



Food and Beverage WASTE SOLUTIONS

At LEL Environmental, we are dedicated to offering a sustainable solution for managing food and beverage waste. Our cutting-edge methods enable manufacturers, distributors, and retailers to efficiently collect, depackage, and repurpose waste materials, reducing their environmental footprint and promoting a more eco-conscious future.



Partner with us today for a sustainable solution to manage food and beverage waste products.





Proper disposal of spoiled or expired food and beverages is crucial not only for maintaining environmental health, but also for upholding brand reputation and regulatory compliance for manufacturers. Incorrect disposal can lead to these items ending up in landfills, which continues to harm our environment and leave a devastating carbon footprint. In order to help create a greener planet, manufacturers often use specialized waste management services to ensure responsible disposal processes, safeguarding both the habitats around us as well as the company's reputation in their market

Our waste to energy services, including anaerobic digestion and composting, are revolutionizing the way we manage organic waste. By diverting waste from landfills, we are not only reducing greenhouse gas emissions, but also creating clean energy and nutrient-rich soil amendments. Our zero-landfill initiative is a testament to our commitment to sustainability, as we strive to protect both the environment and our clients' reputations through responsible waste management and depackaging services.

Here's how it works:

Anaerobic Digestion: LEL Environmental is proud to utilize the remarkable process of Anaerobic Digestion to convert food and beverage waste into renewable energy. This process involves breaking down organic material in the absence of oxygen, producing biogas which can be used as a sustainable energy source.

How it Works

- Step 1:** **Feedstock Preparation:** Organic materials, such as food waste, animal manure, and wastewater sludge, are collected and processed.
- Step 2:** **Digestion:** The prepared organic matter is introduced into a sealed, airtight tank called a digester.
- Step 3:** **Microbial Breakdown:** In the absence of oxygen, various bacteria and archaea break down the organic material in a four-stage process:
 - 1. Hydrolysis:** Large organic molecules are broken into smaller, usable ones like sugars.
 - 2. Acidogenesis:** Sugars and amino acids are converted into organic acids.

3. Acetogenesis: Organic acids are further broken down into acetic acid and other products.

4. Methanogenesis: Methane-producing microorganisms convert these products into methane (CH₄) and carbon dioxide (CO₂).

Step 4:

Product Collection: The resulting gas, known as biogas, is collected, while the remaining material, digestate, is separated from the liquid.

Outputs and Uses

Biogas: This renewable energy source can be used to generate electricity and heat, or it can be purified into biomethane to be used as vehicle fuel or injected into the natural gas grid.

Digestate: This nutrient-rich substance is an excellent organic fertilizer and soil conditioner, providing valuable nutrients like nitrogen and phosphate. It can also be used in applications like animal bedding or for making building materials.

Types of Anaerobic Digesters

Different digester designs exist to suit various feedstocks and operations:

Plug Flow Digesters: Common at dairy farms, these systems are suitable for scraping manure.

Complete Mix Digesters: These enclosed tanks are used with a broader range of solids concentrations and often involve mechanical, hydraulic, or gas mixing systems.

Anaerobic Sequencing Batch Reactors (ASBRs): These digesters operate in cycles of fill, react, settle, and decant, allowing for almost constant gas production.

Key components of an AD system

While designs vary, most AD systems share several core components:

Feedstock preparation: A receiving and processing area where organic waste is depackaged, ground up, and mixed into a slurry before entering the digester.

