

EBMUD Wastewater Treatment Plant

Oakland, California, USA

Status | Project | Contact

Implemented | Wastewater treatment | East Bay Municipal Utility District (EBMUD)

Food waste is the second largest category of municipal solid waste (MSW) sent to landfills in the United States, accounting for approximately 18% of the waste stream. Over 30 million tons of food waste is sent to landfills each year. Of the less than 3% of food waste currently being diverted from landfills, most of it is being composted to produce a fertilizer.

In addition to developing traditional hydropower projects, water utilities are beginning to explore the potential to generate energy by retrofitting water collection and delivery conduits with in-line hydro turbines. Wastewater treatment plants can optimize the energy efficiency of their core equipment by using variable frequency devices, implementing energy-saving automation schemes and right-sizing impellers. Many water utilities are actively working to reduce the energy and GHG footprints of their facilities and ease the load on the existing power grid by increasing efficiency and generating energy on-site.

The wastewater treatment plant operated by the East Bay Municipal Utility District (EBMUD) in Oakland, California is more than a treatment plant--it's also a green factory. Biodegradable wastes in sewage, food scraps and grease from local restaurants, plus waste streams are utilized to generate biogas and fertilizer. In 2012, EBMUD's wastewater treatment plant became the first net-positive, energy-generating wastewater plant in the United States; it produces more renewable energy onsite than is needed to run the facility, with additional biogas to power its low-emission gas turbines.

Lessons Learned

- Modified sewage treatment facilities offer an effective and cost efficient option for the treatment of food waste and capture of methane and production of organic fertilisers as by-products.
- Methane produced through treatment processes can enable facility energy independence and be sold to the electric grid.
- The skills and technology required for these activities normally already exist in sewage treatment facilities.

The issue

Case background/context

In the United States food waste is the second largest category of municipal solid waste (MSW) sent to landfills, accounting for approximately 18% of the waste stream and consisting of 30 million tons. Less than 3% of this total food waste is diverted away from landfill, making it one of the least recovered materials in the municipal solid waste stream. This is despite it being one of the most important materials to divert as food waste has, according to a study by the East Bay Municipal Utility District (EBMUD), three times the methane production potential as bio-solids. Methane is the main component of natural gas and its capture in the decomposition of food waste is integral for achieving greenhouse gas reduction goals and also has a significant role within a drive for energy independence.

Traditional wastewater treatment plants, both in the US and globally, tend to only deal with sewage sludge. However these plants can also be considered as ideal places to divert and treat food waste in order to produce additional gas and fertiliser. When facilities start digesting food waste, the increased energy production allows them to offset the amount of energy they are using and potentially sell excess energy back to the grid.

The response

The main objective of the case

In order to decrease food waste and mitigate climate change impacts, EBMUD's main wastewater plant has initiated an innovative method of reducing the amount of food waste reaching landfills while simultaneously producing renewable energy. This has involved the utilisation of a sewage treatment facility to convert post-consumer food scraps to energy via anaerobic digestion. The facility is the first of its kind in North America.

Waste haulers collect post-consumer food waste from local restaurants and markets and take it to the EBMUD sewage facility. In an anaerobic digester bacteria break down the food waste, releasing methane as a by-product. The methane is captured and used as a renewable source of energy to power the treatment plant. After the digestion process, the leftover material can be composted and used as a natural fertilizer. Anaerobically digesting food waste prior to composting reduces the emissions of volatile organic compounds (VOCs) which contribute to air pollution.

The results

Outcomes

The EBMUD pilot facility described above currently converts 20 to 40 tons of restaurant food scraps to electrical power per day. Through the treatment of food waste, in addition to sewage waste, the wastewater treatment plant is net-positive, producing more than enough renewable energy to meet onsite power demands. This monumental accomplishment was achieved through the installation of an energy-efficient, low-emission gas turbine in 2011.

Renewable energy that is produced beyond the plant's energy requirements is sold back to the electric grid, thereby reducing greenhouse gas emissions and providing savings for EBMUD ratepayers. The surplus can also be used for carbon credits. Biogas production saves EBMUD approximately \$3 million each year by reducing electric power demand. Furthermore by introducing food waste treatment into the wastewater treatment plant, the project supports local and regional efforts towards greenhouse gas reduction (climate change), oil independence, zero waste and landfill reduction.

In addition to the production of renewable energy, the co-digestion of food waste with sludge at wastewater treatment plants in EBMUD has a number of additional advantages:

- As EBMUD wastewater treatment facilities are located in dense, urban areas where the food waste is generated, the costs and emissions associated with transportation are reduced.
- As many EBMUD wastewater treatment facilities already have anaerobic digesters, infrastructure investment costs were minimized and on-site expertise for operation was pre-existing.
- A by-product of the anaerobic digestion of food waste is organic fertiliser for agricultural purposes. This contributes to reducing emissions associated with the production of chemical fertiliser.

Based on the success of the pilot project, EBMUD plans to grow this recycling program. By 2020, the EBMUD wastewater treatment plant could be selling twice as much electricity as it uses. EBMUD wastewater treatment plant has been creating a model of pioneering wastewater utilities that can be replicated and promoted in other regions.

References

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