

# To Codigest or Not to Codigest?

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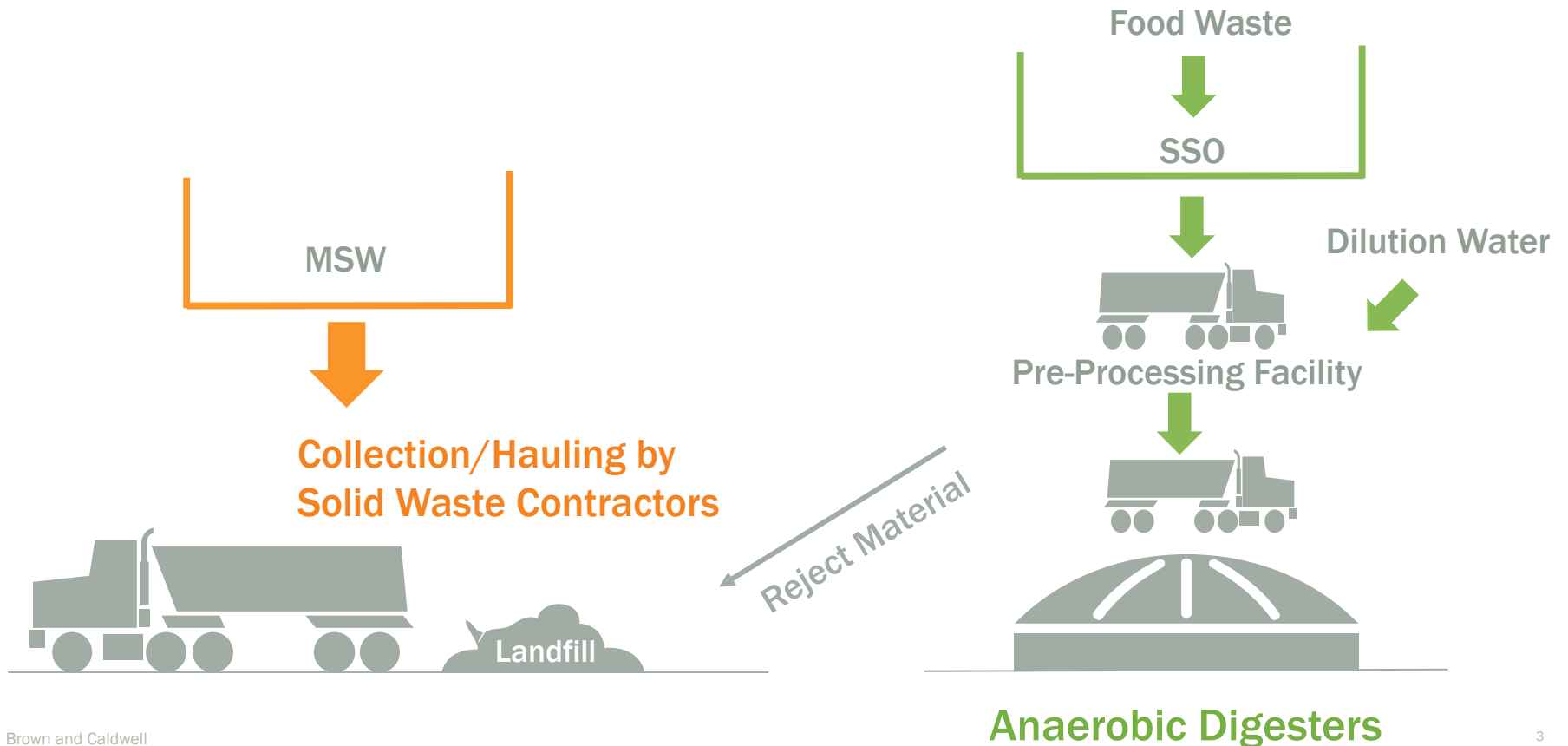


# Agenda

- 1. Why Codigestion**
- 2. Process Considerations**
- 3. Case Studies**

# Codigestion involves bringing high-strength wastes for co-processing with sewage sludge

Example: Pre-processed source separated organics (food waste)



