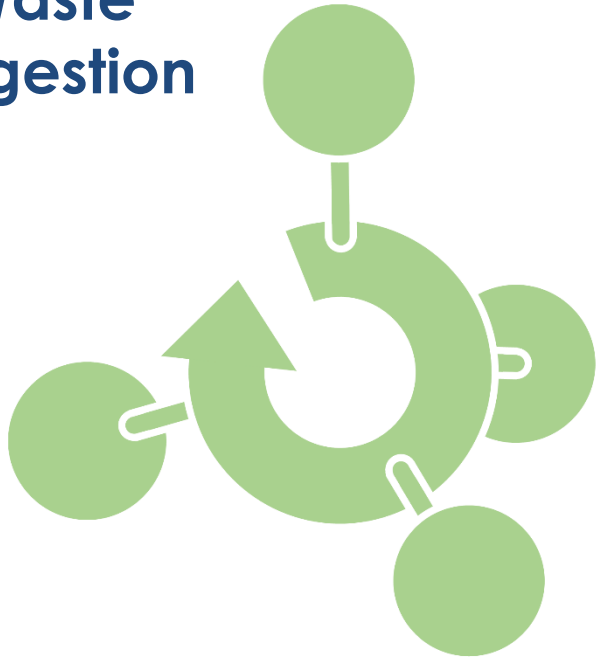
IE Seminar Series – The Power of Food and Ag Waste

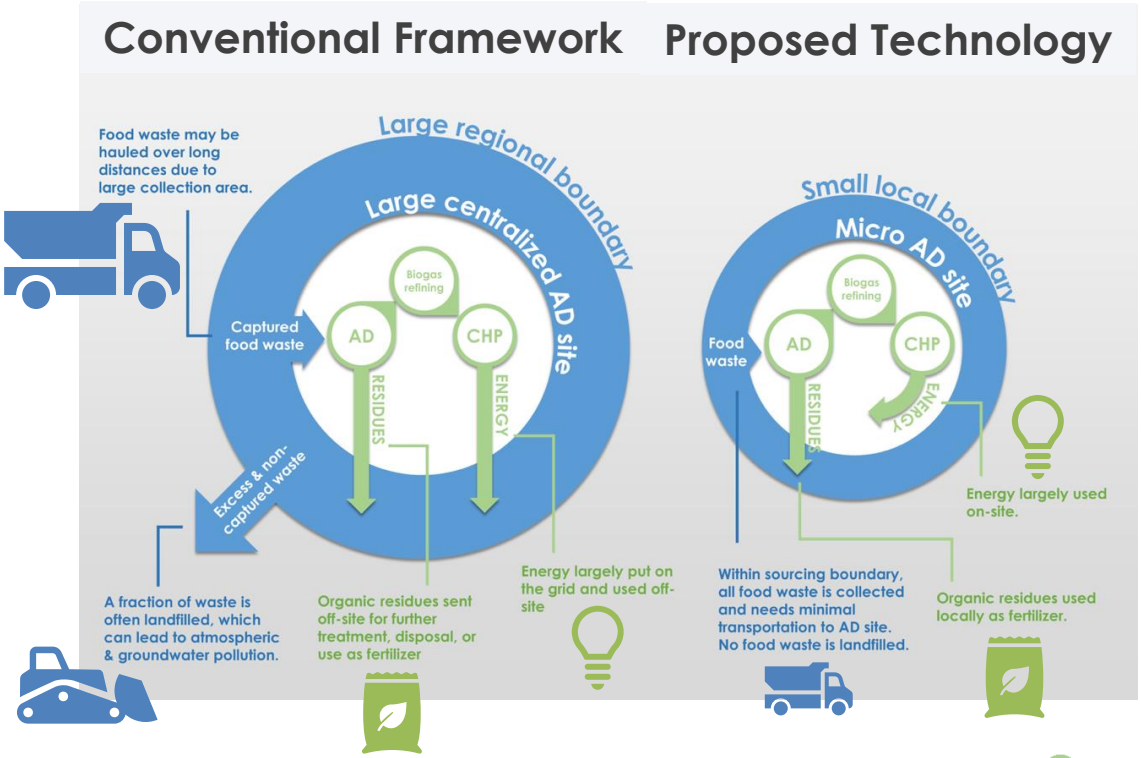
Demonstrating the Potential for On-Site Electricity Generation from Food Waste Using Containerized Anaerobic Digestion Units



Sara Pace, PhD
Postdoctoral Scholar
Food Science and Technology
8 March 2018

Background

- 40% of food is loss or waste, with most going to landfill (GHGs)
- Anaerobic digestion (AD) can produce electricity, heat, and fertilizer
- But what scale of AD infrastructure?



