EPA Tools & Resources Webinar Q&A
Food Waste
January 17, 2024

LANDFILL METHANE STUDY:

- **To make sure I understand the landfill presentation: The 30% of methane generated is the food decay vs the 60% of what is emitting?**
  Of the total landfill gas generated, food makes up 30% of that total amount. Of the gas emitted, food makes up 60% of that amount. This is because gas generated in later years is more likely to be captured whereas gas generated in years 1-3 after disposal is not likely to be captured.

- **Going forward, now that these landfill gas collection systems are in place, will fugitive methane emissions be less?**
  Yes, emissions are expected to decrease. According to the EPA's Annual Inventory of Greenhouse Gases, landfill methane emissions have been steadily decreasing across the country.

- **Was there any analysis done in regard to the impacts on methane emissions if landfill gas collection and control systems (GCCS) were installed sooner than 5 years after waste placement? Similar to your model of reducing food waste by 50%.**
  This was not examined in this study but is being examined for future research.

- **What are some assumptions made in your study?**
  There were many assumptions and they are stated in detail in the report: https://www.epa.gov/land-research/quantifying-methane-emissions-landfilled-food-waste

- **Is the exclusion of non-fossil (biogenic) CO2 emissions from the landfill emissions supported by any estimates or modeling of Soil Organic Carbon stocks and flows?**
  The exclusion of biogenic CO2 is consistent with the approach used in the Annual Greenhouse Gases (GHG) Inventory. It is not validated or compared to soil organic carbon flows.

- **Do you have public data available about which (% and name and location) landfills in the United States are calculating the emissions using Tier 1 vs Tier 2 vs Tier 3 vs Tier 4?**
  EPA does not maintain a database of landfills which utilizer Tier testing for the non-methane organic compounds emission estimates.

- **Can you talk a little bit about the 10 archetype categories you include in the report. What archetypes for landfill are currently in operation in the United States?**
  The archetypes primarily refer to different landfill operating characteristics as they have changed over time. For example, a landfill operating in the 1980s and 1990s would have less gas collection than a landfill operating in 2020. The primary archetype landfill, as stated in the report, was archetype 9, and which has a gas collection system. There are many landfills in the U.S. that do not have a gas collection system.

- **Just wondering, why it is not possible install capture system prior to 4 years after landfilling? Is it a technological limitation or a practical consideration?**
  Operators state that it is a practical challenge rather than technological. Landfills are large active construction sites, and so the installation and placement of gas collection wells in areas near active disposal present challenges for heavy equipment operators and truck drivers to avoid them while disposing of waste.

- **What measures are needed to ensure landfill gas collection systems capture more methane?**
  Landfill operators could install gas extraction wells sooner. Landfill operators must balance the desire to collect methane gas with over-aggressive "pulling" on the vacuum/collection system to prevent landfill fires.

- **If a landfill has a LFG (landfill gas) system in place that has been operating for many years, is there any research on how that methane capture compares to something like anaerobic digestion (AD)?**
  AD systems are likely to capture a large majority of the gas generated. These are mechanical systems and there can be leaks but these systems are designed to degrade food in 30-60 days and capture nearly all of the gas. We do not have a reference for this.

- **I don't understand the point of this research. If landfills are the only system that collects methane, why are they considered a last resort? Every other method releases 100% of methane generated to the atmosphere. What was the benefit of this study?**
  Food waste could be sent to a compost or anaerobic digestion facility rather than a landfill. Both options release less methane from food waste than landfills.

- **How has the transportation (petroleum use) of food waste impact the value of removing the food waste from the landfill methane production?**
  Although this was not part of the current study, transporting food waste from the point of a generation to a different facility (e.g., compost or anaerobic digester) would have its own environmental impact. This was not quantified in the current report.

- **Was the half-life of methane compared to CO2 analyzed/considered since methane is significantly less (magnitude of 10)?**
  No. We did not compare the atmospheric half-life of methane to carbon dioxide. The half-life in the report refers to the half-life of biodegradable carbon as it decays in the landfill.

- **Is there data showing methane emissions from food waste contributed by residential areas versus commercial (restaurants, grocery stores, etc.)?**
  We are not aware of such a dataset.

WASTED FOOD SCALE:

- **When discussing food waste, is there a focus on vegetative foods as opposed to food waste options for protein/animal-based foods?**
  EPA seeks to prevent all types of food waste where possible. For more information on the impacts of different types of food waste, please see EPA's report From Farm to Kitchen: The Environmental Impacts of U.S. Food Waste.