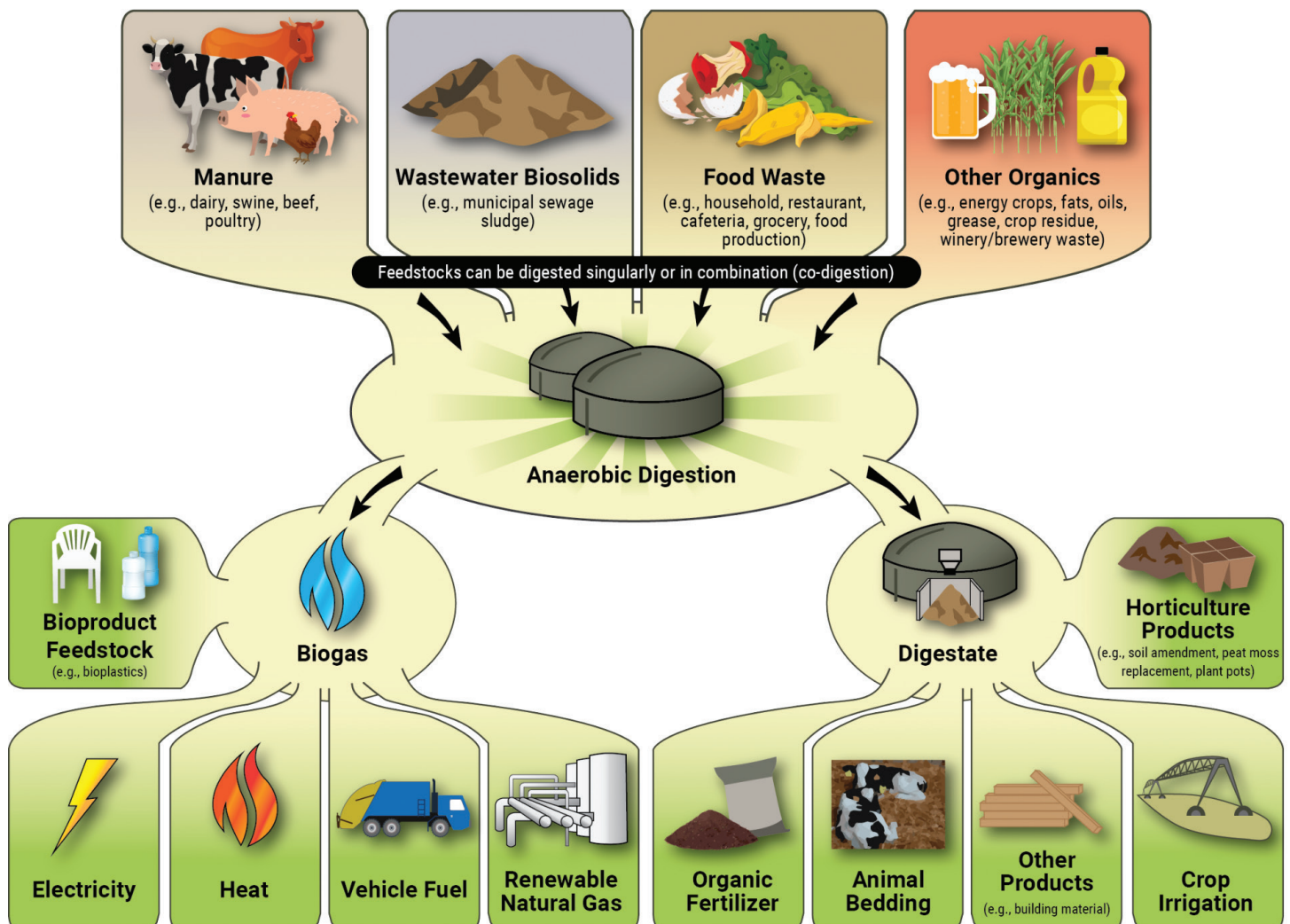
Digester tank: An airtight vessel—often a concrete, steel, or fiberglass tank—that holds the organic materials while anaerobic digestion takes place. There are different designs, such as covered lagoons, plug-flow tanks, and complete-mix tanks.

Biogas handling system: Piping and equipment for collecting the biogas from the digester. It may include gas scrubbing equipment to remove corrosive hydrogen sulfide and other contaminants before the gas is used.

Energy conversion equipment: Devices like combined heat and power (CHP) systems that use the biogas to generate electricity and heat. The biogas can also be upgraded into renewable natural gas (RNG) for injection into the natural gas grid.

Digestate management: Equipment for separating the solid and liquid portions of the digestate. Solids can be used as animal bedding or compost, while the nutrient-rich liquid can be used as fertilizer.

Anaerobic Digestion in Action



Source: EPA.gov



Benefits

Waste management: Diverts organic waste from landfills, reducing landfill volume and freeing up space.

Renewable energy: Produces biogas that can be used for electricity, heat, or vehicle fuel, helping reduce reliance on fossil fuels.

Greenhouse gas reduction: Captures methane, a potent greenhouse gas that would otherwise be released into the atmosphere from landfills and manure lagoons.

Soil health: Produces digestate, a nutrient-rich fertilizer that can improve soil health and reduce the need for synthetic fertilizers.

Odor reduction: Reduces the odors associated with decomposing manure and other organic waste.

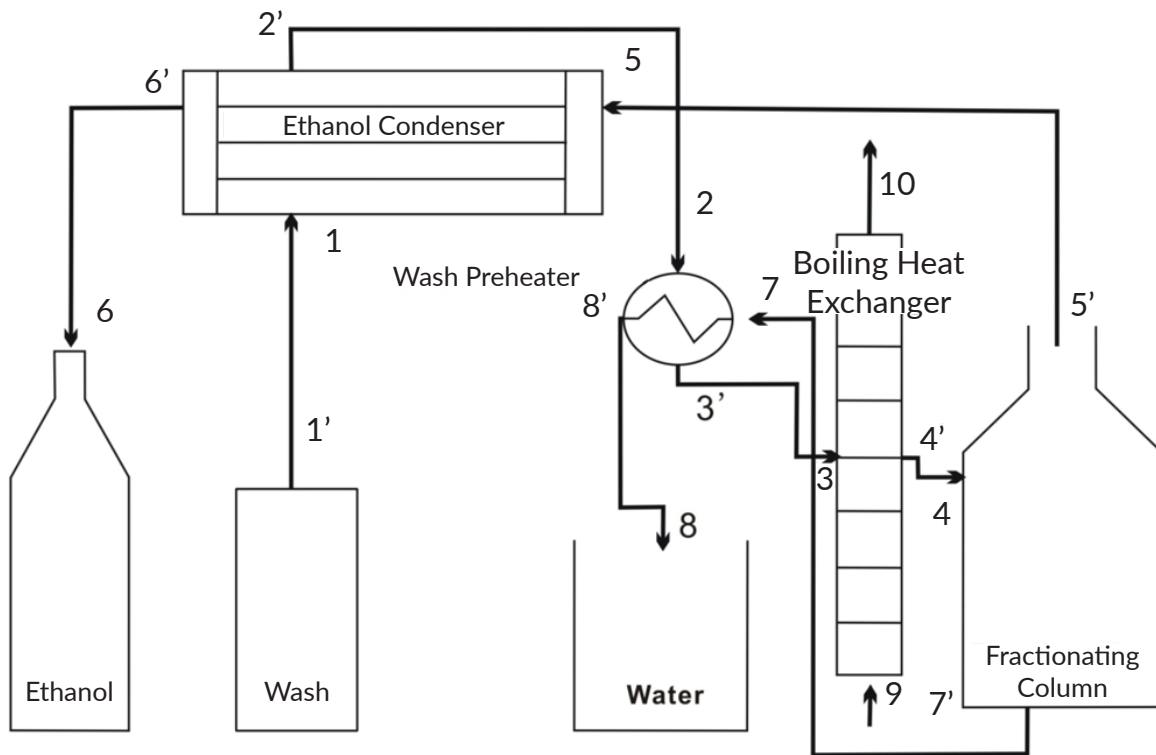
Economic incentives: Creates diversified revenue streams for farms through tipping fees for taking in food waste, energy production, and fertilizer sales.

Composting: Composting transforms organic waste like food scraps, leaves, and paper—into nutrient-rich soil using microorganisms such as bacteria, fungi, and insects. The process requires layering green (nitrogen-rich) and brown (carbon-rich) materials, maintaining moisture like a damp sponge, and regularly turning the pile to ensure oxygen flow. Composting unfolds in three phases: mesophilic (moderate heat), thermophilic (high heat to kill pathogens), and maturing (cooling and humus formation), typically completing in 3–9 months.

