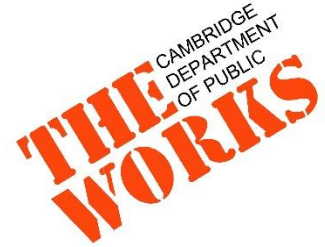


City of Cambridge Food Waste Management Fact Sheet

Spring 2021



History and development of Cambridge's food waste program.

In 2014, the City of Cambridge began a small pilot program to explore the option of offering curbside compost collection. The Pilot expanded in 2015 and after three more years of planning and piloting, the program expanded citywide in 2018. As of 2021, the City of Cambridge's curbside food waste program serves more than 25,000 households citywide. The goals of the program is to reduce waste and protect the environment, control rodent activity, and manage increasing costs for disposal.

As of Spring 2021, the City's Department of Public Works (DPW) hauls food scraps and compostables to Waste Management's Centralized Organic Recycling (CORE) facility in Charlestown. DPW sends at least 7 tons of food waste to CORE daily. The CORE facility processes at least 100 additional tons per day. After the combined food waste is processed and slurried, it is delivered to the Greater Lawrence Sanitary District (GLSD) in North Andover, MA. At GLSD, the organics are mixed with other organic waste in an anaerobic digester. The end products are renewable biogas (i.e. natural gas) and biosolids (see below for more info on this). Adding food waste increased the production of clean biogas by 200-250%, while biosolids production increased by 5-10%. Read more about the [GLSD Organics to Energy Project here](#).



Photo Credit: Kyle Klein

In 2018, Cambridge City Council's Health & Environment hosted a hearing to learn more about this process. Both Massachusetts Department of Environmental Protection (MassDEP) and EPA wrote letters of support for the use of GLSD and CORE by DPW. The letters are included at the end of this document.

The curbside compost program has resulted in an 8% decline in trash in the first year.

How did the City decide where to send food waste for processing?

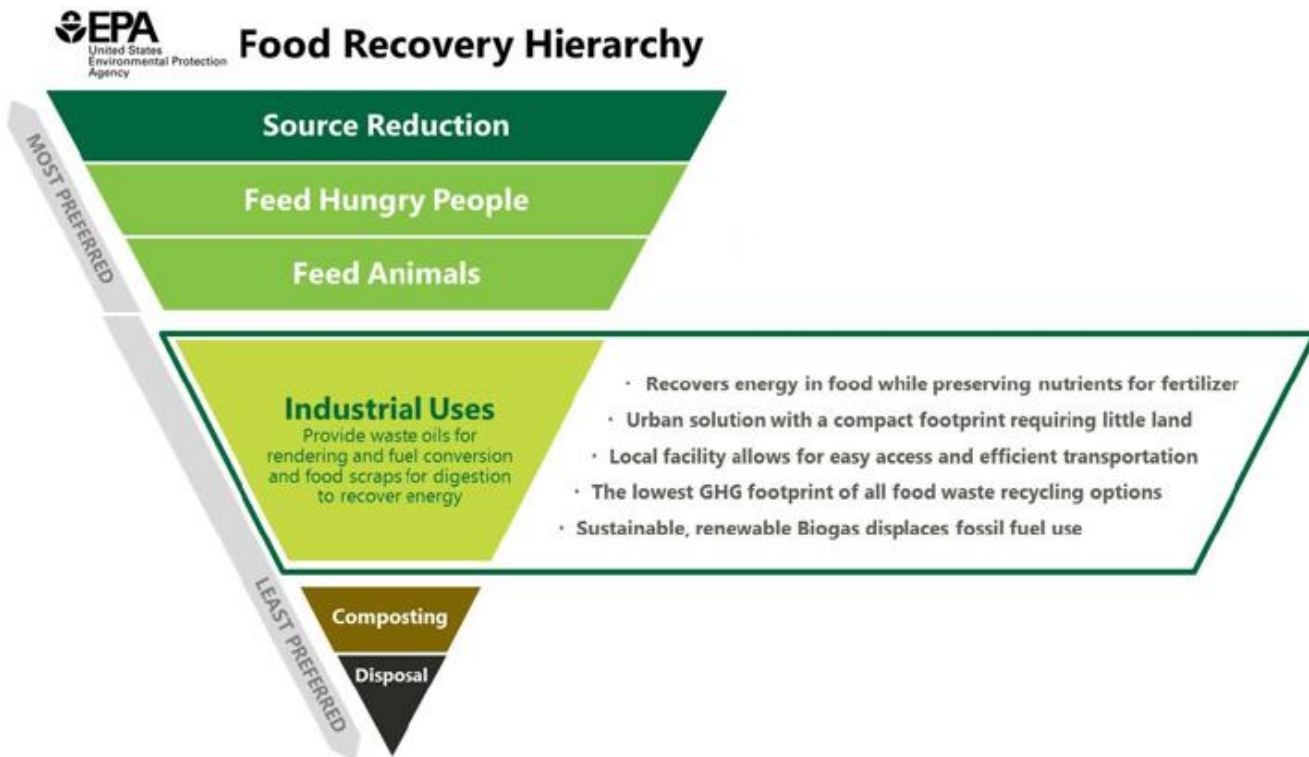
As the curbside organics program grows, DPW needed a contractor that could meet the specifications needed by DPW. Some of the requirements of the processing facility were they must be:

