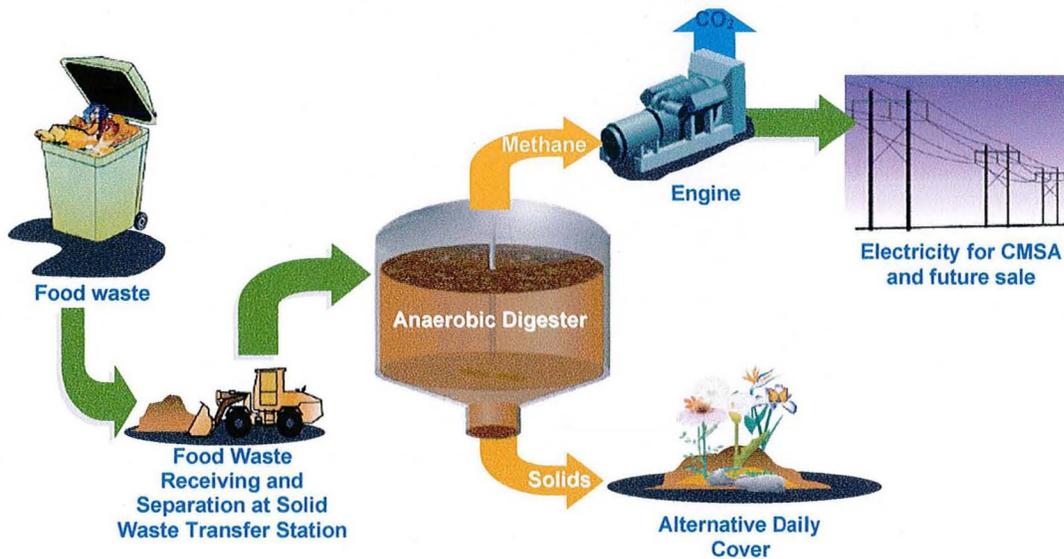


What is Anaerobic Digestion?

Anaerobic digestion (also known as food-to-energy (F2E) is the decomposition of organic solids in an oxygen-free environment. Through this technique, a natural biogas is created (consisting primarily of methane gas) which is captured and utilized as a source of renewable energy. By diverting food waste from landfills, fugitive green house gas (GHG) emissions are averted. Food waste is very biodegradable and has a much higher volatile solids destruction rate than biosolids. Therefore, residuals will only increase slightly and may be used as an alternative daily cover.



Why Food Waste?

A 2008 study revealed that 27% or 4,700 tons of solid waste disposed of at Redwood Landfill by MSS, is food waste. Currently, the U.S. only diverts 3% of food waste from landfills; most taken to compost facilities that do not capture the biogases.¹ Food is the **largest single source of waste in California** accounting for 16% percent of the Commercial waste stream.²

1. Cal Recovery 2008 MSS Waste Characterization Study.
2. California 2008 Statewide Waste Characterization Study (CalEPA)

What Food is Utilized?

Initially, MSS will only be collecting pre-consumer food waste from select high volume commercial customers, including vegetable trimmings, waste from food preparation, and spoiled food. Due to the necessary processing machinery for anaerobic decomposition, the feed stock collected must be free of contaminants. A clean feedstock will minimize the costs from equipment failures and keep rate increases to a minimum. Ideally, once commercial customers are adept at sorting pre-consumer waste, MSS will begin training for collection of post-consumer waste as well (table scraps).

How will the process work in Marin?

- After extensive kitchen employee outreach and education on best pre-sorting practices, MSS will collect pre-consumer food waste from the established commercial sites.
- The food waste will be trucked to the Transfer Station at MSS where it will be sorted and ground into a slurry-like substance.
- The slurry is then transferred to CMSA, $\frac{6}{10}$ of a mile away, where it goes through a final processing stage and is added to the slurry tank.
- As the bacteria begin to decompose the slurry, biogas is collected and used in a co-generator to power the plant.

The path to F2E

Permitting

MSS has demonstrated CEQA compliance without need for another Negative Declaration or Environmental Impact Report. This is because food waste is already apart of it municipal solid waste stream and is identified in its existing Solid Waste Facility Permit documentation. CMSA already has anaerobic digesters operating on site utilizing biosolids as a fuel source. They submitted an Enforcement Agency notification that was approved in October 2012.

Construction

- Complete construction of CMSA facility expected fall 2012.
- MSS and CMSA will develop F2E program agreement November 2012.
- Transfer station improvements by MSS expected to start late fall 2012 or early 2013.

Program start

Anticipated start early-mid 2013.

BENEFITS

Food waste has **3X** the methane production potential as biosolids!

