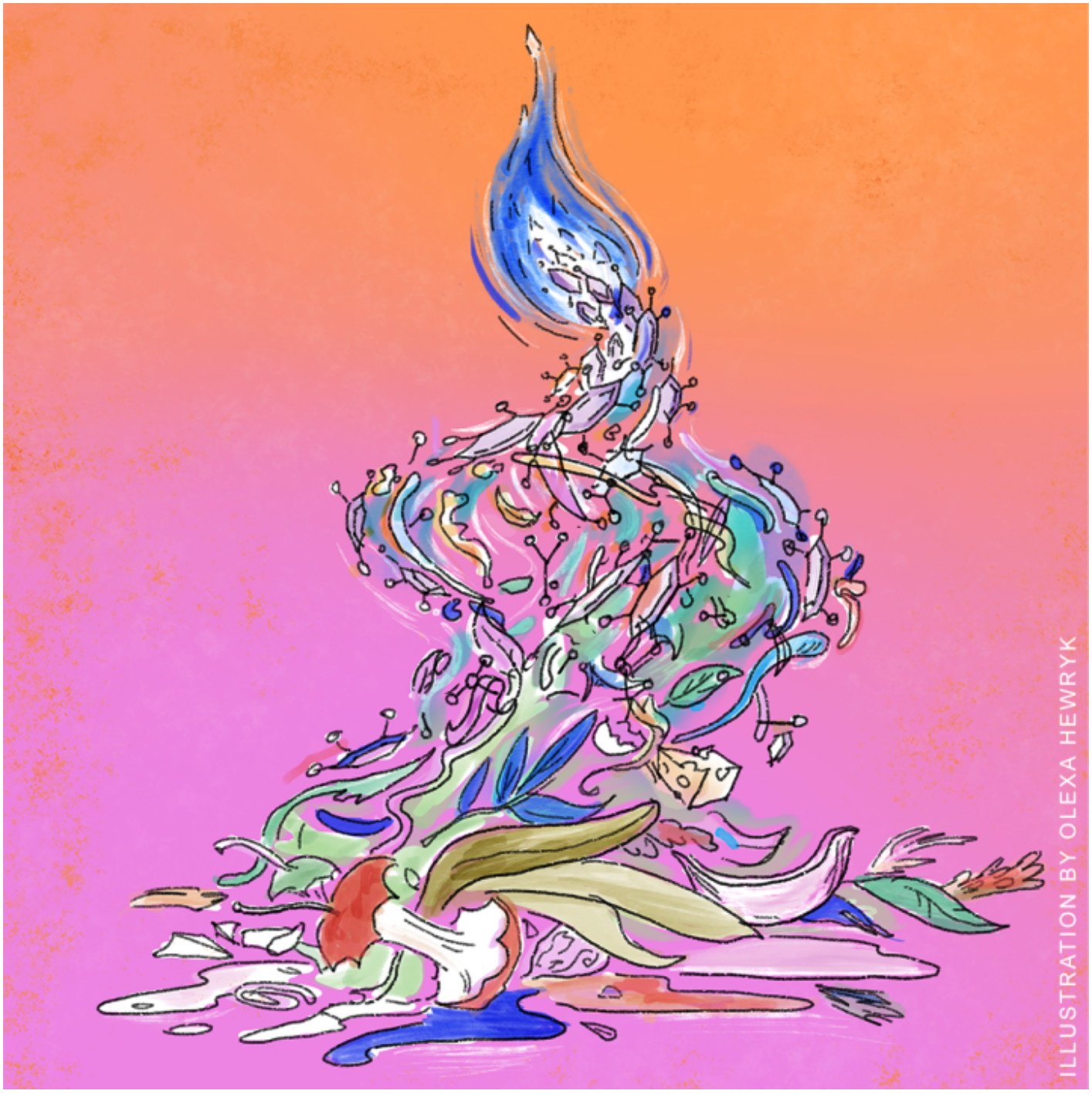
ARE BIODIGESTERS THE NEXT FRONTIER IN FOOD WASTE?