# WWTPs are uniquely positioned for the emerging organics marketplace

- Most WWTPs have anaerobic digesters (with energy recovery facilities)
- A number of WWTPs already use digestion and cogen capacity for co-digestion of FOG and liquid HSW
- Co-digestion of pre-processed SSO follows FOG program model



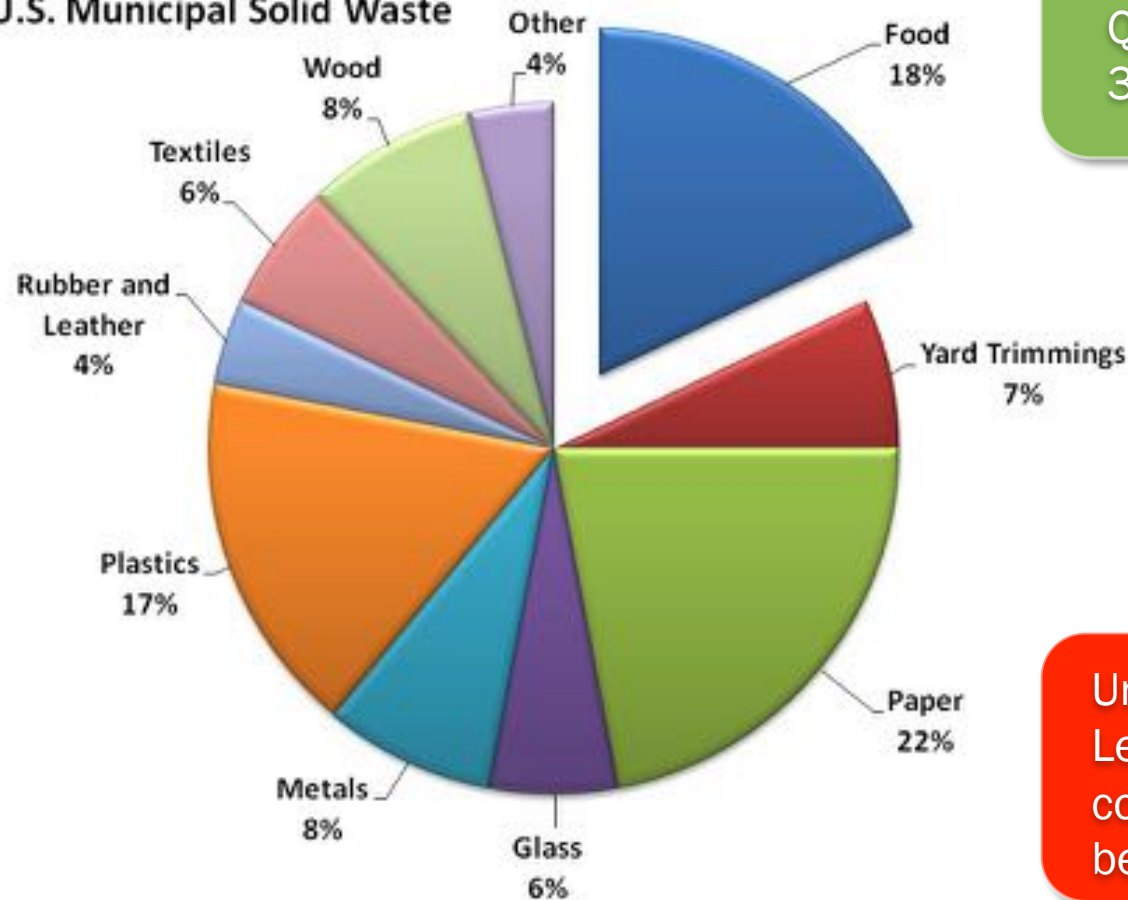
# Organics bans are driving new opportunities for co-digestion

Regulations at the local or state level can create opportunities



# Food/Organic Waste Quantities are Large

Percent Composition of Typical U.S. Municipal Solid Waste



United States  
Average Food Waste  
Quantities:  
30 Million tons/year (EPA)

Potential Energy :  
398,350,000,000 ft<sup>3</sup>-biogas/  
year  
2,600,000 MW

