

*Marin Sanitary Service &*

# **Central Marin Sanitation Agency**



**Central Marin  
Commercial  
Food-to-Energy  
(F2E)  
Program**

**EPA Sustainable Materials Management Webinar**

**March 12, 2015**

# Presentation Outline



- **Central Marin's Commercial Food-to-Energy (F2E) Initiative**
  - What is F2E?
  - Public-Private Partnership – CMSA and Marin Sanitary Service
  
- **Marin Sanitary Service F2E Program**
  - About MSS
  - Transfer Station Improvements
  - MSS outreach, training, services, and collection statistics
  
- **CMSA F2E Program**
  - About CMSA
  - Treatment plant F2E/FOG facility
  - Anaerobic digestion and energy production
  
- **Program Metrics, Benefits, and Reasons for Success**
  
- **Questions**



Commercial  
Food Waste  
to  
Energy Program

# Commercial Food Waste to Energy



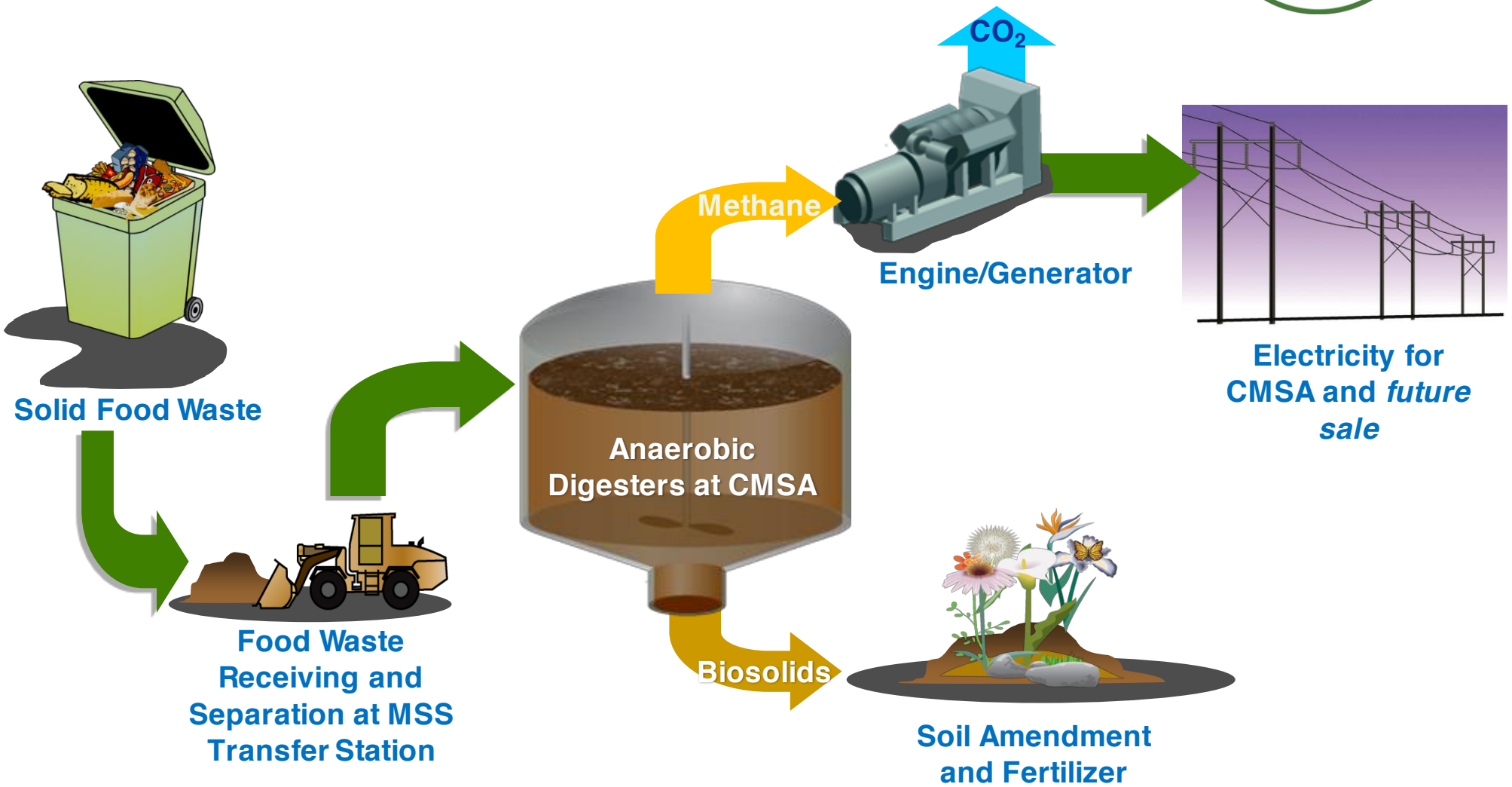
Central Marin Food Waste

**Process:**  
Anaerobic digestion



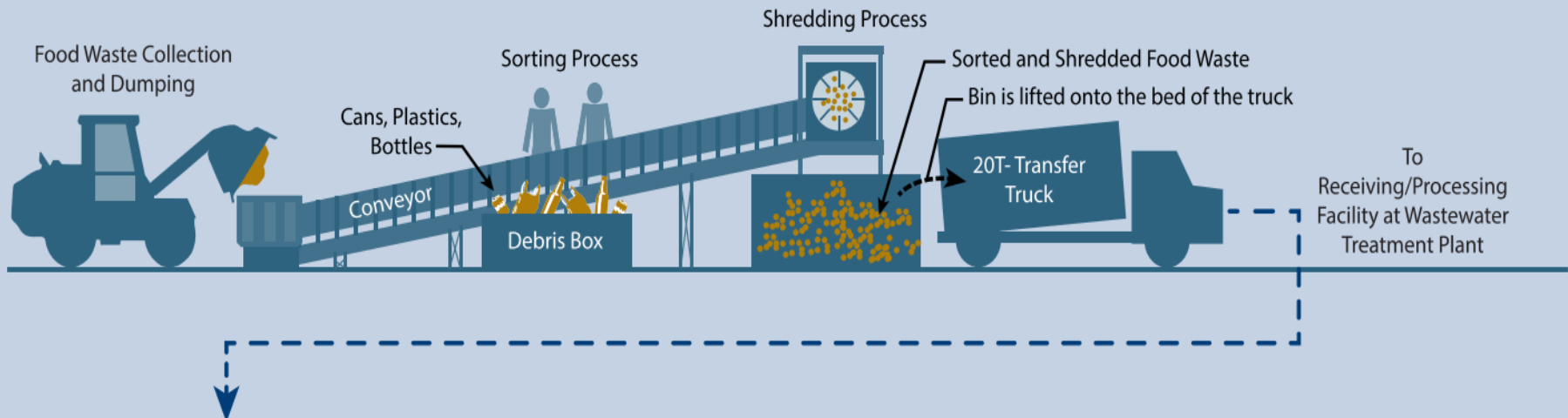
Biogas (methane)