August 9, 2022



By John B. Thomas

Managing our waste streams in ways that don't pollute the planet is a fundamental challenge for New York City and the Coop. New York City sends 4 million tons of waste to landfills every year, a third of which is food waste. This food waste decom-

poses in landfills to produce methane, a potent greenhouse gas that has nearly 80 times the potential to carbon dioxide to contribute to climate change. Methane is also the primary component of natural gas, which still makes up about a third of total U.S. energy consumption. So not only is the methane from food waste bad for our climate, it's also a wasted resource we could be using to create energy. Efforts to limit food waste are critical both to reduce waste and by proxy all of the wasted water, energy and labor that went into the production of unused food; but also a key component in the fight against climate change.

ENTER THE BIODIGESTER

Biodigesters—systems that turn organic waste like food scraps and wastewater into energy and fertilizer—are a technology that may help address the city's food waste problem. Typically composed of a large covered pit buried in the ground, biodigesters use a process called anaerobic digestion to consume organic matter like food waste, producing methane and manure as byproducts. Smaller ones are about the size of a septic tank, typically buried in the ground. Larger industrial-scale biodigesters can take up a similar footprint to a small power plant. But most have large tanks where the process of anaerobic digestions (bio-digestion) takes place. Biodigesters harness the methane that would be lost by food rotting in landfills and offset the need for industrial fertilizers.

Biodigesters are also a passion of Coop member Matthew Landfield, who recently took a course in ecological design after moving to the Hudson Valley during the pandemic and developing a curiosity about how to reduce his home's environmental impact. "In a future where we continue to burn fossil fuels and our waste streams are a net loss, we need to better manage these waste streams and the organic matter they produce as they decompose," he said. "It would be interesting to explore if something like this might be useful to help manage the Coop's waste streams."

Biodigesters are not a new technology. "They are well dialed-in as a technology all over China and Northern Europe," says New York-based biodigester expert Andrew

Faust. Faust teaches a course on urban permaculture online (learn more at www.permaculturenewyork.com; andrew@homebiome.com). Biodigesters have been in use since at least the early 1900s, when Germany built the first biogas-producing wastewater treatment plant. They have since spread to India, China and parts of Asia as cheap sources of cleaner energy and an alternative to wood-burning stoves for cooking, especially in rural areas. To this day, Germany is still the world's largest producer of biogas with an estimated 9,706 biogas plants operating as of 2018—the highest number of biogas plants in any country in the world. Yet smaller scale biodigesters are gaining ground in Asia, where the number of household level units likely vastly exceed Germany's number, with some estimates suggesting 50 million or more household units in China alone.

> EFFORTS TO LIMIT FOOD WASTE ARE A CRITICAL COMPONENT IN THE FIGHT AGAINST CLIMATE CHANGE.