United States :  
Less than 3 % diversion to  
compost, digestion or other  
beneficial use

# A snapshot of the emergence of co-digestion as a new practice



# Common Opportunities



## Fats, Oils, and Grease (Liquid Waste)

**Driver:** economics, sustainability, etc.

- Many programs start here
- Proven business model
- Opportunistic
- Maturing market- public and private entities compete



## Food Waste/Source Separated Organics

**Driver:** compliance, economics, sustainability, etc.

- New compliance driven organic feedstock
- Follows FOG business model
- Requires additional pre-processing steps
- Large quantities of material

### Other opportunities:

**Brewery waste**

**Spent syrup (cola, candy processing)**

**Dairy waste**



# Why would you want to do co-digestion?

## The “Big” Three



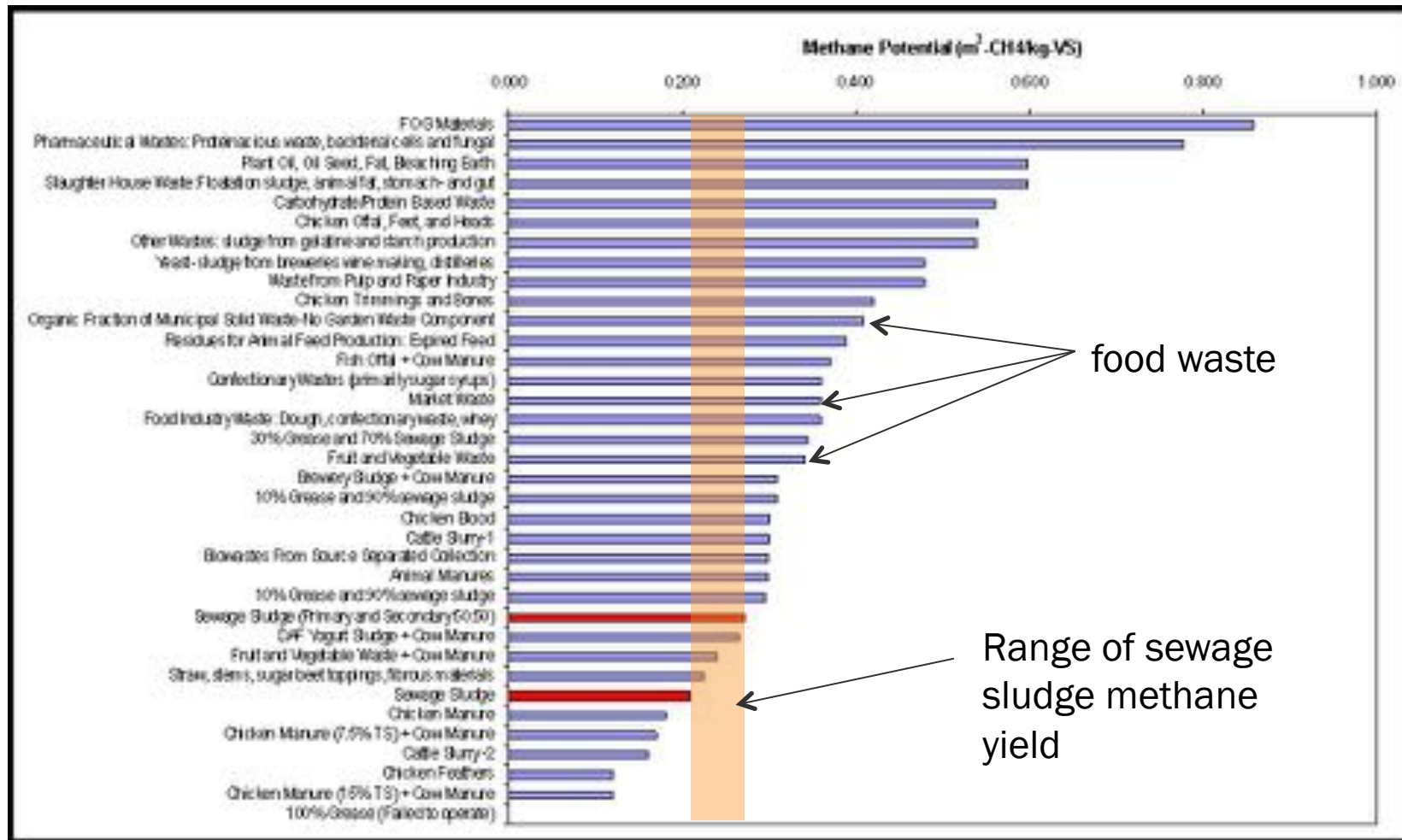
### Other reasons:

- Provide disposal point to reduce illicit discharges
- Regulatory changes/help meet landfill diversion goals
- Interagency coordination
- Removes grease from collection system
- Reduction of greenhouse gases
- Improved digestion performance

# How Should I Fill My Excess Capacity?

- Available liquid industrial organics
- FOG (preferably via organized, permitted program)
- Food waste
- If multiple feedstocks available, assess digester capacity and select based on convenience, reliability, and gas yield

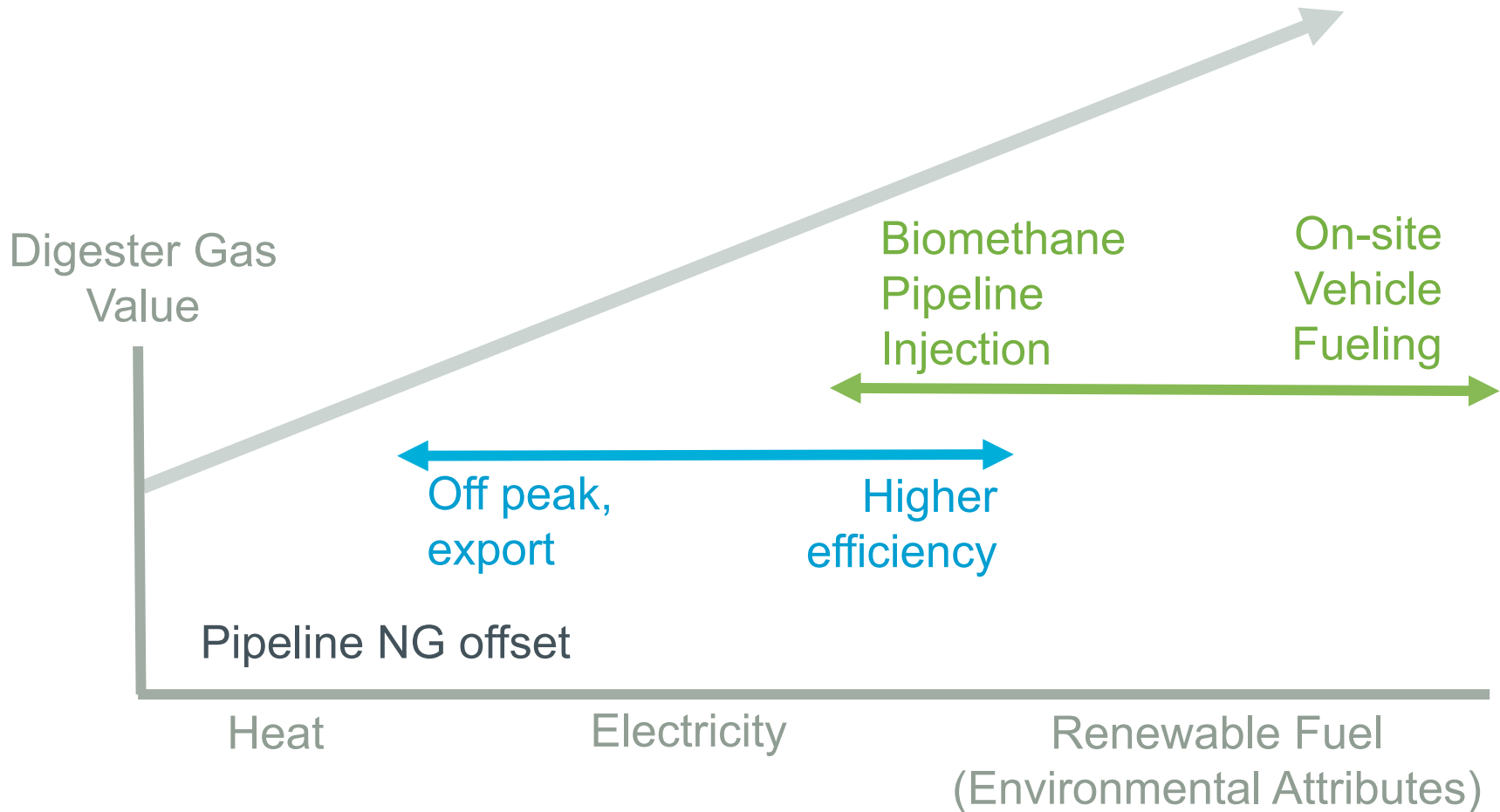
# High Methane Yield from Raw Organics



# Co-digestion increases digester gas production and improves the economics of a digester gas utilization project

- Recent analysis for a ~10 MGD WWTP:
  - Every digester gas utilization alternative failed to break even on 20-year NPV without co-digestion (~100 cfm)
  - Every alternative benefitted from a small amount of co-digestion feedstocks
  - ~2 trucks per day tipped the economic balance

# Know Where Your Excess Gas Will Go and Get Your Best ROI



# Process considerations

- Equipment and labor intensivity
- Foreign materials can damage equipment so screening is needed
- If pre-processing on site, have a pomace material for dry digestion or for composting
- High potential for odors from raw products
- Ensure sufficient strength (minimum acceptable strength equivalent to sludge)
- Chemical Properties:
  - Additional phosphorous and ammonia, can lead to struvite or vivianite or effluent issues
  - Cations (monovalent and divalent cations)
  - Digester toxicity
  - Secondary system settling issues
  - Acidity
  - Exotic chemicals
  - Foaming potential-glycerol requires acclimation

# Purpose of Food Waste Pre-processing

Majority of raw organic waste needs some preliminary treatment

- Raw organic waste not “digestable” because of: surface area, size, physical composition, and contamination



Contamination typically falls into two categories or fractions:

1. Lights
2. Heavies



# You don't want plastics, metal, glass, sand and other things in your digester.



Plugging, wear on equipment, etc



aesthetic qualities, 503 biosolids regulations



# Objective: Generate a “Clean” Feedstock



Raw material

Preprocessing



Clean digestible slurry



Non-organics for disposal or use elsewhere

# Big Picture

Low investment + Lots of available material = Rapid ROI

Who else has digesters nearby?

Where else would this material go?