# What is Food to Energy?

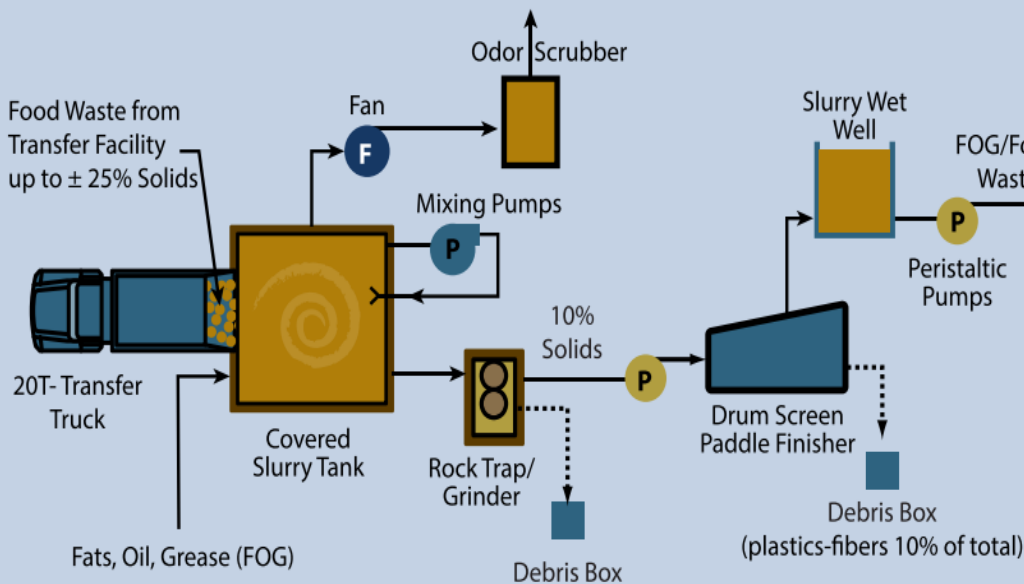


# F2E Processing @ MSS and CMSA

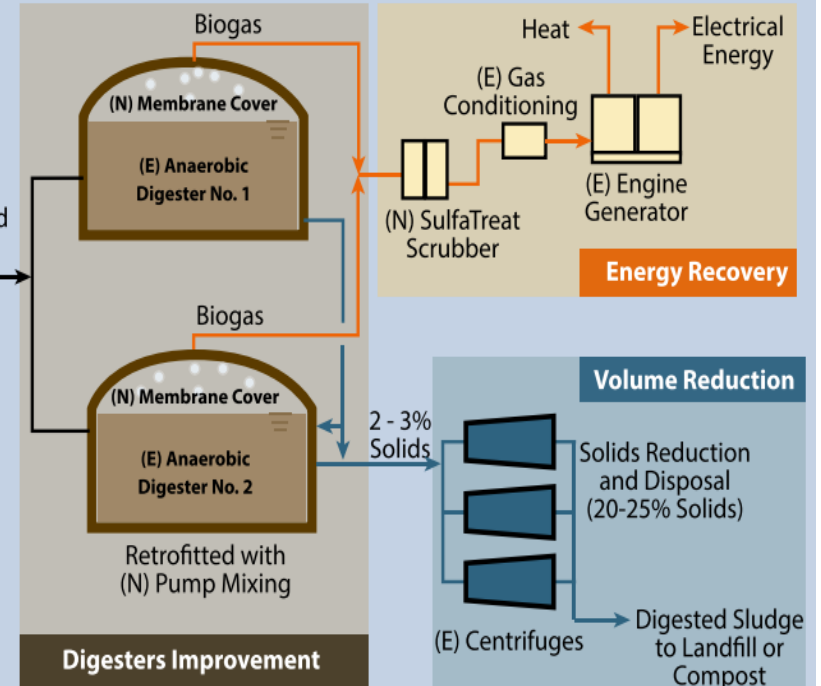
## New Food Waste Separation Facility at Solid Waste Transfer Facility



## New Receiving/Processing Facility at Wastewater Treatment Plant



## Existing and New Facilities at Wastewater Treatment Plant





# Why Go After Food Waste?

- Food is the second **largest source of waste in California**
  - ~16% percent of the Commercial waste stream
  - ~25% of the Residential waste stream
- A 2014 Waste Characterization study found ~**29%** of residential solid waste sent to Landfill by MSS, is **food waste**. For commercial customers it was ~**39%**.