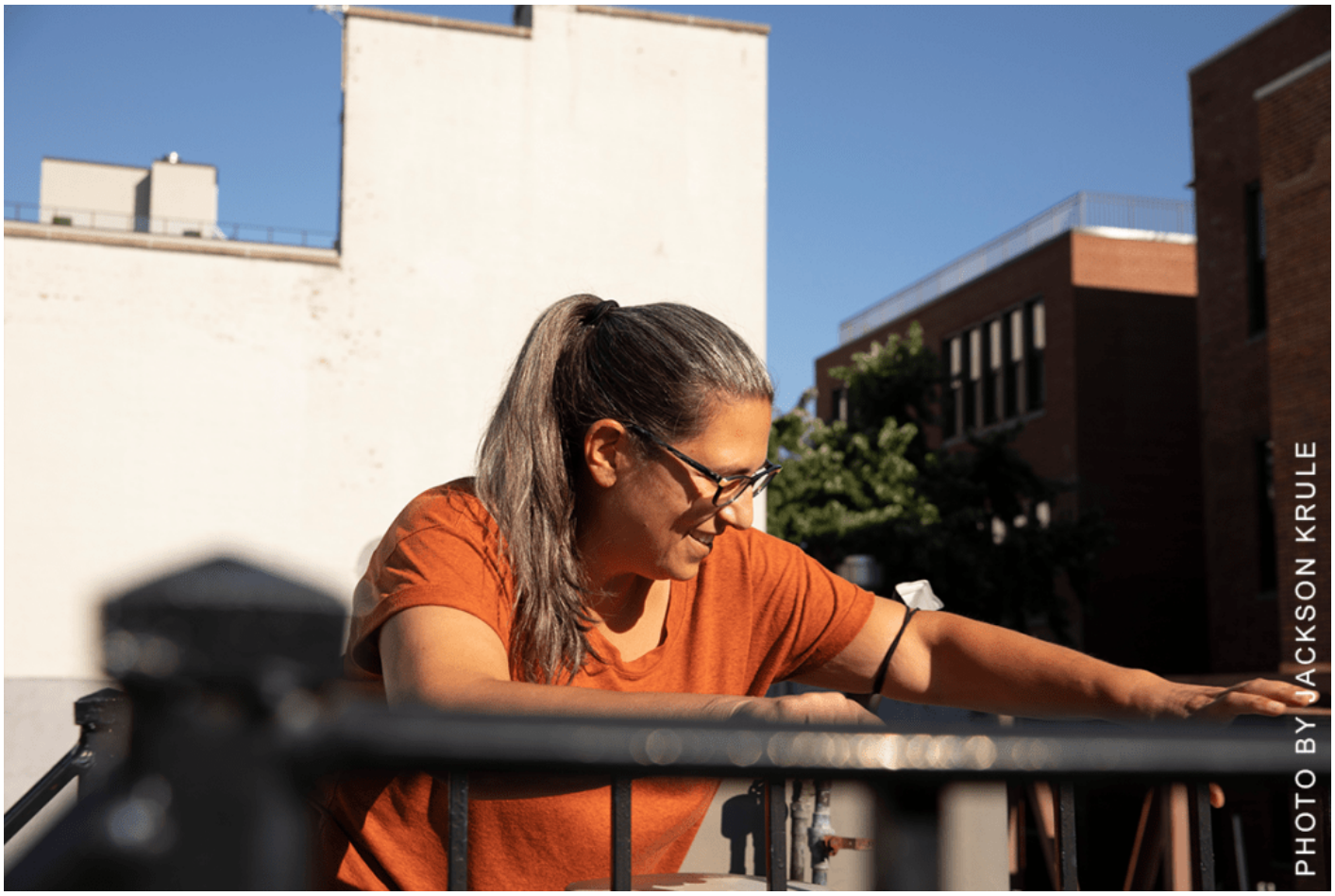
Biodigesters vary significantly in scale, from home-level units that rely on the input of a single or multiple families, to industrial facilities like those at Newtown Creek, with its gleaming silver eggs that have been icons on the East River for decades. They can also operate at an intermediate scale, like the biodigester developed by Magic Hat brewery, where the onsite set-up produces nearly all of the Vermont brewery's daily energy needs.

WHAT DOES THIS MEAN FOR THE COOP?

Could biodigesters be a good solution to help the Coop reuse its food waste to create energy and fertilizer? The short answer is: potentially, but likely only in partnership with our broader community.

When it comes to food waste, the Coop—like most grocery stores in New York City—produces not an insignificant amount of waste. The Coop doesn't have precise da-

ta on our food waste. General Coordinator Elinoar Astrinsky estimates that we fill a 65-gallon drum with discards almost daily during the summer months, and a bit less during the cooler months. Using a very rough estimate, that means the Coop likely produces around 66 tons of food waste annually.[1]



General Coordinator Elinoar Astrinsky

What do we do with that waste? It is hard to imagine a more thoughtful approach more in the cooperative spirit than what we already do. The first thing the Coop does is prevention. With our air conditioning and refrigeration, the cool temperatures at the Coop help to extend the shelf life of our produce. The second is diversion: the Soup Kitchen Committee oversees a daily delivery of food that is slightly bruised but still good to the C.H.I.P.S. food kitchen on 4th Avenue.