1. Less than 10 miles from DPW
2. Capacity for 50+ tons per week
3. Open 7am-3pm Monday-Saturday.
4. Capable of accepting and managing incidental contamination.

After looking at facilities within 30 miles of DPW, one site could meet all criteria: the CORE facility. Proximity of a permitted facility was a major factor in the decision. Traveling to a more distant facility would require more fuel and may require an additional collection truck or two. Furthermore, when seeking potential processing facilities, the City learned that all sites nearest to Cambridge were at capacity or were unable to commit to accept the quantity of food waste the City collects on a daily basis. Lastly, feedback from the EPA suggested that sending food waste to anaerobic digestion (AD) may be advantageous compared to traditional composting.

What are the environmental impacts of anaerobic digestion of food waste?

Most food waste is collected as trash and sent to landfill or incineration. Composting is one step above disposal on the Food Recovery Hierarchy. Lastly, anaerobic digestion (AD) is an emerging technology to process food waste. The US EPA created a food recovery hierarchy to rank options for managing food waste and AD is categorized under “Industrial Uses.” Both composting and anaerobic digestion (AD) produce a beneficial soil amendment, but AD has a lower greenhouse gas impact because AD captures carbon in the form of renewable biogas which is used to offset the consumption of fossil fuels.



How is Cambridge’s food waste processed?

The CORE facility processes Cambridge’s food waste (with tons of restaurant, grocery store and other food waste) into an organic slurry. The slurry is processed in an anaerobic digestion tank at GLSD. With the aid of natural occurring bacteria, the anaerobic digesters convert the food into renewable biogas and solids. The biogas is captured and used on-site in a combined heat and power (CHP) unit. A CHP unit creates both electricity and hot water, similar to a coal or natural gas power plant. Unlike a traditional power plant, the CHP unit at GLSD recycles the waste hot water to heat buildings. The production of clean energy from AD offsets the demand for fossil fuels (both natural gas and electricity transmission). Harvesting and producing energy on-site

is as much as 60% more efficient than energy from fossil fuel sources on the grid. And, most of all, the input fuel is biogas, not fossil fuel based.

Furthermore, in 2019 the US EPA commissioned a lifecycle analysis (LCA) of food waste management options. Eastern Research Group performed the analysis on behalf of the EPA. The study can be found on the EPA website [here](#) or a more user-friendly analysis of the study from the authors was published in Biocycle in these two links: [Part 1](#) & [Part 2](#). The LCA study concluded that AD at a facility like GLSD has very significant advantages and performed most favorably for many of the environmental impacts assessed.

What are Biosolids?

After treating wastewater, solids are leftover. They must be landfilled, incinerated or processed to be a beneficial soil amendment, known as biosolids. GLSD has been generating biosolids for beneficial use for more than 15 years. Prior to generating biosolids, GLSD landfilled and incinerated the leftover solids. Biosolids are the nutrient-rich organic byproducts resulting from treating wastewater. GLSD, a wastewater treatment plant, has been producing the highest quality of biosolids, Class A biosolids, for more than a decade. They meet the EPA's requirements to be certified as Exceptional Quality (EQ).¹ The biosolids are also tested under MassDEP testing procedures to ensure the material is safe for beneficial use as a soil amendment.

