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# **Food Waste Co-Digestion at Oneida County Water Pollution Control Plant (NY)**

## Business Case Analysis Snapshot

## Glossary

AD	Anaerobic digestion
CHP	Combined heat and power
FOG	Fats, oil, and grease
kW, kWh	Kilowatt, kilowatt hour
mgd	Million gallons per day
NYSDEC	New York State Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
O&M	Operations and maintenance
OCSO	Oneida County Sewer District
OHSWA	Oneida-Herkimer Solid Waste Authority
SSO	Source separated organics
WPCP	Water Pollution Control Plant

## ACKNOWLEDGMENTS

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Jones, C.A.; Coker, C.; Kirk, K.; and Reynolds, L. 2019. **Food Waste Co-Digestion at Water Resource Recovery Facilities: Business Case Analysis. Project ENER19C17/4792.** Water Research Foundation: Alexandria VA and Denver CO. Copyright © 2019 The Water Research Foundation.

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Cover photo is an aerial view of the Oneida County Water Pollution Control Plant and OHSWA's Eastern Transfer Station (where food scrap preprocessing occurs), courtesy of Oneida County. Cover design by Evan Odoms.

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# Oneida County Water Pollution Control Plant

## Oneida County, New York

In upstate New York, the Oneida-Herkimer Solid Waste Authority (OHSWA) and Oneida County/Oneida County Department of Water Quality and Water Pollution Control (Oneida County), with adjacent facilities in the city of Utica, have partnered to create a Food2Energy program to divert food waste from landfill to anaerobic digestion. The partnership, initiated prior to New York State enacting the Food Donation and Food Scrap Recycling Act, provides a food scrap recycling option for food scrap generators, including the large generators of food scraps located within 25 miles of the facility (which includes most of Oneida and Herkimer Counties) that are covered under the new recycling mandate effective January 2022.

The Oneida County Sewer District (OCSD), which is administered by the Oneida County Department of Water Quality and Water Pollution Control, provides wastewater services for 110,000 residents in 15 municipalities, including the City of Utica, NY. Oneida County's Water Pollution Control Plant (WPCP) (33 mgd average daily flow) and sewerage system is undergoing a \$380 million upgrade. Based on a long-term financial analysis conducted to inform the design of the upgrades, the utility decided to shift from incinerating its biosolids to treating them via anaerobic digestion and elected to add 10-12% capacity to its new digesters to accommodate co-digestion.

OHSWA is a New York State public benefit corporation, created at the request of Oneida and Herkimer Counties in 1988 to provide sustainable solutions to solid waste management for the 75 communities in the two counties, including developing new facilities and programs for waste reduction and recycling. The Authority, which receives no financial support from the Counties, is funded primarily by facility tip fees, with additional revenues from the sale of recovered products (landfill gas, recyclables, compost), carbon and other environmental attribute credits, and grants.

The Food2Energy program launched in 2019, after construction was completed of a source separated organics (SSO) preprocessing facility at OHSWA, and new anaerobic digesters and a new liquid receiving station at the WPCP.

### **OHSWA Organics Management Strategy and Investments**

In alignment with its mandate to maximize recovery and recycling, OHSWA – in partnership with Oneida County – in 2016 initiated a feasibility study of co-digestion of commercial SSO in Oneida County's proposed new digesters. The Authority manages a compost facility currently used for yard waste, but it has insufficient capacity to expand to accept food scraps. Based on the study finding that the scale of potential commercial SSO supply was sufficient to make preprocessing for co-digestion economically feasible, OHSWA moved forward with commissioning the design and construction of a SSO processing facility in its Eastern Transfer Station, located in a property adjoining the WPCP. Construction was completed in 2019.

The commercial SSO that is collected and hauled to the site is unloaded onto a sloped concrete tipping floor with a drain for inspection and removal of unprocessable items. The SSO is then loaded into a Scott THOR Turbo Separator, which reduces the particle size, and after gray water from the WPCP is added to aid in emulsification, separates out packaging and other contaminants. OHSWA chose the THOR organics separator for its high-throughput capacity – 12 to 20 tons per hour – and its high tolerance for contamination. The processed SSO is pumped to a 7000-gallon conical bottom mixing tank. This tank is





**Figure 1. Scott Equipment THOR Turbo Separator in the Oneida-Herkimer Solid Waste Authority SSO Preprocessing Facility in the Eastern Transfer Station. Source: OHSWA.**

continuously mixed to prevent settling and more gray water added to dilute the slurry to a total solids (TS) content of 10%. Currently the slurry is hauled across the street to the WPCP by truck. Construction of a force main connecting the two facilities to pipe the slurry underground is in the works. OHSWA also will be installing a meter to measure percent solids, in order to manage the addition of gray water to achieve the 10% TS target for the slurry to be pumped to WPCP.

### **Generator Participation**

The feasibility study, which anticipated that participation would increase over time, estimated that an initial phase of the program could yield 5,000 tons per year, from a combination of large generators currently sending their food waste to landfill – which are subject to the mandate (as of January 2022) – plus smaller voluntary participants with sustainability commitments. Due to the uncertainties in projecting compliance and voluntary participation, the analysis for sizing equipment needs and assessing economic feasibility of the program included a sensitivity analysis over a range of SSO tons supplied, from 5,000 tons per year in the initial phase to 21, 000 tons per year, the estimated maximum for currently available SSO.

OHSWA provides an economic incentive for generators to participate in the program by charging a tipping fee for SSO of \$40 per ton, for a savings of \$22 on the \$62 per ton tipping fee for garbage.

Currently around 15 large organics haulers are participating, transporting SSO to OHSWA from generators including Hannaford grocery stores, food manufacturing companies (e.g., Chobani and Hood), local colleges and some restaurants. Other generators have expressed interest in the program.