Goals and Objectives

- Goal: increase the deployment of cost-effective, small-scale AD systems to reduce GHGs
- Objectives:
  1. Install and operate innovative, AD solution to process food waste
  2. Monitor and enhance pilot AD system performance
  3. Evaluate technology benefits
  4. Outreach and knowledge transfer

Project Overview

Location: Navy Base Ventura County

Technology overview: **Flexibuster**

- Biochemical conversion of food waste to energy and fertilizer
- Containerized unit with remote monitoring capabilities
- 6,700 lbs/day (min 70% food waste)
- 64 kW CHP system
  - 479.5 MWh/year electricity
  - 27,740 therms of heat energy

Four-year project duration

UC DAVIS
UNIVERSITY OF CALIFORNIA

BIODICO
SUSTAINABLE BIOREFINERIES

Project Partners

SEaB™ energy

SAN NICOLAS ISLAND
POINT MUGU
NAVAL BASE VENTURA COUNTY
PORT HUENEME

Site Prep and Operations

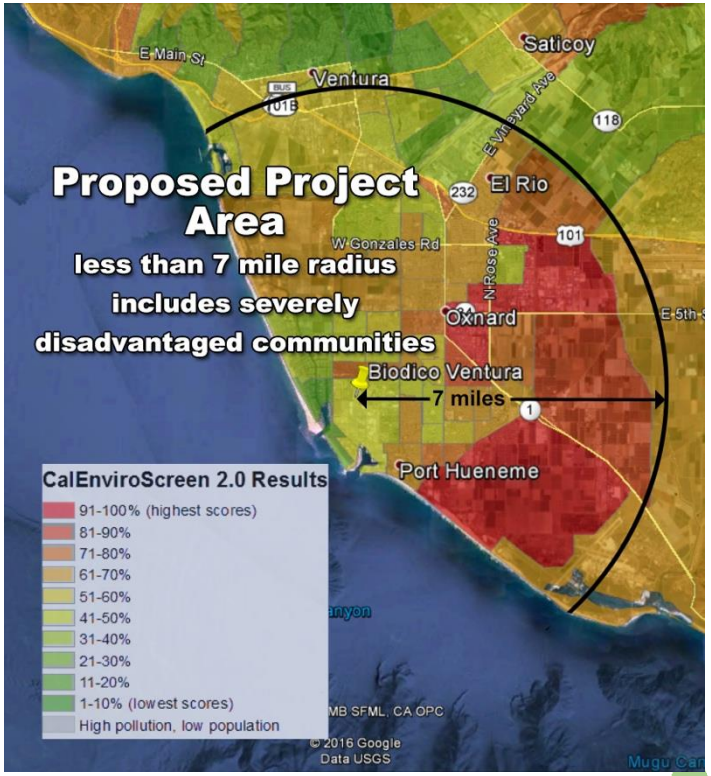
Food Waste Bins

Mouth Unit

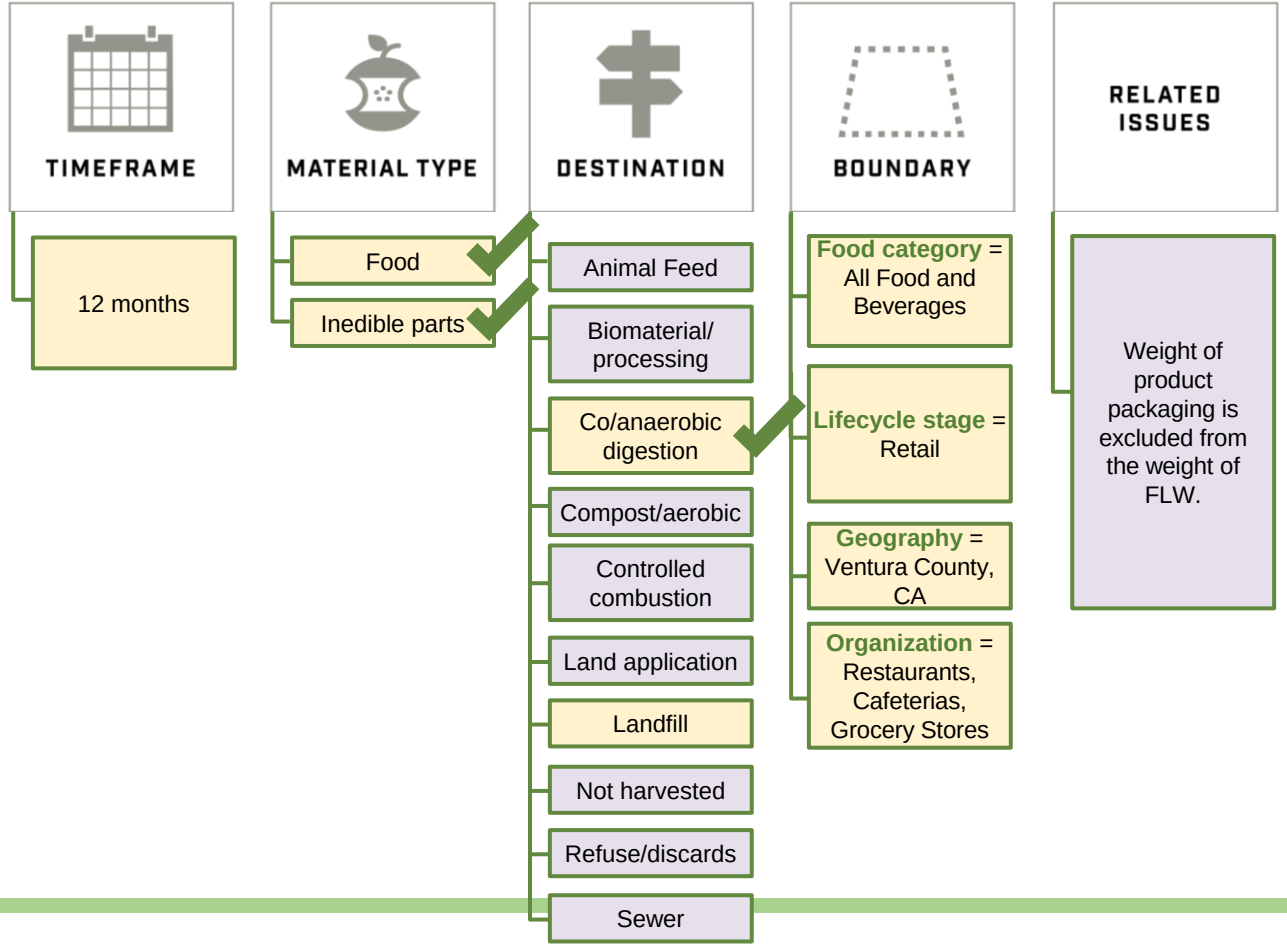
CHP Unit

Food Waste Collection

- Collection of food waste from local enterprises within 7-mile radius
- Feedstock: non-recoverable for human consumption
- Region includes severely disadvantaged communities



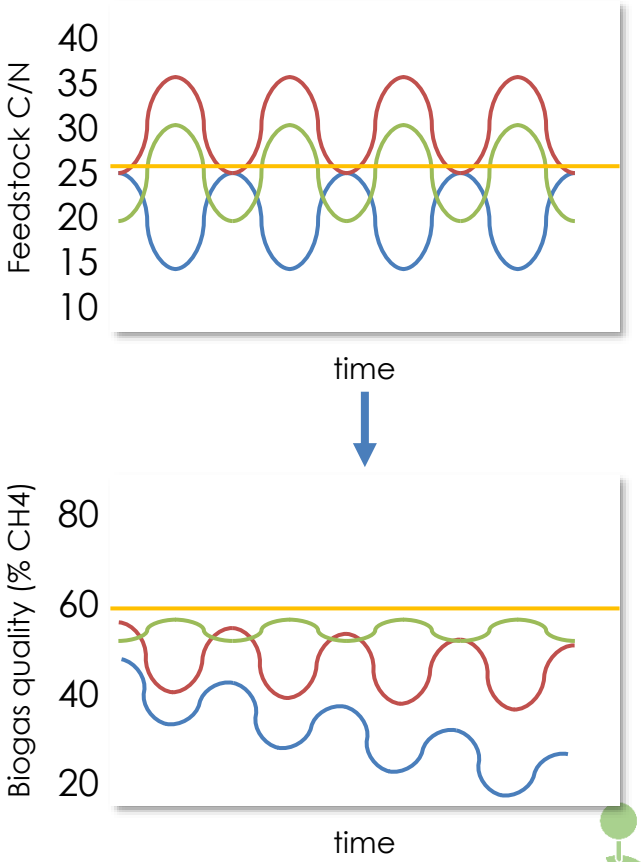
Food Loss and Waste Survey



System M&V

Measurement and Verification of System Performance

- Monitor, evaluate, and enhance the performance of micro-scale AD system
- Data requirements and analysis:
  - Biogas production and waste bioconversion data
  - Energy production data
  - Digestate quality data
  - Assessment of biogas yield in response to fluctuating C/N in feedstock