# Public-Private Partnership



**Central Marin Sanitation Agency**



# Public Private Partnership



## ■ Key Elements

- Concept development (2008)
- Methane Capture Feasibility Study - project by CMSA, San Rafael, and MSS (2008/2009)
- Presentations to cities, towns, and Board of Supervisors (2009 and 2012)
- Food Waste Processing and Disposal Agreement executed in 2013
- Public tours at MSS and CMSA
- Presentations to environmental groups and press
- Delivery of FOG and food waste began in late 2013/early 2014

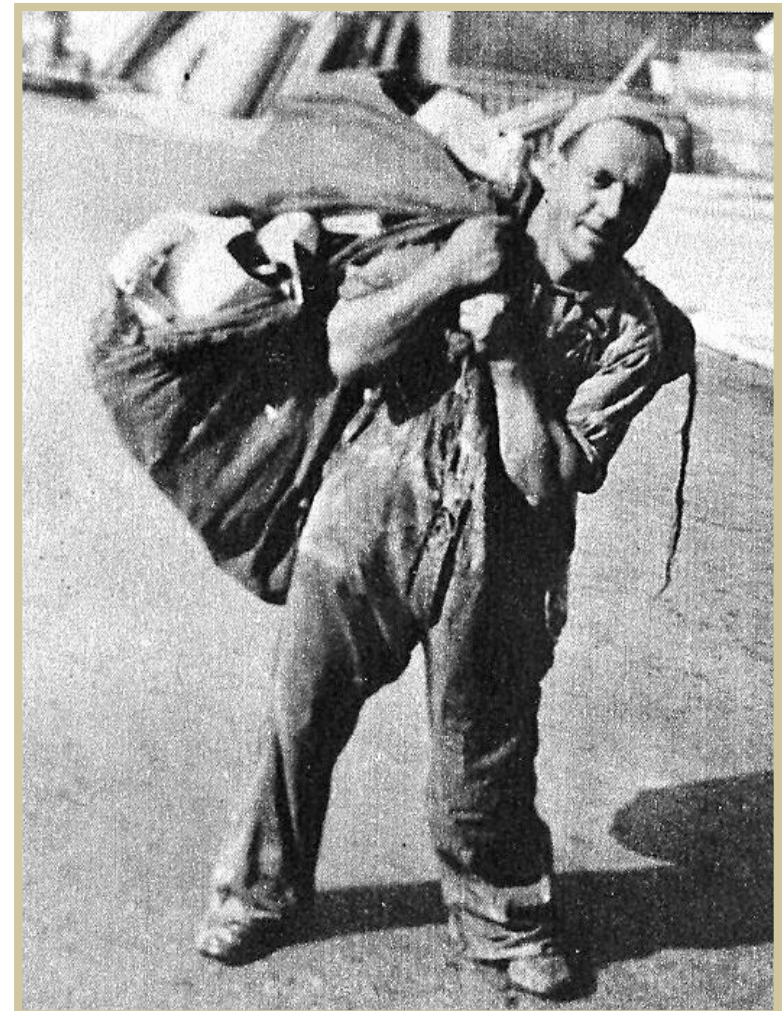
The background is a solid green color with several overlapping circles of varying shades of green on the left side. The circles are semi-transparent and overlap each other, creating a layered effect. The text "MSS F2E Program" is centered on the right side of the green area.

# MSS F2E Program

# Public-Private Partnership



- **Marin Sanitary Service (MSS)** a private company
  - Provides curbside solid waste collection, recycling, and organics services to Marin County since 1948.
  - Serves nine jurisdictions within the County of Marin
  - Serves ~30,000 residential and 3,000 commercial/multifamily dwellings.
  - Process approximately 250,000 tons of solid waste, organics, and recyclables annually



# First Line in Quality Control

- **Customer Enrollment: pre-consumer food waste**
- **Staff Training & Monitoring**
- **Tools for Success**
  - Labeling & Signage
  - Kitchen Layout
  - Internal and External collection containers



# Second Line in Quality Control: Contamination Removal Protocol



Removes  
contaminants  
after tipping on  
floor



Removes visible  
contaminants  
from cart prior  
to dumping



Removes visible  
contaminants  
from cart as  
contents tipped  
into truck





**CLEAN FEEDSTOCK**

# MSS Tipping Floor



# MSS Processing Equipment





Loading materials onto the conveyor



# Hopper, Belts, and Magnet



# Program Details



## ■ Customer Enrollment

- **Pre-consumer** commercial food waste would be collected and then transferred to the MSS Transfer Station for processing to remove contamination and then transported to CMSA.
- Eventually include **post-consumer** food waste