Over the 18 months from July 2019 through December 2020, OHSWA has received 4300 tons of commercial SSO. Quantities from food manufacturing have been increasing during this period, as more facilities are being added to the SSO pickups. However, institutional food service organizations and restaurants have experienced reductions in business due to COVID-19, and many have postponed considerations of participation. When the impacts of COVID-19 on the food sector diminish, the Authority will concentrate on outreach and education to increase the participation of generators within the waste shed, including restaurants and others not subject to the mandate. As participation grows, the hauling costs will become more competitive, which will improve the economics for generators.

### **Financial Impacts**

OHSWA has invested \$3.7 million in the design and construction of the SSO preprocessing facility, including construction of a new building and installation of preprocessing equipment, storage tanks, and pumps. It has received grants to cover portions of the capital costs from NYSDEC, including a Climate Smart Communities Grant, in partnership with Oneida County, for \$1,327,500 and an additional \$276,407 grant from NYSDEC's Municipal Waste Reduction and Recycling Program. OHSWA paid for the rest of the project through its cash reserves.

The organics facility tip fee was set to cover the capital and building and equipment O&M costs of the SSO processing system. OHSWA has an integrated tip fee, where the higher tip fee for municipal solid waste cross-subsidizes the recycling waste streams, by covering overhead costs of administration, outreach and public education, shared by all, as well as the operating costs of traditional recycling (for which no tip fee is charged), and any operating losses from organic recycling. To date, the revenues from organics recycling are comparable to its capital and O&M costs.

### **Oneida County Co-digestion and Energy Strategy and Investments**

Oneida County's Water Pollution Control Plant (WPCP) (33 mgd average daily flow) and sewerage system is undergoing a \$380 million upgrade, primarily motivated by a regulatory mandate to mitigate combined stormwater and sanitary sewer overflows in the collection system. To accomplish this, the upgrades will increase peak design flow from 55 to 111 mgd. The initial upgrade plan for biosolids management was to refurbish their incinerators, but a 30-year financial analysis indicated an anaerobic digester (AD) solution would have higher net returns. In addition to lower O&M costs, another advantage of AD would be to sidestep the increasing stringency of air quality regulations for incinerators. When evaluating future needs for AD capacity, Oneida County incorporated an additional 10-12% of volume for co-digestion.

In 2019, the utility decommissioned its incinerators, and constructed two new egg-shaped digesters, and a secondary digester with a gas holding structure. It also constructed a liquid waste receiving station in front of the digesters. At the station, the WPCP is currently using JWC "Honey Monster" septage receiving equipment to preprocess the food slurry before adding it to the blend tank. Because the plans for the Food2Energy program had not gelled when the contracting occurred, the receiving capacity was designed for food processing residuals, such as dairy whey, as well as fats, oil and grease (FOG). In a subsequent construction project, the utility is planning to install a SAVECO "The Beast", which includes a drum screen

and augur, to screen the slurry for contaminants. When that occurs, the septage receiving station will be moved to the headworks of the plant.

Oneida County invested in a Unison Solutions biogas conditioning system to remove siloxanes, moisture and Hydrogen Sulfide from the biogas, and three Capstone 200-kW microturbines and heat exchangers to recover energy from the biogas. After conditioning, the gas is channeled through the microturbines, which produce electricity and generate heat used to heat the digester complex and the liquid receiving station. There are plans to add two more 200-kW microturbines to increase capacity from 600kW to 1,000kW within the next few years.



**Figure 2. New Capstone microturbines at the Oneida County Water Pollution Control Plant.** Source: Oneida County.

### **Operational Impacts**

The facility has co-digested about 5 million gallons of food slurry over the past 19 months through February 2021. It does not currently accept FOG waste. The plant has not experienced digester upsets during this period.

Because co-digestion started shortly after the digesters became operational, it is difficult to identify the impacts of co-digestion *per se*. Oneida County estimates that the 12% of feedstock from food slurry increases biogas by 20%. It does not have an estimate of the impact on biosolid production.

### **Financial Impacts**

The investments supporting the Food2Energy program to date, including the three digesters, a new liquid receiving station, and three 200-kW microturbines, cost \$30 million. The approximate cost for future investments include \$1.9 million for two new 200-kW microturbines and heat exchangers and \$330,000 to install preprocessing equipment designed for food waste slurry and FOG in the receiving station.

With a tipping fee of \$.02/gallon, Oneida County has earned \$100,000 in tip fees over the 19 months of co-digestion. With the estimated increase in biogas from co-digestion, it has produced an additional

959,000 kWh, for a cost savings of \$63,000. The combined impact on net revenue is an additional \$8590/month. The plant was able to reduce labor costs with the shift from incineration to AD (by cutting the two 24/7 positions monitoring the incinerators); the addition of co-digestion has not added appreciably to labor costs.

Oneida County anticipates receiving a total of \$2 million from a NYSERDA grant program supporting the installation and operation of Anaerobic Digester Gas (ADG)-to-Electricity Systems, including \$1 million received upfront for capital costs and \$1 million payback over 10 years based on metered electrical production. The county has been exceeding the “minimum” production required for the \$100,000 annual payback.

Oneida County is financing \$348 million for the facility and sewer system upgrade program, primarily with low interest loans from the New York State Clean Waste State Revolving Fund. In addition, the County has received a total of \$32 million in grants for the project as a whole.

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**Figure 3. New egg-shaped digesters and septage receiving station at the Oneida County Water Pollution Control Plant. Source: Oneida County.**





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1730 M Street, NW, Suite 700

Washington, DC 20036

Tel: 202.939.3800

Fax: 202.939.3868

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