Evaluation of Project Benefits

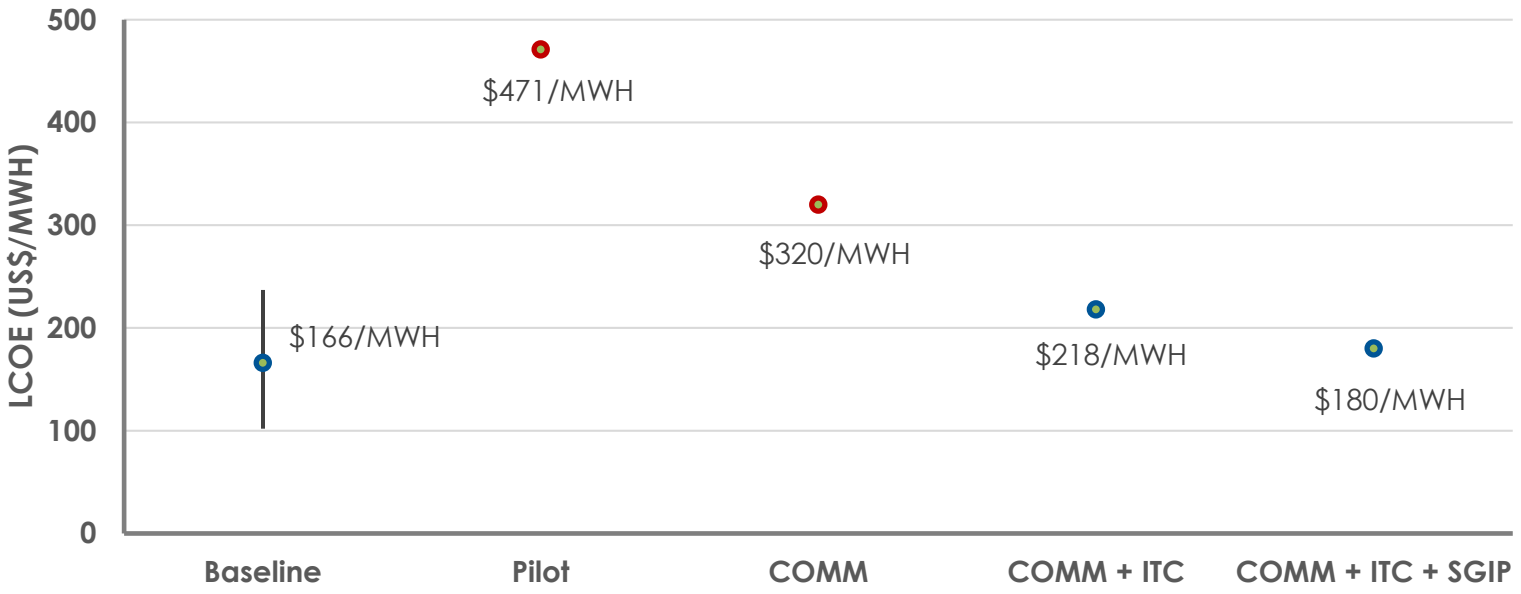
- Estimate economic and environmental costs and benefits with broad scale out of micro-AD
- Compare micro-AD scale out to more centralized AD infrastructure system including transport costs

Deployment Scenarios	Electricity Savings (MWh/year)	Cost Savings ($/year)	Demand Reduction (MW)	GHG Emissions Reduction - CO_2e (M metric tons/year)
1% Market Penetration	35,370	$5.38M	450	9,967
50% Market Penetration	1,768,500	$269M	22,500	498,365
100% Market Penetration	3,537,000	$538M	45,000	996,730

Quantitative Benefits to Ratepayer under Various Scenarios of Market Penetration

Evaluation of Project Benefits

Levelized Cost of Energy



Outreach

- Raise awareness about food waste
- Identify opportunities to redirect food to those in need
- Fully evaluate and share the potential for small-scale AD systems to produce positive local benefits from this "low-value" waste stream
- Site visits and technology tours

Thank You!

Contact info:

Jill Brigham
(530) 752-4141
jbrigham@ucdavis.edu

Ned Spang
(530) 754-5447
esspang@ucdavis.edu

Chris Simmons
(530) 752-2109
cwsimmons@ucdavis.edu

Russ Teall
(805) 689-9008
rteall@biodico.com

Tara Barbier
(530) 752-1456
tnbarbier@ucdavis.edu

Sara Pace
(859) 644-7609
sspace@ucdavis.edu