

The Issue

Food and other organic material represents more than two-thirds of all waste landfilled annually in California. This equates to an estimated six million tons of food waste. As organic waste degrades in landfills it produces methane, a highly potent greenhouse gas (GHG). In response, the State of California passed legislation to increase organics recycling by 75% over 2013 levels by 2025, creating an opportunity for innovative solutions to recover valuable resources from this organic 'waste' and reduce GHG emissions.

The Project

Lystek International facilitated a partnership between the Goleta Sanitary District and the University of California, Santa Barbara with assistance from the California Energy Commission's Electric Program Investment Charge (EPIC) program.

The Lystek-Goleta Digestion & Co-Generation project proved that it is technically feasible to divert organic waste from landfills and efficiently recover valuable resources - including green energy and fertilizer - onsite at Water Resource Recovery Facilities (WRRFs).



Proven Technologies – Working in Unison

This project demonstrated how proven technologies can work together to:

-  Improve organic material processing and divert waste from landfills
-  Optimize digester performance
-  Reduce residual waste volumes and increase biogas generation
-  Produce a Class A quality biofertilizer product with proven demand

Multiple configurations were demonstrated:

1. Food waste → anaerobic digestion (*established baseline*)
2. Hydrolyzed food waste → anaerobic digestion
3. Hydrolyzed digested municipal biosolids → anaerobic digestion
4. Hydrolyzed TWAS only → anaerobic digestion

The Partners

Project partners collaborated to process biosolids from the Goleta Sanitary District and food waste from UCSB and leverage Lystek THP® to optimize digestion performance and biogas production.

The Benefits



Operational Savings

This project proved that valuable resources can be reliably and cost-effectively recovered from organic wastes using efficient and easy to operate systems that can optimize the use of conventional WWRF infrastructure.



Reduced GHG Emissions

Diversion of organic materials not only extends the limited life of landfills, but also reduces harmful GHG emissions.



Increased Biogas

This configuration increases biogas generated compared to conventional anaerobic digestion.

Renewable biogas reduces our dependency on fossil fuels and supports alternative sustainable energy solutions.



Fertilizer Production

There is the opportunity to fertilize the soils these foods were grown in by producing a low-volume, high value, fertilizer product to truly complete the circular economy.

Organic waste pre-processing

The **Smicon SMIMO30** unit is a proven European technology for pre-processing source-separated organics into a high-quality feedstock for anaerobic digestion. It depackages and separates packaged food waste with 99% efficiency, preparing the organic food waste for digestion.



Lystek THP

The patented and proven **Lystek THP®** system leverages a combination of heat, alkali, and high shear mixing to hydrolyze biosolids and organic materials.

SSO slurry and dewatered biosolids were processed using Lystek THP at low temperature and ambient pressure operating conditions to produce a more easily digested feedstock slurry for anaerobic digestion.



LysteMize Digestion

LysteMize® digestion uses the hydrolyzed residual feedstock to optimize anaerobic digestion performance. Lystek THP hydrolyzed material contains high quantities of soluble COD. This substrate delivers dramatically improved biodegradability and biogas yield. This offers enhanced renewable energy recovery and minimizes residual volumes requiring offsite management.



Proven Results

This project demonstrated how proven technologies can be used in multiple applications, all of which diverted waste from the landfill, generated additional biogas, and reduced residual solids.

When used to pre-treat difficult to digest SSO wastes:

- Biodegradability of the SSO improved by 327%
- Biogas production increased by 21%
- Biogas yields increased by 370%

When used to hydrolyze and refeed municipal biosolids:

- Soluble COD increased digested biosolids by 600%
- Biogas production increased by 15%
- Biogas yields increased by 10%
- Reduced residual biosolids by 15%

When used to hydrolyze TWAS upstream of AD:

- Soluble COD increased by 600%
- Biogas increase observed within 4 hours of THP
- Biogas yield increased by 21%
- Residual solids decreased by 18%
- Volatile solids reduction increased from 45% to 60%

This project demonstrates that Lystek THP and LysteMize digestion technologies can offer both wastewater treatment and other organic digestion facilities enhanced digestion of biosolids and non-hazardous organic residuals.

"Two of the main drivers for the next few years at our District are to become energy neutral and reduce our biosolids expenses. Being able to produce our own power will make us more resilient during power outages and reducing our overall biosolids quantities will reduce the ongoing expenses associated with disposal. The Lystek project has shown us success in both of these areas. We look forward to continuing to innovate with Lystek and making long-term progress on the District's economic and environmental initiatives."

Steve Wagner, General Manager, District Engineer, Goleta Sanitary District (California)