# Case Studies

# Case Study: Net Zero at East Bay Municipal Utility District

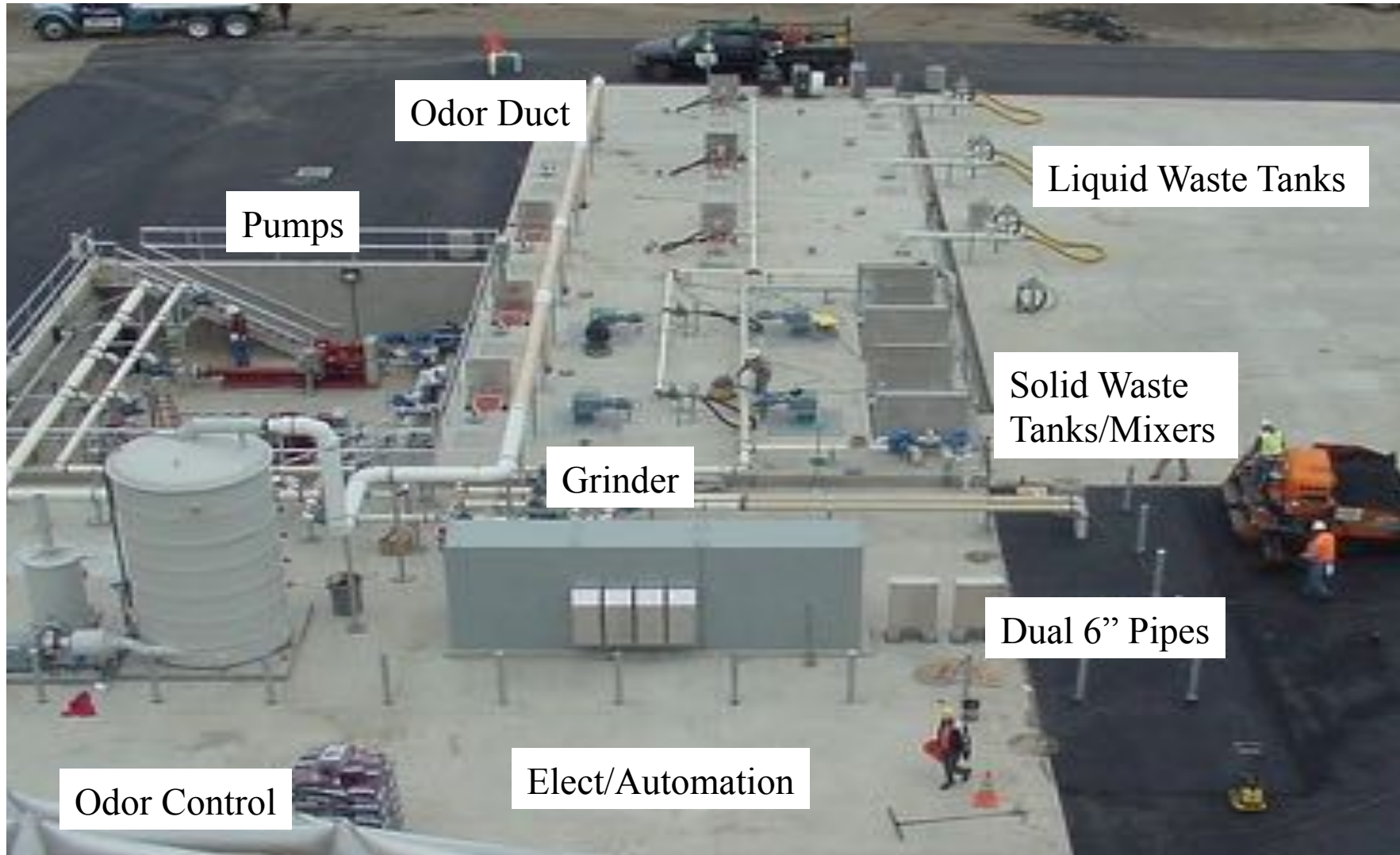


# Major Co-Digestion at EBMUD – WWTP is first Energy-Neutral WWTP in US

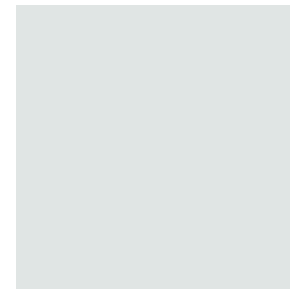
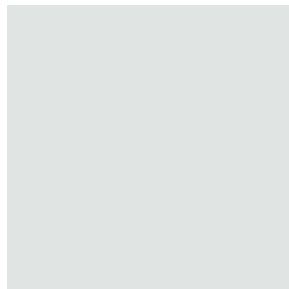
- Commercial food waste is collected, pre-sorted, and ground before delivery by Recology (no tip-floor at EBMUD)
- Material is discharged into underground tanks, processed through a pulper, slurried, and pumped into digesters for co-digestion
- Many wastes are trucked to the WWTP for co-digestion



# EBMUD Facility built in 2004 for Food Waste and High-Strength Waste for Co-Digestion



# Case Study: Burritos, Beer, and Biogas at Santa Rosa



# HSW Receiving Facility

City of Santa Rosa



## DRIVER

- Support local business
- Provide sustainable HSW outlet
- Take advantage of installed cogen capacity

## SOLUTION

- 40,000 gpd HSW receiving facility
- Local business outreach

## TAKE AWAY

- O&M friendly facility
- Approaching rated capacity within 6 months of startup
- Doubled cogen power output

“This is the missing link in the operations of the plant. There’s a ratepayer benefit. There’s an environmental benefit. And there’s a business attraction benefit.”

