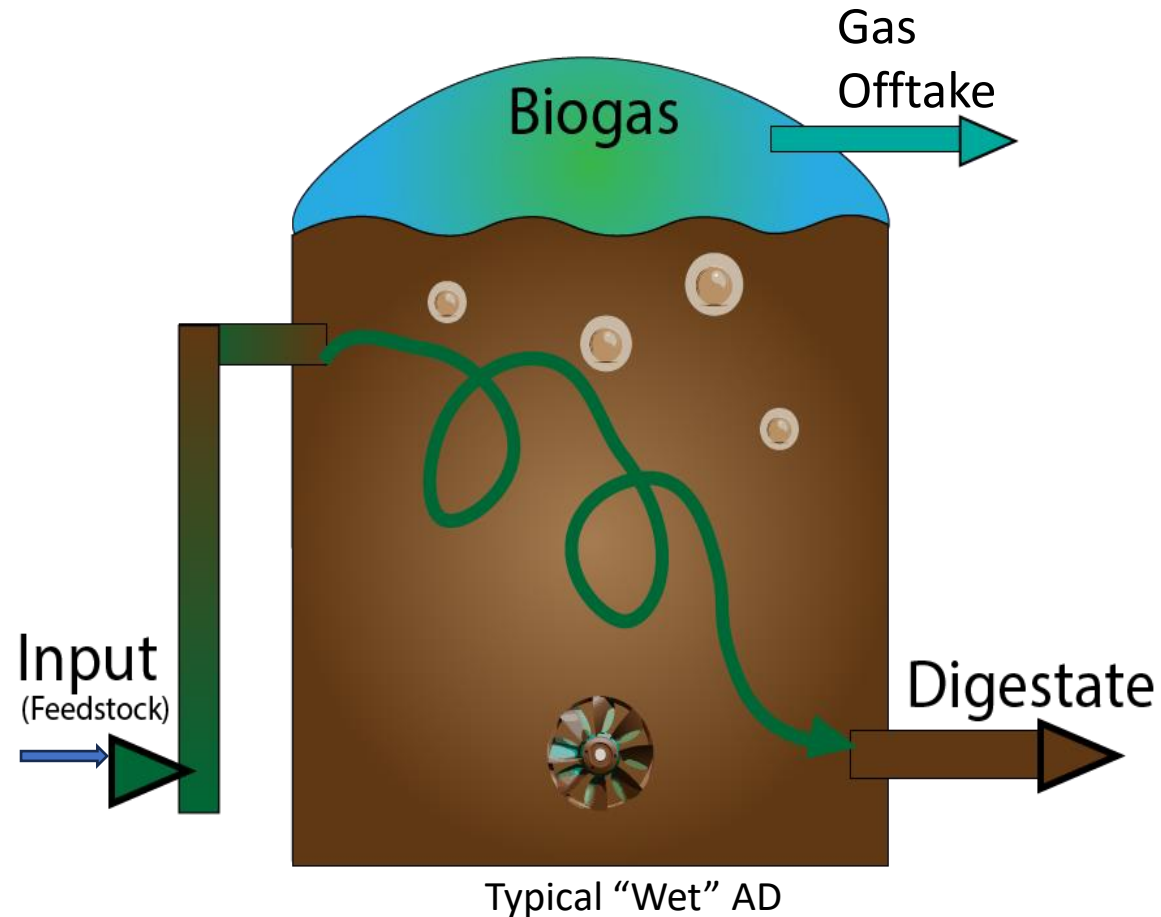
Can have good odor control, and produces energy by producing methane

Climate impacts

- When organic material breaks down, it is eaten by microbes, releasing **gases**
- Aerobic vs anaerobic
- Methane is a **potent greenhouse gas** (GWP 27-30)
- Landfill is an oxygen-starved environment
- Landfills can capture methane and burn it, but by the time they do, **over 60%** of the methane from food waste has already been released



Anaerobic Digestion



Set Up

Put organic matter in an air-tight vessel.

Digestion

Oxygen will get used up.

Microbes will grow and eat the organics.

Microbes will release gases.

