



City Council Report

Date: September 17, 2018
To: City Council
Through: John Pombier, Assistant City Manager
From: Scott Bouchie, Environmental Management and Sustainability
Department Director
Niel Curley, Special Projects Manager
Subject: Food-to-Energy Bench-Scale Digester Testing Intergovernmental
Agreement (Citywide)

Purpose and Recommendation

The City Council is requested to approve and authorize the City Manager, or his designated representative, to enter into the Bench-Scale Digester Testing Intergovernmental Agreement (IGA) with Arizona State University for bench-scale digester testing services as part of the City's food-to-energy concept program.

Background

As part of Council budget discussions during the FY 18/19 Budget process, the Environmental Management and Sustainability (EMS) department introduced the food-to-energy program at the Council's [April 5th Study Session](#). The food-to-energy program is a conceptual commercial service that would collect food waste, then co-digest that food waste with wastewater in the anaerobic digesters at the City-owned Northwest Wastewater Reclamation Plant (NWWRP). The result of co-digestion is the increased production of methane that could be captured and used to fuel the City's collection trucks or utilized to generate on-site power at the NWWRP.

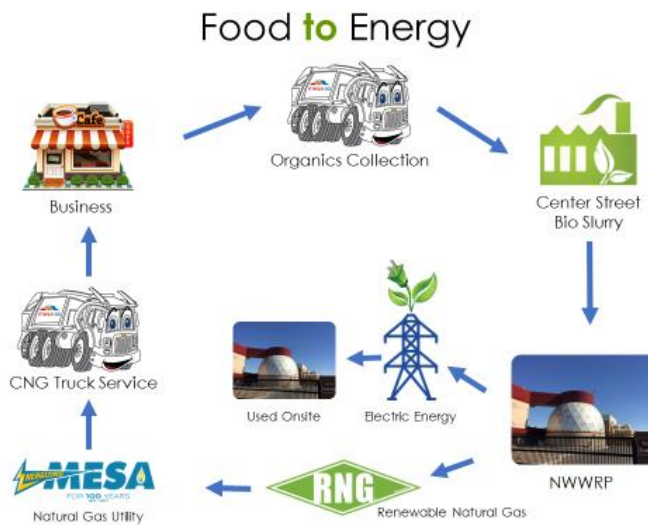


Figure 1 - Food to Energy Conceptual Program

The EMS department will be conducting a year-long feasibility study to analyze the technical, operational, and financial feasibility of a food-to-energy program from October 2018 to September 2019. Included in the feasibility study is bench-scale digester testing, which will replicate the operating conditions of the anaerobic digesters at the NWWRP on a small scale, then analyze and document the effects of adding food waste.

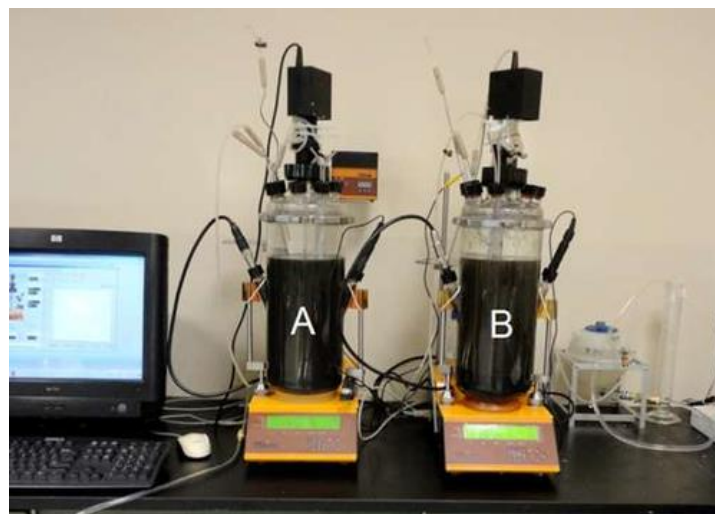


Figure 2 - Example Bench-Scale Digesters

Discussion

The Biodesign Swette Center for Environmental Biotechnology (BSCEB) at the Arizona State University Tempe campus has award-winning staff with expertise in wastewater operations and bench-scale digester testing. The IGA lays out a scope of work for the BSCEB with milestones they must accomplish throughout the yearlong test period. The BSCEB will also be required to provide the necessary data and information the City will need to understand the effects of adding food waste to the digesters at the NWWRP. Monthly progress reports with data and findings will be provided to the City and its engineering consultant. At the end of the test period,

the BSCEB will be required to deliver a report to the City with an analysis of the data and the anticipated impacts of adding food waste at the NWWRP.

In addition to testing the effects of co-digesting food waste, the BSCEB will also analyze the effects of adding a combination of food waste and fats, oils, and grease (FOG) to the digesters at the NWWRP. The City has partnered with the City of Tempe for the food waste and FOG bench-scale digester testing. The City of Tempe will fund the food waste and FOG portion of the study, and the City of Mesa will fund the food waste portion of the study.

In total the BSCEB will run five bench-scale digesters with one serving as the control, two accepting food waste, and two accepting a combination of food waste and FOG. The City of Mesa will provide the sludge and the City of Tempe will deliver FOG samples through their grease co-operative. Food waste samples will be provided by the City of Mesa and ASU.

Alternatives

The City has the option to slowly introduce food waste and or a combination of food waste and FOG to the digesters at the NWWRP and observe the effects. Bench-scale digester testing allows the City to understand the impacts of co-digestion at no risk to current operations. The bench-scale digesters will be operating at parameters mirroring current operations at the NWWRP and will provide insights into potential harmful impacts to the digesters, allowing the City to mitigate against possible adverse effects if the program were to launch at full scale. The data and information will also provide insights into the expected biogas composition and methane production aiding in the financial feasibility analysis of the food-to-energy program. Utilizing the expertise of the staff at the BSCEB and their capacity for bench-scale digester testing will provide valuable insights that will determine future operational procedures.

The City can opt to not perform the bench-scale digester testing and rely on existing research literature to estimate the effects of co-digesting food waste or a combination of food waste and FOG. The bench-scale digester testing will use Mesa specific inputs (FOG, sludge, and food waste) resulting in Mesa specific data applicable to the NWWRP. The bench-scale digester testing is designed to closely mimic the NWWRP yielding directly applicable analysis and data.

Fiscal Impact

The cost for Mesa's portion of the bench-scale digester testing is not to exceed \$113,775. ASU will invoice the City monthly to recover costs associated with bench-scale digester testing.

Coordinated With

The food-to-energy program is a collaboration between City departments including EMS, Energy Resources, Water Resources, and Engineering. The scope of work has been reviewed and approved by Water Resources and Engineering staff. The IGA has been reviewed and approved as to form by the City Attorney's Office.