- Mike Prinz, Director of Subregional Operations





# O&M friendly facility

## Santa Rosa turns industrial food waste into energy and savings



(1 of 2) Ken Kolp of North Bay Restaurant Services hooks up a hose to transfer septic tank sludge from his truck to a high strength waste system at the Laguna Treatment Plant in Santa Rosa, on Tuesday, December 20, 2016. (BETH SCHLANZER/The Press Democrat)

**KEVIN MCCALLUM**  
THE PRESS DEMOCRAT | December 27, 2016



Ken Kolp used to start his workday with a two-hour trip to the East Bay to dispose of thousands of gallons of slimy slop sucked out of area grease traps.

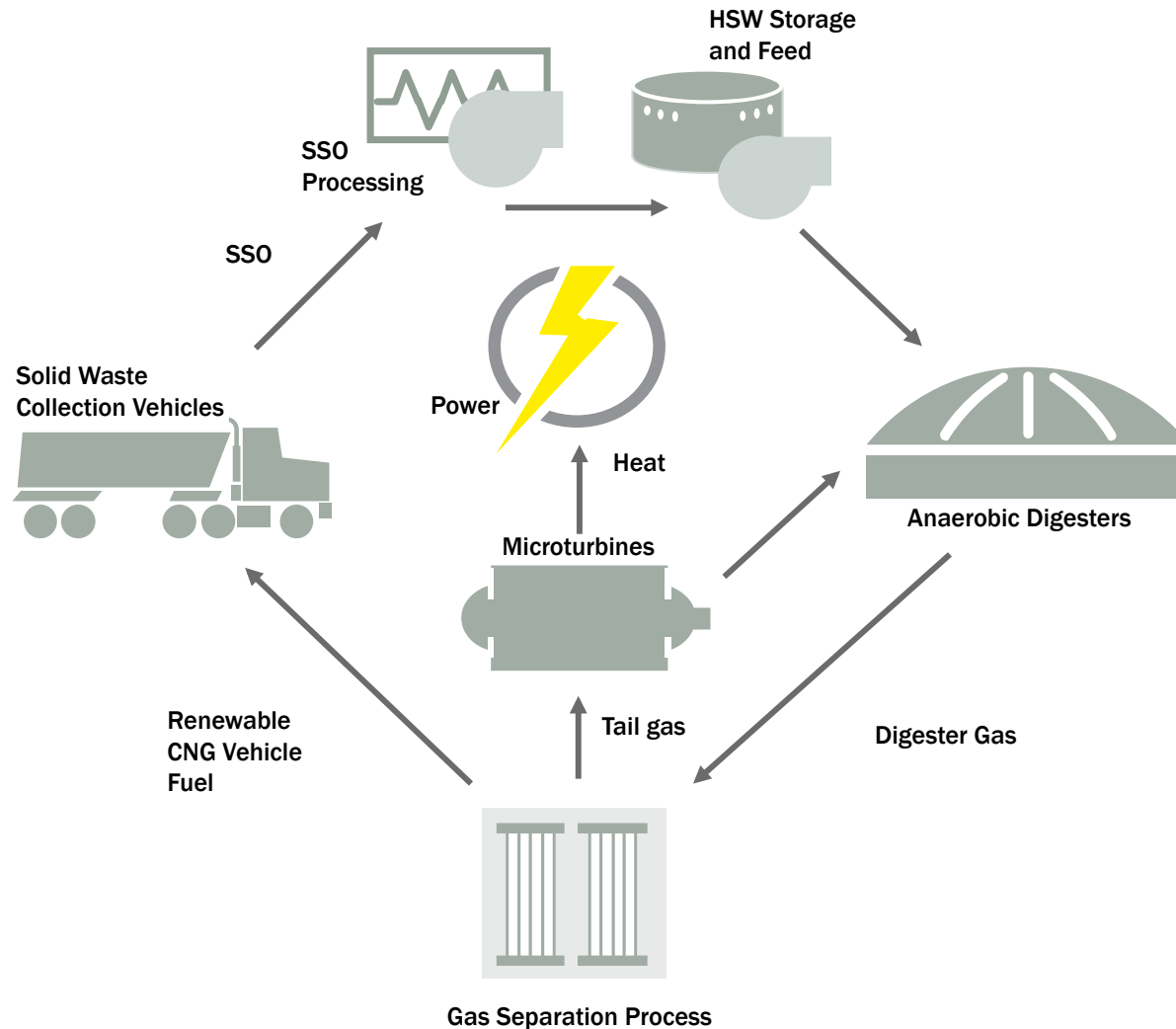
Now, he just drives his tanker truck over to Santa Rosa's Laguna Road wastewater treatment plant, pumps the oily ooze into one of four new holding tanks, and is back on his route in a matter of minutes.