Byproducts

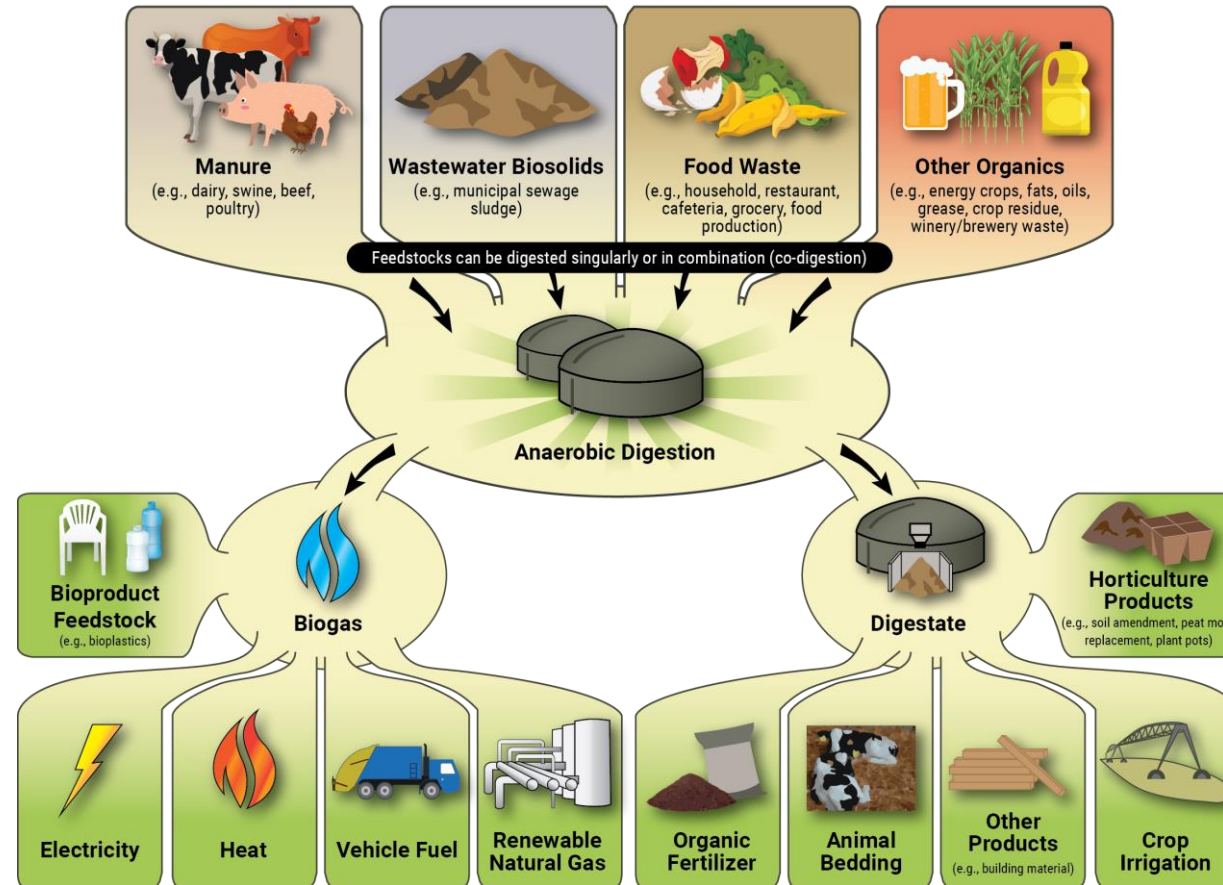
Gases accumulate at the top. It is called "biogas" and is mostly methane.

The remaining solids are called "digestate"

Useful Byproducts

Biogas

- Used as fuel.
- Can be burned in an onsite generator or heater.
- Can be cleaned and piped into a natural gas pipeline.



Source: EPA

Digestate

- Nutrients and organic matter.
- Can be spread as is onto fields.
- Can be dried and used for animal bedding, soil amendment.



Where AD is used in the U.S.

