Marin Sanitary Service &
Central Marin Sanitation Agency

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

NACWA Energy Workgroup

January 26, 2017
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
  - Quality Control
  - Transfer Station Improvements
  - MSS outreach, training, services, and collection statistics

- CMSA F2E Program
  - About CMSA
  - Treatment plant organic waste receiving facility
  - Anaerobic digestion and energy production

- Program Metrics, Benefits, and Next Steps

- Questions
Commercial Food Waste to Energy Program
Commercial Food Waste to Energy

Process: Anaerobic digestion

Central Marin Food Waste

Biogas (methane)
What is Food to Energy?

Solid Food Waste

Food Waste Receiving and Separation at MSS Transfer Station

Anaerobic Digesters at CMSA

Methane

Engine/Generator

CO₂

Electricity for CMSA and future sale

Beneficial reuse: Landfill ADC and Soil Amendment/Fertilizer

Biosolids
F2E Processing @ MSS and CMSA

New Food Waste Separation Facility at Solid Waste Transfer Facility

Food Waste Collection and Dumping

Cans, Plastics, Bottles

Sorting Process

Shredding Process

Sorted and Shredded Food Waste

Bin is lifted onto the bed of the truck

20T-Transfer Truck

To Receiving/Processing Facility at Wastewater Treatment Plant

New Receiving/Processing Facility at Wastewater Treatment Plant

Food Waste from Transfer Facility up to ± 25% Solids

Fan

Mixing Pumps

Odor Scrubber

20T-Transfer Truck

Covered Slurry Tank

Rock Trap/Grinder

Debris Box

Debris Box

10% Solids

10% Solids

Slurry Wet Well

FOG/Food Waste

Peristaltic Pumps

Drum Screen Paddle Finisher

Existing and New Facilities at Wastewater Treatment Plant

Biogas

(E) Anaerobic Digester No. 1

(N) Membrane Cover

(E) Gas Conditioning

(E) Anaerobic Digester No. 2

(N) Membrane Cover

Biogas

Retrofitted with (N) Pump Mixing

2 - 3% Solids

Volume Reduction

Solids Reduction and Disposal

(20-25% Solids)

(E) Centrifuges

Digested Sludge to Landfill or Compost

Energy Recovery

(E) Engine Generator

Heat

Electrical Energy
Public-Private Partnership

Central Marin Sanitation Agency
MSS F2E Program
First Line in Quality Control

- **Customer Enrollment**: pre-consumer food waste
- **Staff Training & Monitoring; Retraining**
- **Tools for Success**
  - Labeling & Signage
  - Kitchen Layout
  - Internal and External collection containers
Second Line in Quality Control: Contamination Removal Protocol

Removes visible contaminants from cart prior to dumping

Removes visible contaminants from cart as contents tipped into truck

Removes contaminants after tipping on floor
CLEAN FEEDSTOCK
MSS Tipping Floor
Loading materials onto the conveyor
MSS Processing Equipment
Hopper, Belts, and Magnet
CMSA FOG/F2E Program
Central Marin Sanitation Agency
- CMSA

- Regional Wastewater Agency in San Rafael, Marin County
- Serves about 110,000 people and San Quentin State Prison
- Joint Powers Agency (JPA) with four satellite collection agencies
- Wide range of influent flows: 7 MGD (ADWF) to 120.5 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

- **Digester Solids Treatment Capacity**: 100%
- **Excess Capacity**
  - 2nd Cogen unit, fuel cell, or Microturbine
  - 27% Excess Capacity
  - Additional Food Waste 68%
  - FOG & Food Waste 54%
  - WW Solids 27%
- **FOG & Food Waste**
  - 5,000-gal FOG and 20 tons of Food Waste
- **Export Power Above 600 kW Plant Load**
  - 750 kW (Existing Cogen capacity)
  - 600 kW (Plant load)
- **Electrical Power to Plant**
  - Cogen
First FOG Load – November 2013
First Food Waste Load – January 2014
Permitting and Operation

- MSS regulated by CalRecycle, and CMSA is regulated by the San Francisco Bay Regional Water Board.

- CalRecycle Regulations changes on January 1, 2016
  - Wastewater agencies that receive organics for co-digestion with wastewater solids in anaerobic digesters exempt from regulations

- CalRecycle’s Local Enforcement Agency (LEA) approved a Solids Waste Transfer Station Permit amendment for MSS.

- CMSA Notified S.F. Bay Regional Water Board that the facility is operational
  - NPDES permit Standard Operation Procedure (SOP) developed

- Digester health has remained stable and has not been affected by the new organic loading

- Minimal operational issues with new facilities and equipment
FOG and Food Waste Program Metrics

- **Amounts Received**
  - *FOG*: up to 20,000 gallons per day, 6 days a week
  - *Food waste*: average 7.5 tons/day, up to 6 days a week

- **Biogas generation increase from** $127,000 ft$^3$ (5-yr average) to over 300,000 ft$^3$/per day.

- **Volatile Solids Ave:** 93% for FOG; 91% for food waste

- **Digester Hydraulic Residence Time Ave:** 35 days +/-

- **Cogenerator runtime on biogas increased from approximately** 7-9 hours/day up to 23+ hours/day (average); and 24 hr operation most days

- **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)
Benefits of F2E Program

- A local renewable energy project
- Reduces landfilling of food waste; reject material is composted
- Increases CMSA’s energy self sufficiency to align with State renewable energy generation goals
- Utilization of existing CMSA asset capacity – cogen and digesters
- CMSA to deliver energy to local utility grid in future
- Reduces greenhouse gas emissions – about 2,000 metric tons per year
FUTURE OF F2E

POTENTIAL EXCESS ENERGY AND METHANE

Pipeline injection for other local uses.

Send electricity back to the grid.

Fuel vehicles
Next Steps for CMSA

- Obtain certification from the California Energy Commission as a renewable power generator
- Modify the Agency’s utility interconnection agreement to allow delivery of power to the local grid
- Negotiate a power sale agreement terms and price with the two local energy providers
- Complete biogas utilization tasks in the Agency’s 2017 Master Plan
- Deliver power and determine how to use future excess biogas
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