## ■ Roll-out plan

- **Recruit** up to 250 commercial food waste producers
  - Continue adding more participants incrementally (3-yr plan)
- **Program outreach**
  - Kitchen staff training
  - Frequent monitoring



# F2E Collection Statistics



Customers	95
Collection Days	6
Avg. Route HRS	4.1
Avg. Cart Weight	132 lbs.
Avg. Daily Weight	4.3 tons

## 2014 Food Waste (Tons)



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# CMSA FOG/F2E Program

# Central Marin Sanitation Agency - CMSA



- Regional Wastewater Agency in San Rafael, Marin County
- Serves about 120,000 people and San Quentin State Prison
- Joint Powers Agency (JPA) with four satellite collection agencies
- Wide range of influent flows: 7MGD (ADWF) to 116 MGD (PWWF)
- Contract services:
  - Collection system O&M for San Quentin Village
  - Pump station O&M for SQ prison and Corte Madera
  - P2 for six local agencies



# F2E/FOG Facility



# Drum Screen Paddle Finisher





# Digestion - Anaerobic Digesters



# Biogas Purification – Step 1



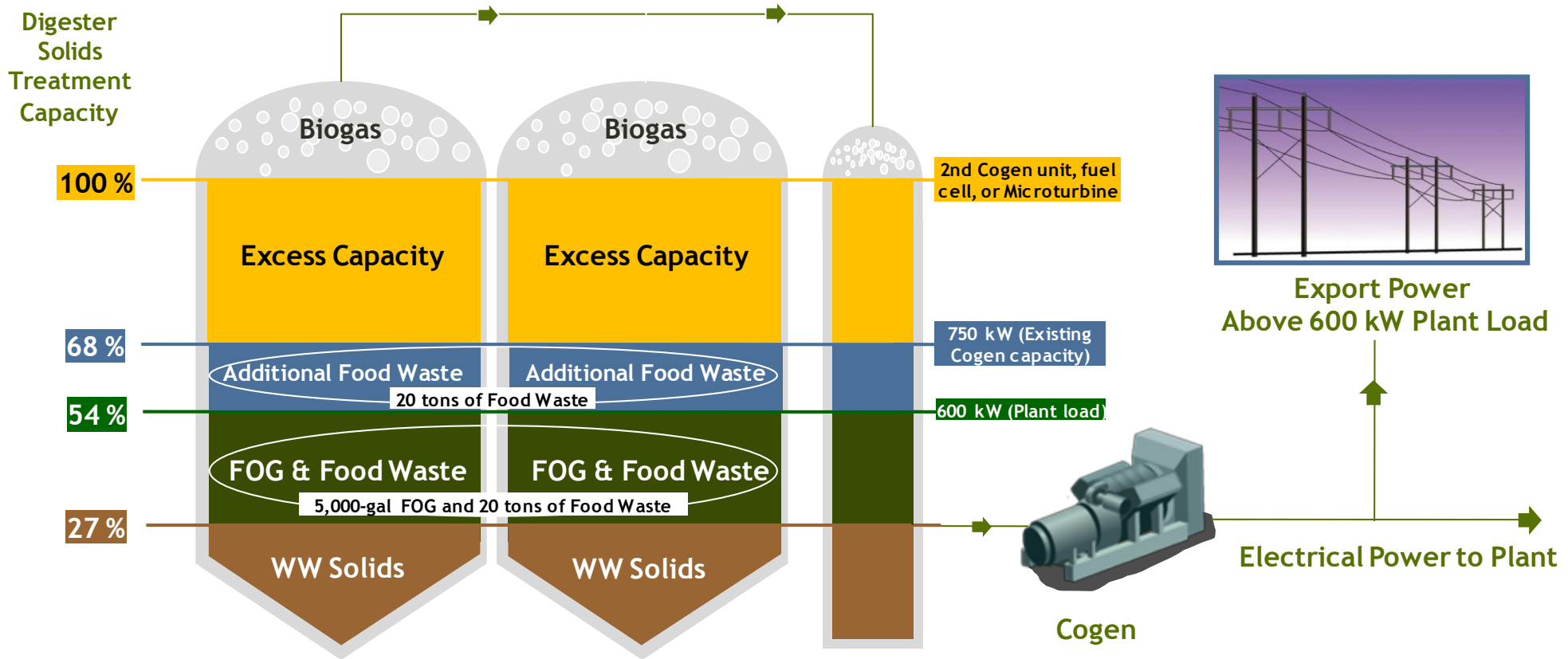