WRRFs

Water Resource Recovery Facility (wastewater plant)
Digesting the biosolids that result from their process

On-Farm

Digesting manure

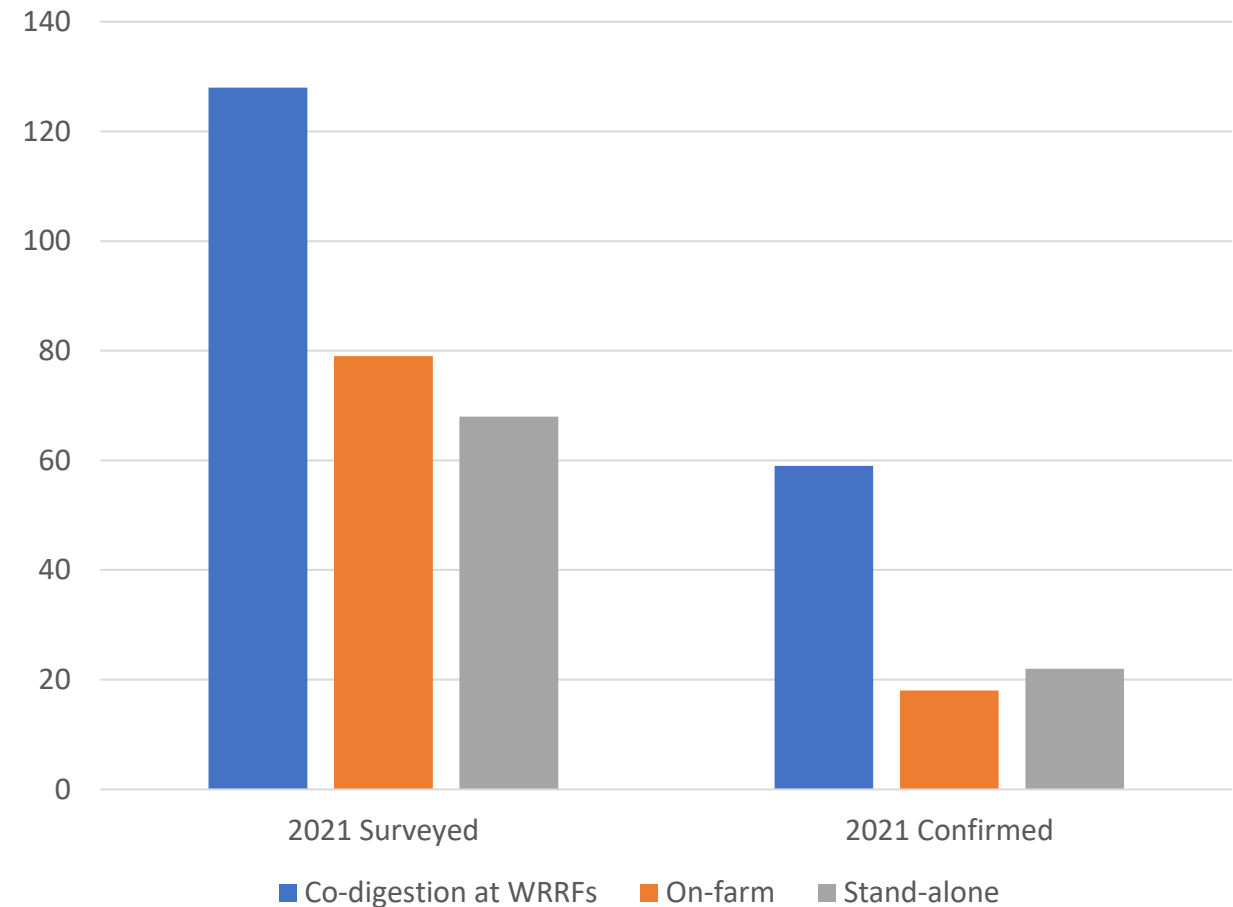
Stand-Alone

Built as a separate facility, usually for a particular nearby feedstock

Where AD is used in the U.S.

Total number of facilities accepting **food waste** is probably around 200

Operational AD Facilities Processing Food Waste



So Many Types:



Single-input or
Co-digestion

Some facilities are built for one specific waste stream, some combine waste streams



The anaerobic digester facility produces electricity.