- **What is EPA's official point of view on using up leftovers?**
  While the Agency does not have an official policy on using up leftovers, there is a clear benefit in terms of reducing greenhouse gas emissions compared to producing then purchasing additional food. Eating leftovers prevents food waste, and prevention is the most environmentally preferable approach to managing food waste (see EPA's Wasted Food Scale).

- **Do for profit companies like Imperfect Foods or Misfits Market play much of a role in preventing food waste? And, same question for nonprofit community recovery programs that host member grocery stores - do they play much of a role in preventing food waste?**
  EPA encourages selling and donation of foods that may have otherwise gone to waste. These are both environmentally preferable approaches to managing food waste (see EPA's Wasted Food Scale). Please note that EPA does not endorse specific private companies.

- **Is "gleaning" unharvested or slightly damaged food from farms included in the food waste scale?**
  Yes. Gleaning is included in the donation pathway.

- **Why do you limit the definition of "upcycling" to processes that result in human food? Upcycling processes can use food waste as a feedstock or starting material to produce other value-added products. Am I reading this interpretation correctly?**
  In the report and the Wasted Food Scale EPA defines upcycling as "remaking wasted food into new food products for human consumption." Many of the processes for making food into other products, such as chemicals, are not yet at commercial scale, and so were not examined in this report.

- **How do you determine what is upcycled? For example, if a spent grain is used to make flour, and bakers say that the spent grain flour is inferior and doesn't make bread to the quality they are used to, is that spent grain in the flour really upcycled?**
  The report assumes the upcycled product is used when determining rankings on the Wasted Food Scale.

- **We have food waste generators who say that they would rather have their food waste go to feed livestock than try to capture, clean, process (using many other resources) to make it human edible. How does the new wasted food scale address that issue? Is it better in this case to use simple food waste to feed animals or to add more resources to process and make it human edible?**
  In the report we prioritize the use of food grown for human consumption for its original purpose, deeming feeding people the "highest value" for food. However, animal feed is also an environmentally preferable food waste management pathway and, in some cases, may be more environmentally beneficial than upcycling. Animal feed may also require resources for processing (i.e., heat treatment), and specific case by case comparisons may be needed between options. The Wasted Food Scale provides general recommendations but does not allow for comparisons among specific technology types or operational practices within a pathway.

- **Local schools are notorious for producing high levels of food waste (unused), and their reasoning is because the requirement to follow state regulations. What pathways would you recommend for schools to implement using new data?**
  We recommend stakeholders follow the new Wasted Food Scale, focusing on most preferable pathways like prevention and donation first.

- **What specific support is building anaerobic digesters getting from the Inflation Reduction Act?**
  EPA received unprecedented funding through the Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act. Through BIL, we developed two new grant programs– Solid Waste Infrastructure for Recycling (SWIFR) program (up to $275M) and the Recycling Education and Outreach (REO) program (up to $75M). Of the $198M EPA awarded this past fall through these two grant programs, over $83M went to projects that addressed organics recycling, and most of this went to composting projects, the majority of which included food waste. These awards went to communities, states, territories and Tribes. The activities outlined in these projects are critical in mitigating the effects of climate change, as organic material sent to landfills releases large amounts of methane (58% of fugitive methane emissions from MSW (municipal solid waste) landfills are from food waste, as our recent report found). Also, in 2022, EPA awarded approximately $2 million to 11 organizations nationwide to divert food waste from landfills by expanding anaerobic digester capacity nationwide. These projects will be completed by the end of 2024.

  Another example of a far-reaching EPA funding program that includes food waste reduction is EPA's Climate Pollution Reduction Grant (CPRG) grant program, which is offering almost $5 billion for climate planning and implementation. Measures that reduce GHGs in the waste and materials management area are included, so food waste reduction, including prevention and recycling, can be included in these programs. Of course, there are many competing priorities for these funds, and waste/materials management is one of many.

- **Are these values integrated into the WARM solid waste management model yet? If not, when will that happen?**
  The results of this research have not been integrated into the Waste Reduction Model (WARM). WARM does not accept research results as an input. However, some of the information, such as landfill gas collection efficiency averages that were used to derive our results and are used within WARM are being re-evaluated for future updates. EPA plans to update WARM in the future. For more information on WARM and to provide public comment on WARM please visit: https://www.epa.gov/warm

- **Is the curbside collection of food waste worth it environmentally since the creation of compost also releases methane and CO2 and our landfills have methane gas capture systems? What studies can scientifically support the curbside collection of food waste?**
  Transportation of food waste to waste management facilities was included in many of the life cycle analyses reviewed in the report, as were emissions from composting facilities. The resulting Wasted Food Scale, based upon this data, ranks composting as more environmentally preferable than landfilling wasted food.

- **Are you assuming that methane produced by anaerobic digestion (AD) is flared or used for energy production?**
  AD was assumed to produce energy in the report.