When it comes to the unavoidable waste of the Coop, we do three key things. The first is led by the Compost Committee. For more than 20 years, the Coop's Compost Committee comes in daily to collect food waste and then processes it in local commu-

nity garden compost facilities. This food waste then gets turned into compost that becomes fertilizer for the gardens.

> “IN A FUTURE WHERE WE CONTINUE TO BURN FOSSIL FUELS AND OUR WASTE STREAMS ARE A NET LOSS, WE NEED TO BETTER MANAGE THESE WASTE STREAMS AND THE ORGANIC MATTER THEY PRODUCE AS THEY DECOMPOSE.”

If there is too much food waste for the Compost Committee, the remainder is picked up by a group called BK ROT, New York City’s first community-supported, bike-powered, fossil fuel-free food waste hauling and composting service. The organization provides young people of color who are interested in getting a foothold in the environmental space with jobs hauling residential and commercial organic waste and transforming it into high quality compost. The Coop then sells this compost to members, creating a closed loop of our food waste.

Finally, in the summer months when there is that excess compost due to warmer temperatures, the Coop contracts with a compost hauling service called Mr. T Carting. They take the remaining compost to an industrial composting facility upstate. This remaining portion of our compost—which is not insignificant during summer months—could be converted to a biodigester to keep all of our food loss and waste local, and to maximize the recovery of methane.

A bin ready for compost.

When it comes to energy, the Coop has already done quite a bit to reduce the greenhouse gas emissions associated with our energy use. Currently, the Coop gets its energy from a provider called Constellation Energy. Constellation sells energy to the local utility, Con Edison, and we direct Constellation on what kind of energy to procure. For several years, now the Coop has purchased exclusively wind energy through Constellation to meet our electricity needs.

Beyond wind energy, the Coop has aggressively pursued efforts to improve energy efficiency such as completing an LED retrofit of all our lighting. This last action alone reduced our annual electricity bill by $40,000 at zero cost to the Coop, as we took advantage of a retrofit program offered by Con Edison.

We still use some amount of natural gas to power our ammonia absorption chillers for air-conditioning, and this alone may be reason to explore biodigesters as a way of capturing methane that might otherwise be released to the atmosphere from food

waste. “We are always looking for opportunities to reduce our energy usage,” said Astrinsky.

WHERE DO WE GO FROM HERE?

While the Coop has a sophisticated approach to reducing our greenhouse gas emissions and utilizing our food waste in ways that are good for our community and the planet, biodigesters could play a role to help fully wean the Coop off of fossil fuels. But likely not without cooperation beyond our membership, as a biodigester is a significant undertaking.

Says Faust, “Biodigesters might be something to explore as a community initiative. Could the Coop create a collaborative project in your neighborhood where you work with restaurants and other grocery stores to create community-generated power?” Working at this scale could offer two solutions: the need to reduce food waste in our city, and the need to reduce our reliance on natural gas.

Individual homeowners may also want to consider home-scale biodigesters as a way of reducing their impacts. With a regulatory gray area due to unclear permitting requirements, home biodigesters are technically feasible and in widespread use as a retrofit to septic systems, for example. Landfield has witnessed one of these home biodigesters in action. “They are remarkable to see because all of the things about the processes make absolute logical sense. Human waste produces methane, and methane is a component of the natural gas we get from National Grid.” He continues, “We desperately need ways to better manage these resources, or it will just be one crisis after another.”

John B. Thomas works on the sustainability and social impact team for a purpose-driven apparel company.

[1] Food scraps, solid and liquid fats weigh 412 lbs. in a 55 gallon drum, or 487 lbs. in a 65 gallon drum. Assuming we gather 1 65 gallon drum per day for 6 months of the year, and half of that for the other 6 months, the annual tally comes out to approximately 132,952 lbs. or 66 tons, of food waste per year.