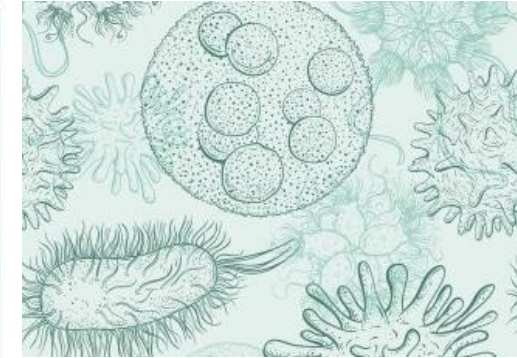
Continuous Flow or
Batch

Some are like a slowly moving pipeline, and some are filled like ovens baking one batch at a time



Wet or Dry

Some use liquid feedstock (<20% solids) and some use “solid” feedstocks (>20% solids)



Warm or Hot

Some cater to mesothermic microbes (80-100F) and some to thermophilic microbes (>120F)

Opportunities for wasted food

- Add as a co-digestion feedstock at existing facilities
- Build new stand-alone facilities
 - at sites of current large generators
 - to serve municipally-collected food waste
- For food and grocery industry waste
 - Depackaging
- & More



Thank You!

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Resource List:

EPA Waste Food Sources

- [EPA's Wasted Food Scale](#)
- [From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways.](#)
- [Sustainable Management of Food Resources](#)
- [Benefits of Preventing Wasted Food at Home](#)
- [Ways to Prevent Wasted Food at Home](#)
 - [Planning and Shopping Tips](#)
 - [Storage Tips](#)
 - [Cooking and Preparation Tips](#)
- [Toolkits for Your Community and Your Home](#)
- [If You Can't Reduce Wasted Food, Divert It From Landfills](#)
- [Resources](#)
- [Sources of Statistics](#)

Date Labeling Sources

- [USDA Food Product Dating](#)
- [Center for Health Law and Policy and Policy Innovation: State Specific Food Waste Factsheets](#)

EPA's Food Donation Sources

- [Food Donation Basics](#)
- [Anyone Can Be a Food Donor](#)
- [Legal Basics](#)
- [Safety Basics](#)
- [Tax Benefits](#)
- [Donating Food](#)
- [Where to Donate](#)
- [Ideas for Increasing Food Donations in Your Community](#)
- [Find Food Recipient Organizations](#)

Other Food Donation Sources

- [Federal Liability Protection for Food Donation: Legal Fact Sheet](#), Harvard Law School
- [Food Safety & Regulations Guidance: A Fifty-State Survey of State Practices](#), Harvard Food Law & Policy Clinic
- [Frequently Asked Questions about the Bill Emerson Good Samaritan Food Donation Act](#), USDA
- [Keeping Food Out of the Landfill: Policy Ideas for States and Localities](#), Harvard Food Law & Policy Clinic

Animal Feed Sources

- [Feeding Animals— The Business Solution to Food Scraps](#), USEPA
- [No Food Left Behind: Benefits & Trade-offs of Food Waste-to-Feed](#), World Wildlife Fund
- [Agricultural Extension Cooperative](#)
- [LEFTOVERS FOR LIVESTOCK: A Legal Guide for Using Food Scraps as Animal Feed](#); [Harvard Food Law & Policy Clinic](#); Food Recovery Project; and University of Arkansas, School of Law

EPA Composting Resources

- [Composting](#)
- [Composting Food Waste: Keeping a Good Thing Going](#)

EPA AD Sources

- [Anaerobic Digestion \(AD\)](#)
- [How Does AD Work?](#)
- [AD facilities that accept food waste](#)

State Resources

- Connecticut: [Organics Recycling](#)
- Massachusetts: [Anaerobic Digestion & Organics Diversion](#)
- New York: [Anaerobic Digestion](#)
- New Jersey: [Bioenergy](#)
- Rhode Island/CET: [Anaerobic Digestion Overview](#)
- Vermont: [Anaerobic Digesters](#)

Other Sources

- NEBRA: [Anaerobic Digestion](#)
- Renegon: [Anaerobic Digestion Explained](#)
- NRDC: [Evaluating Anaerobic Digestion for Municipal Organics Recycling](#)