Biosolids are valuable because it reduces the amount of synthetic fertilizers manufactured. Chemical fertilizers contribute significant amounts of greenhouse gas emissions when they are manufactured and used. Lastly, chemical fertilizers can hurt the health of local water ways by contributing to algae growth. Therefore recycling biosolids for land application can minimize the environmental impact of synthetic fertilizers. Furthermore, applying biosolids to land has been shown to increase the soils' ability to store carbon, which helps to sequester greenhouse gases.

More than 10 million tons of biosolids are produced in the US annually. Approximately 51% of biosolids are land applied; most of the remaining biosolids are landfilled or incinerated. Recycling nutrients in the form of biosolids helps divert waste from landfills, offset the consumption of synthetic fertilizers, and reduce greenhouse gas emissions. For more information on biosolids visit www.epa.gov/biosolids or <http://www.nebiosolids.org>.

Does anyone else process food waste at a wastewater treatment facility?

Co-digesting food waste at a wastewater treatment facility is growing increasingly popular. Approximately 1,200 wastewater treatment facilities in the U.S. have anaerobic digesters to manage wastewater solids. Furthermore, about 20 percent of wastewater treatment facilities digest food products, similar to what GLSD is doing. Examples of this can be found at facilities in Oakland, Los Angeles, New York City, upstate NY, and Hershey PA. The trend towards processing food waste at wastewater plants is growing because AD requires less time and space than composting.

GLSD's "Organics to Energy Project" was conceived to assist Massachusetts in diverting organics from landfills and increasing local renewable energy. This project includes over \$25 million in investments; including more

¹ Source: www.epa.gov/biosolids. A Plain English Guide to EPA Part 503 Biosolids Rule (1994) Chapter 1 Page 7.

than \$7.5M in Massachusetts State funding, to develop one of the most advanced recycling and renewable energy programs in the US.

Why is the Cambridge program called curbside composting?

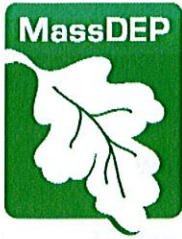
During the curbside compost pilot, DPW sent food scraps to a farm-based composting facility in Saugus. DPW spent months considering different names for the curbside collection program. While the current method for processing food waste is anaerobic digestion, DPW found that using the term “compost” was most inclusive. The City found that “compost” translated best to other languages and was more recognizable to the population of Cambridge that may not be versed in the terminology of food waste management. Options such as “curbside organics” caused confusion among some Cambridge residents. For example, some thought that curbside organics meant only organic food was allowed in the curbside carts. When surveying businesses and residents, DPW found that the most common term that residents recognized when thinking of diverting food scraps was the term ‘composting’ and ‘compostables.’ To make the program more inclusive and inviting, we decided that curbside compost was best for branding to encourage those who may not be as well-versed in the terminology to join the program.



Why does yard waste go to different facility than food waste?

There are a few reasons. The main answer is because of MassDEP Permitting reasons. MassDEP allows a composting site to accept 5-15 tons per day of food waste and not all yard waste sites process food waste. The limitation of food waste is because the science of making compost requires a minimum 30:1 ratio of carbon to nitrogen organic materials. Food waste is relatively high in nitrogen, and thus a significant amount of high carbon organic materials is needed. For example, Cornell University and the US Composting Council suggests that approximately 10 times more yard waste is needed than food waste (by volume) for a good compost system.

For further questions, contact Cambridge DPW at recycle@cambridgema.gov.



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October 5, 2018

Vice Mayor Jan Devereux, Chair
Councilor Quinton Zondervan, Chair
Health & Environmental Committee
Cambridge City Council
Cambridge City Hall
795 Massachusetts Avenue
Cambridge, MA 02139

Dear Vice Mayor Devereux, Councilor Zondervan and other distinguished members of the Health & Environmental Committee,

The Massachusetts Department of Environmental Protection (MassDEP) appreciates this opportunity to comment publicly on the City of Cambridge's voluntary food waste collection program, in light of the October 9th hearing of the Cambridge City Council Health and Environmental Committee.

MassDEP is the state regulatory agency charged with developing the Commonwealth's Solid Waste Master Plan pursuant to M.G.L. c. 16, §21. The Solid Waste Master Plan is the Commonwealth's blueprint for reducing solid waste and managing solid waste that is generated, reused, recycled, or disposed by Massachusetts residents and businesses. It establishes a broad policy framework for solid waste management in Massachusetts over a span of 10 years (2010-2020), including a current state assessment, a policy vision, and concrete goals and strategies for the near and long term vision of higher reuse and recycling rates, and reduced disposal. The City of Cambridge is taking a leadership role in reducing waste disposal through its food waste collection program.

MassDEP is pleased to provide information to the Council regarding the benefits of collecting and adding Cambridge's food waste to the organic materials managed by the Greater Lawrence Sanitary District (GLSD). Both the City of Cambridge's program and GLSD's processing of

This information is available in alternate format. Contact Michelle Waters-Ekanem, Director of Diversity/Civil Rights at 617-292-5751.

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organic material at its facility advance MassDEP's 2010 Solid Waste Master Plan goals of diverting an additional 350,000 tons of food waste from landfill disposal and supporting new infrastructure to handle that food waste, including both anaerobic digestion (AD) and composting facilities. In 2012 MassDEP modified solid waste regulations to support the goals of organics diversion and renewable energy generation. The changes were completed after two years of deliberative development, with the benefit of significant public involvement. AD facilities provide capacity for food waste diversion, which reduces the amount of waste that must be landfilled, incinerated or sent out-of-state for disposal. Anaerobic digesters also provide the additional benefits of generating clean biogas and energy, offsetting energy costs for facilities and producing fertilizer products.

The City of Cambridge has been a leader in establishing its food waste collection program – first as a pilot and now as a voluntary city wide service. As noted on the City's website, in its first four months of operation, more than a million pounds of food scraps have been diverted from landfills and the City's trash has been reduced by 4 percent. It should be noted that large scale curbside food waste collection programs always include some degree of contamination from materials such as plastic bags or film, which means this material must be processed before it can be composted or digested. The Cambridge program effectively addresses this need by having this material processed at the Waste Management facility in Charlestown, ensuring a high quality feedstock for the anaerobic digestion process.

There are both local and statewide benefits of Cambridge and GLSD collaborating to co-process food waste and wastewater sludge. Organic materials are diverted from landfills and incinerators, and the addition of food waste to GLSD's operation results in a significant increase in biogas generation, reducing the need for power from the grid and decreasing GLSD's energy costs. Increased power generation capacity on-site can assist with maintaining wastewater treatment operations even during large power outages. Although the addition of food waste has increased the energy output from GLSD's digesters, it is not expected to increase the total volume of sludge from the AD process due to improved digestion efficiency. Finally, the collaboration supports GLSD's goal of operating at "zero-net-energy" by using renewable energy resources, including the resources in the organic materials from the Cambridge food collection program to generate all of its power.

Another benefit of the collaboration between Cambridge and GLSD is to capture and reuse nutrients contained in the fertilizer end product. MassDEP's regulations for Land Application of Sludge and Septage (310 CMR 32.00) were put into place to ensure that biosolids products generated by wastewater treatment, such as the fertilizer pellets produced by GLSD, do not pose a risk to human health or the environment. Key points of these regulations and their application to GLSD's biosolids product are as follows:

- Any sludge product that is used, sold, or distributed for land application in Massachusetts requires a Suitability Approval from MassDEP or "AOS".
- The AOS classifies the product into one of three different types based on treatment and product quality.

- Sludge produced at GLSD has been approved by MassDEP and classified as Type I, which ensures quality of the sludge that allows for the least restricted uses. Type I biosolids can be used, sold, or distributed as a fertilizer product, and can be used for growing any vegetation (eg on a farm or in a garden).
- GLSD's product is required to be tested monthly and meet specific limits for a number of parameters to address environmental and human health risk. GLSD's monthly sampling results have consistently complied with the requirements for a Type I product.