- **Are anaerobic digestion (AD) facilities generally producing a surplus of energy, or just producing enough to power themselves? Also are there any studies on the quality and use of the digestate?**
  AD facilities typically produce a surplus of energy. For more information on the characteristics and uses of digestate please see Chapter 4 of EPA's report From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways. Additional information can also be found here: https://www.epa.gov/anaerobic-digestion/anaerobic-digestion-data-collection-project

- **Are you working with Municipal Wastewater Treatment Plants that are already co-digesting food wastes to better understand purity and different operational modes that may reduce GHG emissions such as direct addition to a digester.**
  Yes. Our analysis indicates it is environmentally preferable to send food waste directly to an anaerobic digester at a wastewater treatment plant (typically by truck) rather than down the drain, through the sewer and wastewater treatment works, then to the digester. This is due to methane emissions and increased energy required to process the food waste on its way to the digester in the latter scenario.

- **Did the analysis consider the significantly greater plastic contamination in AD digestate that is composted vs. source separated compost?**
  Yes. The circularity analysis in the report noted greater potential for impurities from recycled products made from multiple waste streams rather than from simply food waste. However, there is evidence of plastic contamination in source-separated food waste streams from packaging and serviceware (e.g., plates and cups) inadvertently included in the stream. For more information, see EPA's report on Emerging Issues in Food Waste Management: Plastic Contamination.

- **If the anaerobic digestion (AD facility uses a depackager to extract food waste, does this change your recommendations for use?**
  Limited data is available on the impacts of depackaging equipment, including its energy use and the potential for creation of smaller plastic particles. Typically the use of depackaging equipment is not included in Life Cycle Analyses of food waste management. For more information on the environmental impacts and benefits of this technology, please see EPA's report Emerging Issues in Food Waste Management: Plastic Contamination. The new report From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways identified one additional study (Morello et al., 2017) on depackagers' environmental performance. Please see section 2-13 for more information. Additional research is needed to determine the influence of pre-treatment steps such as depackaging on the Wasted Food Scale.

- **If food packaging is moved from plastics to corn based (biodegradable) will the packaging contamination issue be removed?**
  Plastic contamination will be avoided if packaging is compostable within the timeframe and temperature at the composting site. However, compostable materials not certified by the Biodegradable Products Institute may still contain PFAS or other persistent contaminants.

- **In-situ aerobic digesters are also a great tool with minimal environmental trade-offs. Have you looked at these too? To clarify I am referring to aerobic food waste digesters in kitchens, restaurants, conference centers.**
  This analysis did not examine aerobic digesters. For more information on the environmental impacts and benefits of this technology, please see EPA's report Emerging Issues in Food Waste Management: Commercial Pre-Processing Technologies.

- **You mentioned methane emissions of the "down the drain" approach where there's methane emission prior to reaching the wastewater treatment plant (WWTP). Can you elaborate on methane emissions in processes involving WWTPs? If sending down the drain is not recommended, then is EPA against in sink disposers?**
  Among the wasted food pathways on the Wasted Food Scale, sending food down the drain and landfilling it both stand out for their sizeable methane emissions. In both cases, wasted food ends up in anaerobic environments (with low or no oxygen) where it generates methane as it decays. While this is what happens in anaerobic digesters, it does not contribute to emissions as significantly because itis a controlled process and the methane is captured for beneficial use. In sewers and some of the wastewater treatment process, methane emissions are uncontrolled/released to the atmosphere. Where possible, EPA recommends managing food waste through more environmentally preferable pathways than down the drain or landfilling, regardless of whether an in-sink disposer was used.

  Concerns about sending food down the drain go beyond methane emissions. An increase in fats, oils and grease can lead to blockages in sewer lines. Food waste adds to the nutrient content in wastewater, increasing the need to remove or manage nutrients at wastewater resource recovery facilities (WRRFs) and increasing energy use. This can present a challenge for WRRFs, especially in areas with surplus nutrients and concerns about eutrophication of local waterways.

  Biosolids management is also a challenge at many WRRFs, with just over half of biosolids being used beneficially nationwide. This limits the circularity of the "down the drain" pathway, as nearly half of valuable organic matter and nutrients in U.S. biosolids end up in landfills or incinerators. A circularity assessment of pathways in the report From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways report contributed to the overall rankings.

- **Based on this exciting work, what do you think are the most important research gaps?**
  We see two areas as top priorities for further laboratory and field research: (1) methane generation from sewer conveyance and wastewater treatment of wasted food, and (2) the environmental benefits and impacts of applying wasted food or wasted food-derived amendments to soil. For additional areas of recommended research please see Section 6.4 of EPA's report From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways.