

Emerging Issues in Food Waste Management: Commercial Pre-Processing Technologies

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Overview

Many businesses and institutions that generate food waste—including some grocery stores, restaurants, hotels, universities, and correctional facilities—are installing technologies on-site to pre-process food waste. In a new report, EPA gathered and synthesized the available data on these technologies to evaluate whether these technologies encourage food waste recycling or reduce the environmental impact of food waste.

There are five general categories of pre-processing technologies:

- **Grinders** mechanically reduce the volume of food waste by macerating it into a slurry;
- **Biodigesters** biologically treat food waste under aerobic conditions with additives like microbes, enzymes, and fresh water to digest the waste into a slurry;
- **Pulpers** mechanically reduce the volume of food waste by compressing it into a semi-dry pulp;
- **Dehydrators** thermally treat food waste to evaporate the liquid and create a dry pulp;
- **Aerobic in-vessel units** use the natural aerobic decomposition process and bulking additives like sawdust to create a semi-dry product that requires further curing.

Does the use of pre-processing technologies encourage recycling?

EPA encourages the recycling of food waste to reduce methane emissions from landfills and recover valuable nutrients and energy. Food waste can be recycled to produce biogas and/or beneficial soil amendments with or without pre-processing by businesses and institutions, and the use of on-site pre-processing technologies does not guarantee recycling.

All these technologies require source separation of food waste from inorganic waste (like packaging), which is an important first step toward recycling. Once food waste is separated, food waste can be recycled on-site or hauled off-site to a composting, anaerobic digestion, or other recycling facility.

Whether the pre-processed food waste is ultimately recycled is dependent upon local conditions and further decisions by the businesses and institutions. For example, grinders and biodigesters produce a liquid output, which is typically sent down the drain into the sewer and onto the wastewater treatment plant. Thus, recycling is dependent upon whether the local wastewater treatment plant has an anaerobic digester, which can recover energy from organic waste. Some grinder models allow businesses and institutions to collect the liquid output and transport it directly to an anaerobic digestion unit, guaranteeing recycling. After wastewater treatment (with or without energy recovery), biosolids remain. These biosolids may be recycled (with or without further processing) and land applied as a soil amendment – or they may be landfilled.

Pulpers, dehydrators, and aerobic in-vessel units all produce a dry output that may be hauled off-site for composting or to a landfill or incinerator. With dehydrators and aerobic in-vessel units, businesses and institutions can instead choose to further cure the waste on-site or off-site to create a soil amendment. The soil amendments created by dehydrators and aerobic in-vessel units are not compost in the traditional sense, and much remains to be learned about their stability and suitability for different uses.

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Does the use of pre-processing technologies reduce the environmental footprint of food waste?

Pre-processing technologies have environmental effects beyond recycling. All the technologies require energy to operate, and many also require water. Also, pulpers, dehydrators, and aerobic in-vessel units can reduce the environmental impact of food waste by significantly reducing the weight of food waste, thus reducing emissions related to hauling.

The environmental effects of grinders and biodigesters are less clear. These technologies typically send processed food waste down the drain, shifting the burden of food waste management from landfills to sewage systems and wastewater treatment plants. The net environmental burden of this shift has not been thoroughly explored in the existing literature.

Sending additional organic waste—high in biological oxygen demand, total suspended solids, and fats, oils, and grease—down the drain raises potential environmental challenges, such as:

- Fugitive methane emissions;
- Reduced biogas potential;
- Increased energy use;
- Pipe clogs or corrosion;
- Operational issues, especially in low flow or aging systems; and
- Increased pollution in discharges from combined systems.

Pulpers and dehydrators remove water from the food waste and typically send this water down the drain, which may raise similar concerns to those noted above.

State and Local Policies

Some states and municipalities are setting food waste reduction goals, implementing food waste recycling programs and/or instituting bans on landfilling large quantities of food waste. These policies may encourage the use of pre-processing technologies. However, some states and municipalities are now considering limitations on the use of particular pre-processing technologies and seeking additional data on their environmental value.

Priority Research Needs

Based upon current available research, EPA cannot conclude whether there are environmental benefits to pre-processing food waste. Scientifically rigorous data are needed to inform policy- and decision-making to increase recycling and reduce the environmental impacts of food waste. Priority research needs include:

- Independently verified operating and performance data for pre-processing technologies.
- Measurement of fugitive methane emissions from sewer conveyance of food waste.
- Comparison of biogas potential of food waste that is unprocessed, processed by grinder, and processed by biodigester.
- Comparison of biogas potential of food waste that has traveled by sewer to a wastewater treatment plant and food waste that has travelled by truck directly to an anaerobic digestion unit.
- Impacts on sewer systems and wastewater treatment plants of additional liquefied food waste (from grinders and biodigesters) and wastewater extracted from food waste (from pulpers and dehydrators).
- Influence of pre-processing technology use on frequency of food waste recycling.

More Information:

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