How to Compost

- 1. Choose a location and bin** – Preferably on bare earth to allow microbial access.
- 2. Create a base layer** – Use twigs or straw for drainage and aeration.
- 3. Layer greens and browns** – Aim for a balanced mix of food scraps and dry materials.
- 4. Add a starter** – A scoop of finished compost or garden soil introduces helpful microbes.
- 5. Keep it moist** – Water as needed to maintain sponge-like dampness.
- 6. Turn the pile** – Aerate every few weeks to support decomposition.

Ethanol Fermentation: Ethanol distillation separates ethanol from water by heating a fermented liquid (wash) until the more volatile ethanol vaporizes at its lower boiling point of 78.37°C. The ethanol vapor rises through a distillation column, where it is cooled and condensed back into liquid form, while the higher-boiling water remains below and is collected separately. This process efficiently isolates ethanol using differences in volatility and boiling points.



Source: MDPI

Animal Feed Blends:

Animal feed blending combines grains, proteins, fats, vitamins, and minerals into a consistent mix that delivers complete nutrition to livestock. Using specialized feed mixers, this process ensures every bite contains the right balance of nutrients—supporting animal health, growth, and productivity while preventing dietary imbalances.

Waste-to-Energy (WTE)

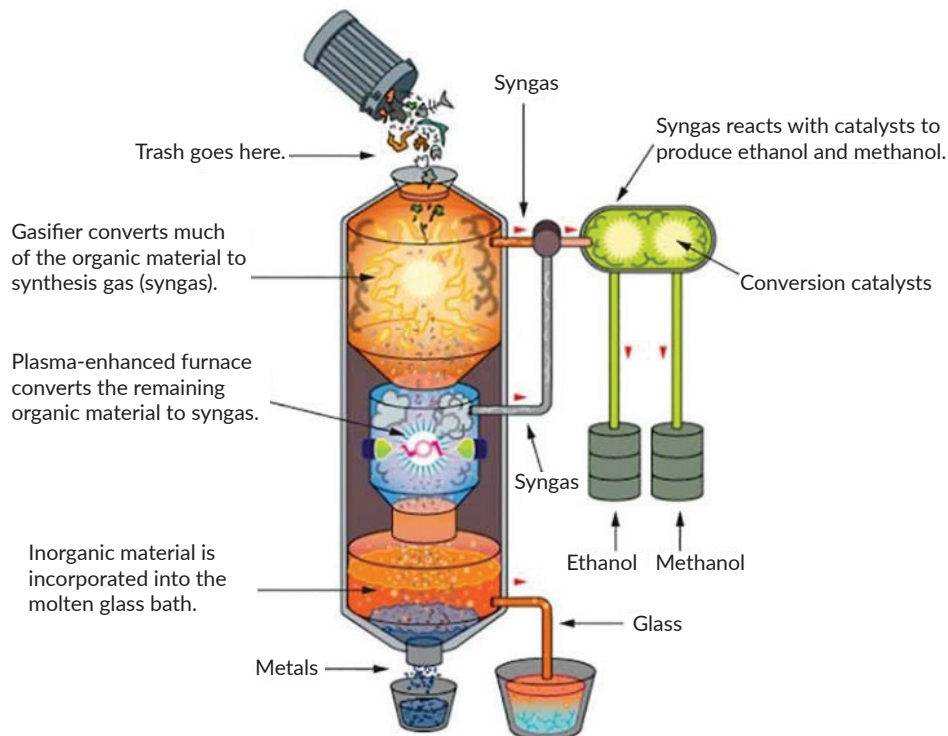
Waste-to-Energy is a sustainable technology that transforms non-recyclable waste into usable electricity through high-efficiency thermal conversion. After waste is delivered to the facility, it undergoes rigorous sorting to remove recyclables and hazardous materials. The remaining refuse is combusted in a specially designed furnace, generating intense heat that produces steam. This steam powers turbines to generate electricity, which is then fed into the local power grid to support community energy needs. Beyond energy recovery, the process extracts valuable metals from the residual ash and dramatically reduces landfill volume—by as much as 90%. Advanced emission control systems ensure that flue gases are thoroughly treated, making WTE a cleaner alternative to traditional waste disposal.