# Biogas Purification – Step 2



# 750 kW (1000 hp) Engine Generator



# CMSA Capacity for FOG and Food Waste



# First FOG Load – November 2013



# First Food Waste Load – January 2014




# Permitting and Operation



- MSS regulated by CalRecycle, and CMSA is regulated by both the San Francisco Bay Regional Water Board and Cal Recycle.
- CalRecycle's Local Enforcement Agency (LEA) approved a Limited Volume Transfer Operation permit for CMSA, and a Solids Waste Transfer Station Permit amendment for MSS.
- CMSA Notified SFRWB that the facility is operational
  - NPDES permit Standard Operation Procedure (SOP) developed
- LEA is performing quarterly inspections at CMSA until CalRecycle regulations change to exempt POTWs that receive organics for co-digestion.
- Digester health has remained stable and has not been affected by the new organic loading
- Minimal operational issues with new facilities and equipment





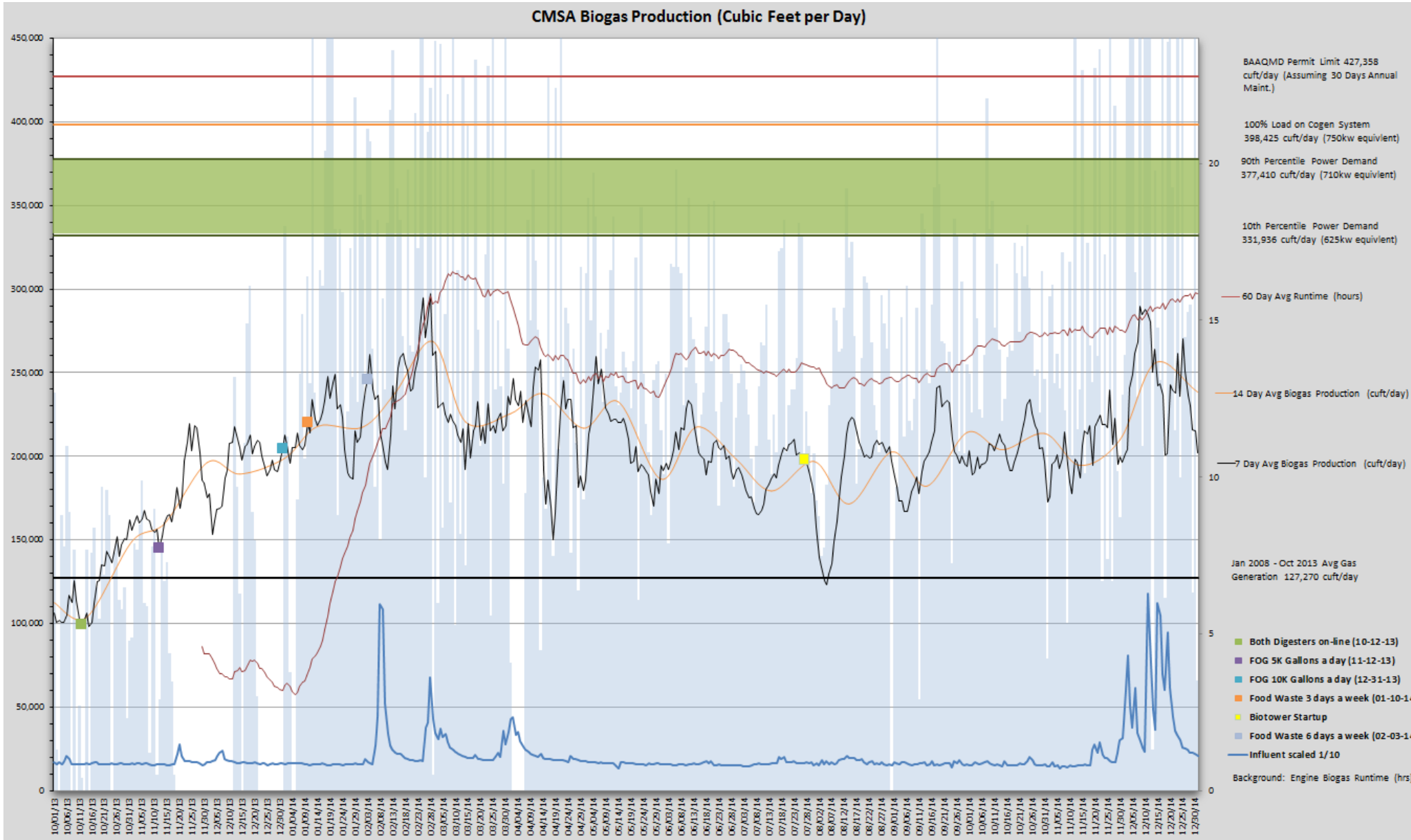
FOG/ F2E  
Program Metrics  
and Benefits