In summary, MassDEP supports Cambridge's food waste collection program, as well as its partnership with Greater Lawrence Sanitary District for co-processing its food waste with wastewater sludge. Combined, these efforts reduce solid waste being landfilled or incinerated, produce clean reliable and renewable energy, reduce energy costs, and generate a product for beneficial reuse.

If you have further questions about MassDEP's Solid Waste Master Plan goals or MassDEP's Biosolids program, please contact Greg Cooper at Greg.Cooper@mass.gov or Lealdon Langley at Lealdon.Langley@mass.gov, respectively.

Sincerely,



Stephanie Cooper
Deputy Commissioner, Policy & Planning



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Cambridge Health and Environmental Committee
Cambridge City Hall
795 Massachusetts Ave.
Cambridge, MA 02139

October 5, 2018

Dear City Councilors Jan Devereux and Quinton Zondervan:

We understand that the Health and Environmental Committee that you co-chair will meet on October 9 to discuss composting and recycling programs, and that one of the challenges to be discussed is codigestion of food waste with biosolids at municipal water resource recovery facilities (WRRFs). EPA is sending this letter to provide technical information that may be of assistance in your discussions.

First, we congratulate you on your food waste diversion program, which aligns well with Massachusetts's Solid Waste Master Plan and is helping you to meet your own zero waste goals. Cambridge is at the forefront of US cities diverting food waste from disposal, and we hope that your model leadership will help other cities implement similar programs in their communities.

There are many ways to manage organic wastes in the municipal solid waste stream, each with advantages and disadvantages, and the appropriate management techniques are highly specific to individual locations. The Massachusetts Department of Environmental Protection, among other state entities, has been promoting increasing infrastructure to manage food waste to support the 2014 Commercial Organics Ban.

To assist municipalities in decision-making around food waste recovery and diversion, EPA has developed the Food Recovery Hierarchy shown below. Anaerobic digestion falls into the "industrial use" category, less desirable than reducing waste, feeding people, and feeding animals but preferable to composting. For more information on the hierarchy, please visit <https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>.

The discussion about managing food waste is often framed as an either/or discussion between techniques such as composting and anaerobic digestion, but the approaches can work together. Anaerobic digestion reduces the solids volume of digested materials by about 50%, and the remaining 50% can be composted post-digestion. EPA conducted life cycle assessment research at a small WRRF in a rural location that contemplated codigesting biosolids with food waste, then composting the digestate to Class A compost as agricultural amendment and fertilizer replacement. The results of this life cycle assessment can be found at https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=338074.

We know concerns have been raised about toxics. As DEP states in its letter to you dated today, GLSD consistently meets standards under MassDEP's regulations for Land Application of Sludge and Septage (310 CMR 32.00). These regulations work in tandem with EPA's rules on biosolids use (commonly called the "503 rule," for the part of the Code of Federal Regulations they fall under) to govern material that is mixed with biosolids in a digester if the end product is intended for beneficial reuse. EPA believes that biosolids are an important resource that can and should be safely used. The 503 rule provides comprehensive requirements for the management of biosolids generated during the process of treating municipal wastewater and creates incentives for beneficial use of biosolids. For more information on the 503 rule, please see the document "A Plain English Guide to the EPA Part 503 Biosolids Rule" available at <https://www.epa.gov/biosolids/plain-english-guide-epa-part-503-biosolids-rule>.

In conjunction with our 503 regulations, EPA has a robust industrial pretreatment program designed to keep metals and other toxic chemicals from entering municipal wastewater treatment collection systems. For more information on the National Pretreatment Program, please visit <https://www.epa.gov/npdes/national-pretreatment-program>.

We applaud your efforts and your leadership role in managing food waste sustainably. EPA supports the practice of codigestion of food waste and biosolids at municipal water resource recovery facilities, and would be happy to provide technical assistance to help you navigate questions that may come up as you consider the processing of Cambridge's municipally collected food waste.

Sincerely,



Ken Moraff, Director
Office of Ecosystem Protection