Waste-to-Fuel (WTF)

Recycling is no longer enough. With rising contamination, limited processing options, and overflowing landfills, we need smarter, more sustainable solutions. *That's where Waste-to-Fuel (WTF) comes in*—a breakthrough process that transforms non-recyclable materials into clean energy fuel stocks.

WTF converts post-industrial waste into alternative fuels without combustion. This method reduces landfill volume, cuts reliance on fossil fuels, and supports a circular economy where waste gets a second life. Every day, materials like shrink wrap, plastic film, cardboard, foam, rubber, wood, and packaging waste are diverted from landfills and repurposed into fuel for manufacturers. By turning waste into fuel, we are redefining recycling.

Turning waste into clean fuels



Source: energy.mit.edu

Packaging Deconstruction: We understand that protecting your brand is of utmost importance. That's why we offer certified turnkey solutions for depackaging, ensuring that materials like plastic, foil, and cardboard are recycled alongside the food waste. Our depackaging services are designed to meet the specific needs of your business, and our team of experts is dedicated to providing you with the best possible service. With our state-of-the-art technology and commitment to sustainability, you can trust that your brand is in good hands.

Zero Landfill Options: At a time when the world is grappling with the consequences of waste disposal, we offer a responsible and efficient solution to help your business manage food and beverage waste in a sustainable way. With millions of tons of waste ending up in landfills or the black market, our zero landfill options ensure that your brand is protected, and your environmental impact is minimized. Our processes are designed to maximize the recovery and recycling of valuable materials, reducing the amount of waste that ends up in landfills.

Revolutionizing Food and Beverage Waste Management

Our cutting-edge technology allows supermarkets, food distributors, haulers, and storage facilities to efficiently recycle their food waste.

Our services in converting waste to energy encompass:

- Processing of non-hazardous waste from municipal and commercial sources
- Advanced devices for air pollution control and monitoring
- Comprehensive wastewater treatment solutions

Environmental Benefits

Our Energy-from-Waste (EFW) services offer numerous environmental advantages, such as:

- Harnessing clean energy sources
- Significantly reducing carbon emissions
- Providing a sustainable alternative energy option
- Offering an efficient approach to waste management
- Financial Advantages: Our EFW solutions reduce the dependency on landfills and the necessity for long-distance waste transportation, while also allowing for the recovery of energy from existing resources.
- Regulatory Compliance: Strict penalties are imposed on those who fail to comply with state and federal waste management regulations.

LEL Environmental: Leading the Way in Sustainable Waste Solutions

At LEL Environmental, we operate with integrity and a deep commitment to eco-conscious practices. Our expert consultants in Energy-from-Waste (EFW) develop customized, step-by-step strategies that deliver precise, high-impact solutions tailored to each client's unique needs.

Let's transform waste into opportunity and make sustainability the signature of your business. With a robust network of partners across North America, we're equipped to support all your food and beverage depackaging and recycling requirements.

LEL Environmental: Depackaging Partners Across North America Serving the Food and Beverage Industry



Our recycling of these food and beverage materials supports processing for:



Anaerobic Digestion

(Bio Gas used to make: Electricity/ Cogeneration, CNG, Pipeline Gas, Boiler and Furnace Fuel, Cogeneration/ Refrigeration)



Animal Feed Blends



Composting



Ethanol Fermentation



Land Farming Applications



Waste-to-Energy Processing and Blending



Waste-to-Fuel



Join the movement

to revolutionize food, beverage, recycling and waste management. Our advanced technology empowers supermarkets, food distributors, haulers, and storage facilities to recycle efficiently and responsibly.

Take the next step in a cleaner, smarter future with our commercial and industrial food waste recycling systems.

