PBS Network – Street Science – Re-inventors

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Eric Keto | **Video Producer** | 307-214-1584 | eketo@KCTS9.org
Katie Herzog – Show Host
KCTS 9 | Crosscut | Hive Media Lab | A part of Cascade Public Media
401 Mercer Street
Seattle, WA 98109
KCTS9.org

What do we typically do with our organic waste now? Where does it go? What costs are involved in processing it?

Nationally it almost all goes into landfills or incinerators. Some cities like Seattle have more options for organic waste collection and composting. The Northeast and West Coast are leading this trend. The costs for business as usually are associated with cleaning up dirty dumpster areas, collection and hauling, and then disposal or recycling in someone else's community.

Talk us through this technology - how does it work? What are the inputs and outputs? How long does the process take?

This is really remarkable: microbes convert the decomposing food into natural gas and liquid fertilizer. Think of this as a mechanical cow or horse. It eats, burps gas, and makes manure. This is biomimicry. Of course, it's not new. Our innovation is that we have miniaturized it, made it affordable, and designed for odor control and fertilizer generation.

How did you come up with the name - is it fair to compare this machine to an actual horse?

It is fair. HORSE is an acronym. It's short for High-solids Organic Waste Recycling System with Electrical output. HORSE. It also is a living system. It generates horsepower….5.5 HP sit inside it. Plus, it's something humans can become attached to.

How did you develop this idea? How long have you been working on devices like HORSE? Are there other folks doing similar work?

I started working with digesters when I was in college at Purdue University in Indiana. My entire engineering career has been focused on infrastructure and how to use microbiology to convert waste into new resources. I have personally witnessed over 10 million tons of waste become something new and valuable, compost, soil, energy, fertilizer, etc. I started Impact Bioenergy in 2013 because no one else in North America was offered microdigesters. The least expensive digester was $5 million. We know of a few companies in Europe doing something similar but none made in the United States.

What are the benefits of housing something like this in a shipping container versus trucking the waste offsite?

Great question: trucking has a few issues we wanted to address.

The burning of diesel fuel is the largest source of GHG from vehicles (25 billion gallons of fuel per year in US; 10 kg GHG emissions per gallon +

traffic congestion is wasting money, time, and fuel ($305 B in lost productivity last year in US) +

valuable carbon-rich resources are being buried in landfills ($218 B of food is wasted and we spend another $15 B landfilling it).

That's equal to digging a hole and burying $1,650 for each person in the United States….every year!

How much maintenance does the device typically require?

This HORSE takes about 2 hours a week to feed and manage. We have designed it to be easy and automatic. Very few moving parts and the foodwaste flows by gravity through the digester.

What are the biggest challenges associated with a device like this? Keeping it running? Gathering raw material? Expense? Energy output?

The biggest challenge for us is finding early adopters and innovators that will lead by example. There are 4,000 college campuses that want to be green stall when the discussion talks about space, and cost accounting, and who will run it. Simple issues that need leadership. UC San Diego finally broke out and will be installing one at their new campus expansion. We hope other campuses will be inspired by UC San Diego.

Where does this tech stand currently? How many of these devices are operational and where are they currently used?

The technology is not new. It's commonly used at wastewater plants and dairy farms. Many low and medium income economies also use digesters on a global basis for cooking and gas lighting, as well as controlling disease from animal waste to make fertilizer.

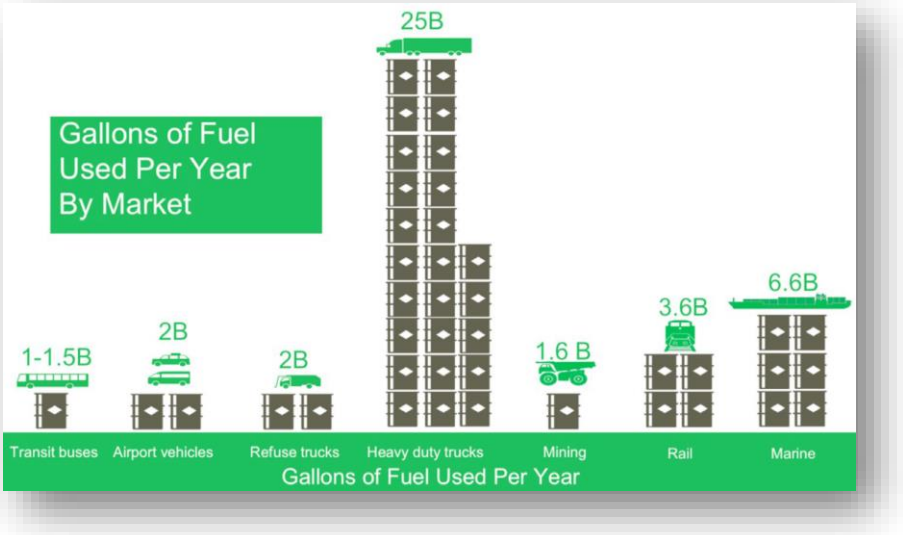
Where do you see this tech headed in the future? Where would it be most useful? Why should companies/individuals/governments pursue something like this?