# FOG and Food Waste Program Metrics



- Amounts Received
  - *FOG: up to 15,000 gallons per day, 6 days a week*
  - *Food waste: average 4.2 tons/day, up to 6 days a week*
- Biogas generation increase from *127,000 ft<sup>3</sup> (5-yr average) to over 225,000 ft<sup>3</sup>/per day average.*
- *Volatile Solids Ave: 91% for FOG; 91% for food waste*
- *Digester Hydraulic Residence Time Ave: 35 days +/-*
- *Cogenerator runtime on biogas increased from approximately from 7-9 hours/day up to 16 hours/day.*
- Program Expenses:
  - *CMSA facility cost: \$2 million (\$1.9 for construction)*
  - *MSS equipment cost: \$530,000*
  - *MSS operating costs: \$315,000 (collection, processing, disposal, outreach)*

# Biogas Gas Production - Oct 2013 to Dec 2014



# Benefits of F2E Program



- A local renewable energy project
- Increases CMSA's energy self sufficiency
- Utilization of existing CMSA asset capacity
- Potential for CMSA to export energy (future)
- Reduces greenhouse gas emissions – about *2,000 metric tons per year (Cap and Trade value?)*
- Reduces landfilling of food waste; reject material is composted
- Helps achieve local agency and County of Marin zero-waste goals

# Why a Success?



- CMSA and MSS Board support
- Marin Sanitary Service partnership
- Support from Board of Supervisors, central Marin town and city councils, and regulators
- Digester and cogenerator unused capacity
- Unanticipated Revenue Bond proceeds
- EBMUD facility and process used as a model
- CMSA & MSS staff contributions during facility design, testing, and start-up, daily facility operation and maintenance, and on-going program administration.

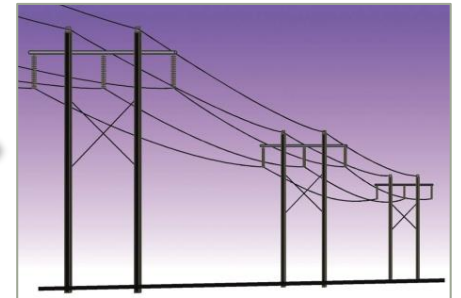
# FUTURE OF F2E



Pipeline injection  
for other local  
uses.



**POTENTIAL EXCESS  
ENERGY AND METHANE**



Send electricity  
back to the grid.



Fuel vehicles

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