# Case Study: Closing the Loop for Roseville



# Energy Recovery Project

## City of Roseville



### DRIVER

- Planned expansion provides new digester capacity
- Opportunity for economically beneficial project

### SOLUTION

- SSO receiving and pre-processing facility
- FOG receiving facility
- Digester gas to vehicle fuel system
- Vehicle fueling station for City refuse trucks
- Microturbines for cogen

### TAKE AWAY

- Vehicle fuel offers best payback
- City has “closed the loop”

# City can control their own destiny



Private energy services  
companies/developers

Landfill

Electric utility

Private haulers

Natural gas utility

Private anaerobic  
digestion facilities

# Wrap Up

- Codigestion works well for utilities that have:
  - Excess digester capacity
  - An identified use for biogas
  - Regulatory drivers
  - Good relationships with HSW providers
- Select feedstocks with an eye to regional and WWTP-specific considerations
- Stability of digestion process and end products must be considered
- Good payback when all costs and benefits are considered – project should pay for itself without incentives and grants

# Thank you!

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**Brown** AND  
**Caldwell**

# QUESTIONS?



it's about connecting



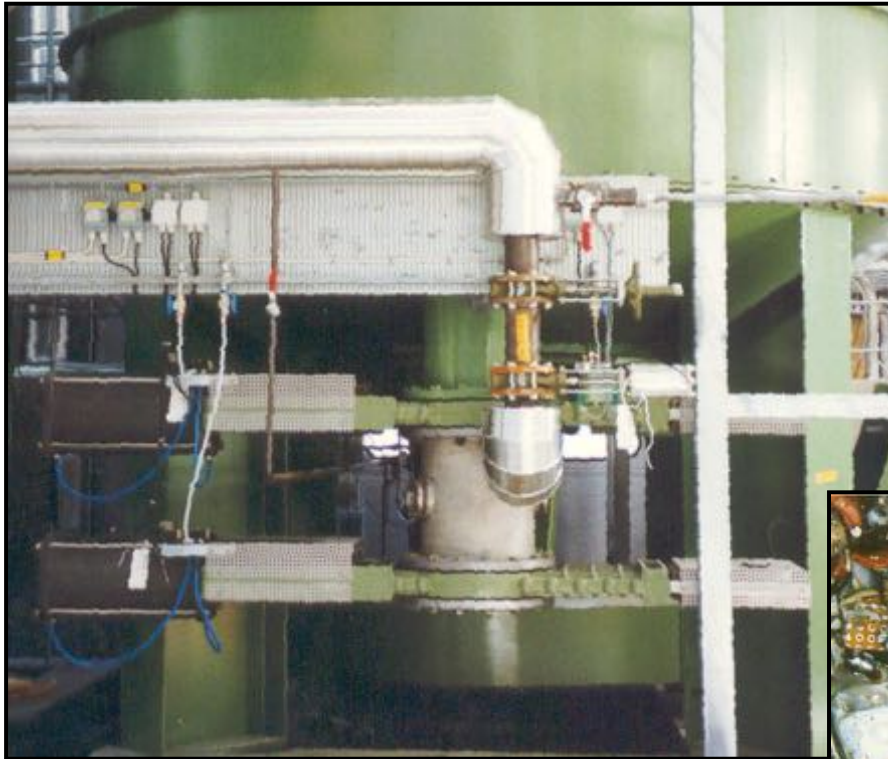
essential ingredients®



# Rake Fraction (Plastics)



# Heavy Fraction (Glass, Metal, Bones, etc.)



# Hydrocyclone (Grit Removal)