This is a universal problem – waste, energy, and growing food. We are getting daily inquiries from islands, campuses, beverage and food manufacturers, and food service and catering operations. We are inspiring people to find a better way to move carbon-rich resources back to the soil. The NY Times and NP Radio both features soil regeneration as a cutting edge issue just this month. Our systems truly deliver a zero-waste solution by recovering the nutrients, energy, water, carbon and organic matter embedded in renewable biomass resources. Rarely does an opportunity come along that can positively touch on energy, water, air, soil, food, jobs, and education simultaneously.

Could something like this be scaled up/adopted for wider use? If so, what would the impacts be?

Yes. Anyone that is bothered by traffic, fossil fuel use, waste, and wants to see more a more resilient society with renewable energy, jobs, and soil regeneration will be interested. It enables greater independence from fossil fuel and chemicals in our food cycle. Our HORSE has an appetite for 960 lbs. per week. Our larger NAUTILUS can process 35,000 lbs. per week. The HORSE is ideal for small campuses, craft brewers/distillers, and restaurants. The NAUTILUS is being deployed on an island.

References



PRODUCING RENEWABLE NATURAL GAS FOR USE IN US VEHICLE FLEETS; new energy update

Traffic's Mind-Boggling Economic Toll

BENJAMIN SCHNEIDER FEB 7, 2018

The largest study of its kind ever conducted reveals just how how costly the scourge of traffic is in the world's greatest cities.

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In the U.S. alone, congestion cost $305 billion last year, an increase of $10 billion from 2016. That's the big, bad takeaway from the largest-ever study of global vehicular traffic by the transportation consulting firm INRIX. Armed with five terabytes of data on 1,360 cities in 38 countries, the study provides a strong empirical sense of how much traffic congestion costs individual cities and drivers.

Not surprisingly, traffic takes the biggest economic toll on the largest, most economically vibrant cities.

https://www.citylab.com/transportation/2018/02/traffics-mind-boggling-economic-toll/552488/

Recycling and composting prevented 87.2 million tons of material away from being disposed in 2013, up from 15 million tons in 1980. This prevented the release of approximately 186 million metric tons of carbon dioxide equivalent into the air in 2013—equivalent to taking over 39 million cars off the road for a year. Learn more about how common wastes and materials, including food and yard wastes, paper, metals, and electronics, contribute to MSW generation and how they can be recycled.

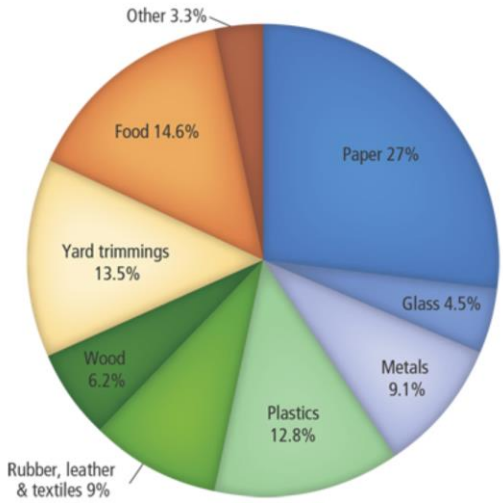

Figure 4. Total MSW Generation (by Material), 2013
254 Million Tons (before recycling)

https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/

U.S. Food Waste - Statistics & Facts

According to the Food Waste Reduction Alliance (FWRA), food waste is defined as 'any solid or liquid food substance, raw or cooked, which is discarded or intended or required to be discarded'. Food waste is regarded as a widespread problem throughout the food industry and occurs in every aspect along the supply chain in the United States as well as worldwide.

In 2015, the value of the food waste from U.S. homes, consumer-facing businesses, farms, and manufacturers came to approximately 218 billion U.S. dollars. From U.S. homes alone, some 27 million metric tons of food was wasted in 2015, out of a total of nearly 63 million metric tons. One example of a food that is wasted by nearly one third in the U.S. is bread. As of 2016, some 32 percent of bread is wasted in the U.S., with 20 percent of that amount wasted in the kitchen, and the remaining 12 percent wasted in the store.

https://www.statista.com/topics/1623/food-waste/