Cattle manure = 25m^3 gas/ton

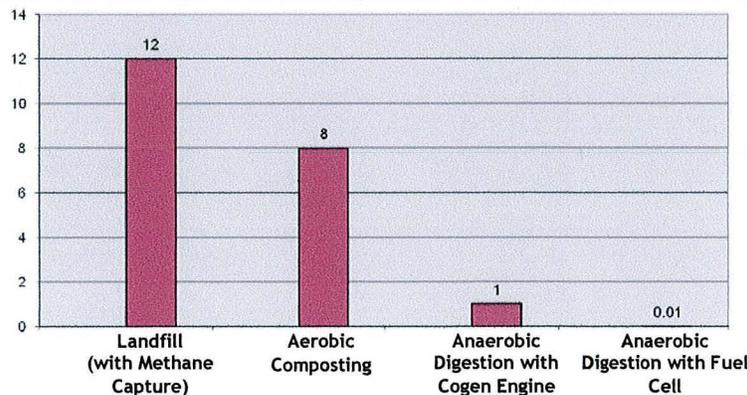
Biosolids = 120m^3 gas/ton

Food Waste = 376m^3 gas/ton

According to a report by the East Bay MUD facility, 10 tons of food waste per day will power 80-140 homes for the year

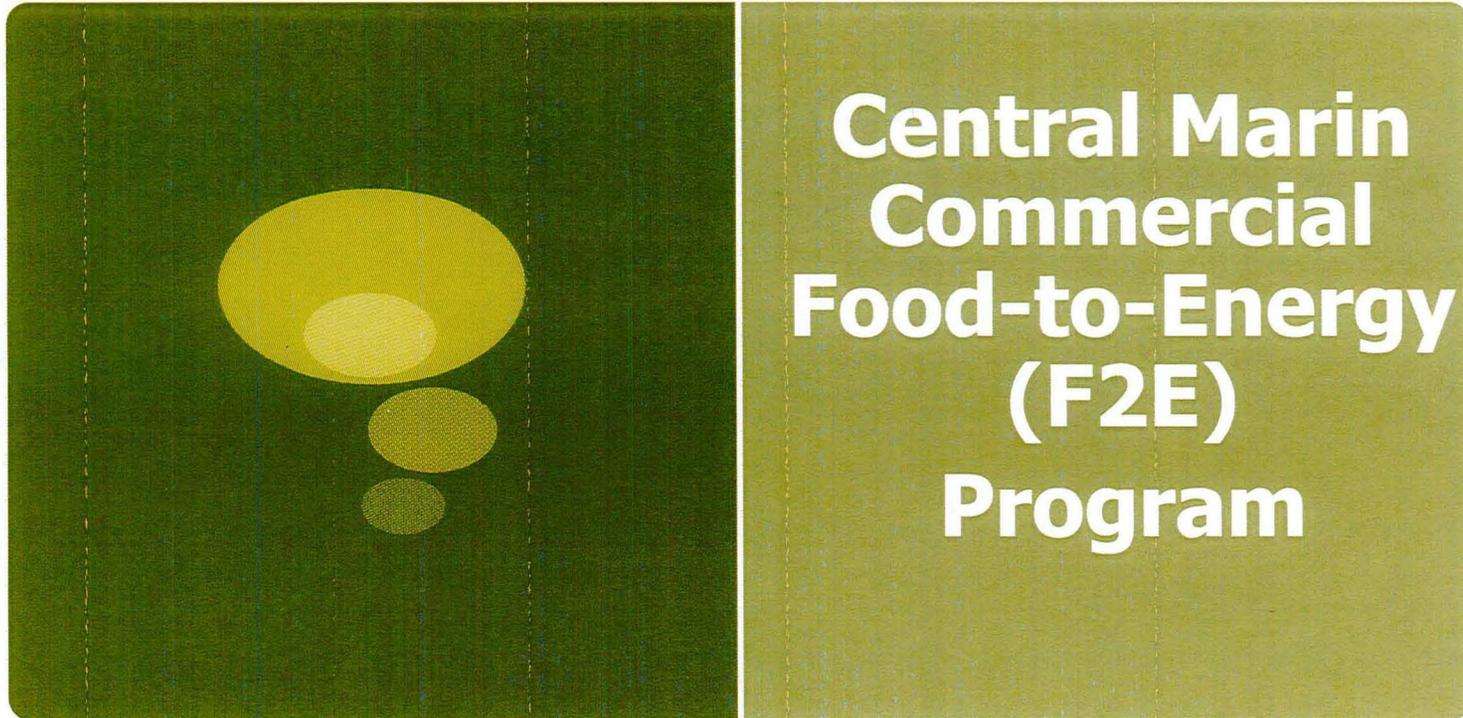
- A local renewable energy project
- Increases CMSA's energy self sufficiency and uses existing infrastructure
- Potential for CMSA to export energy (in the future)
- Reduces green house gas emissions – *2,000 metric tons*
- Reduces landfilling of food waste

Greenhouse Gas Carbon Dioxide Equivalent of Commercial Food Waste



Marin Sanitary Service &

Central Marin Sanitation Agency



San Anselmo Town Council Presentation

November 27, 2012

Presentation Outline



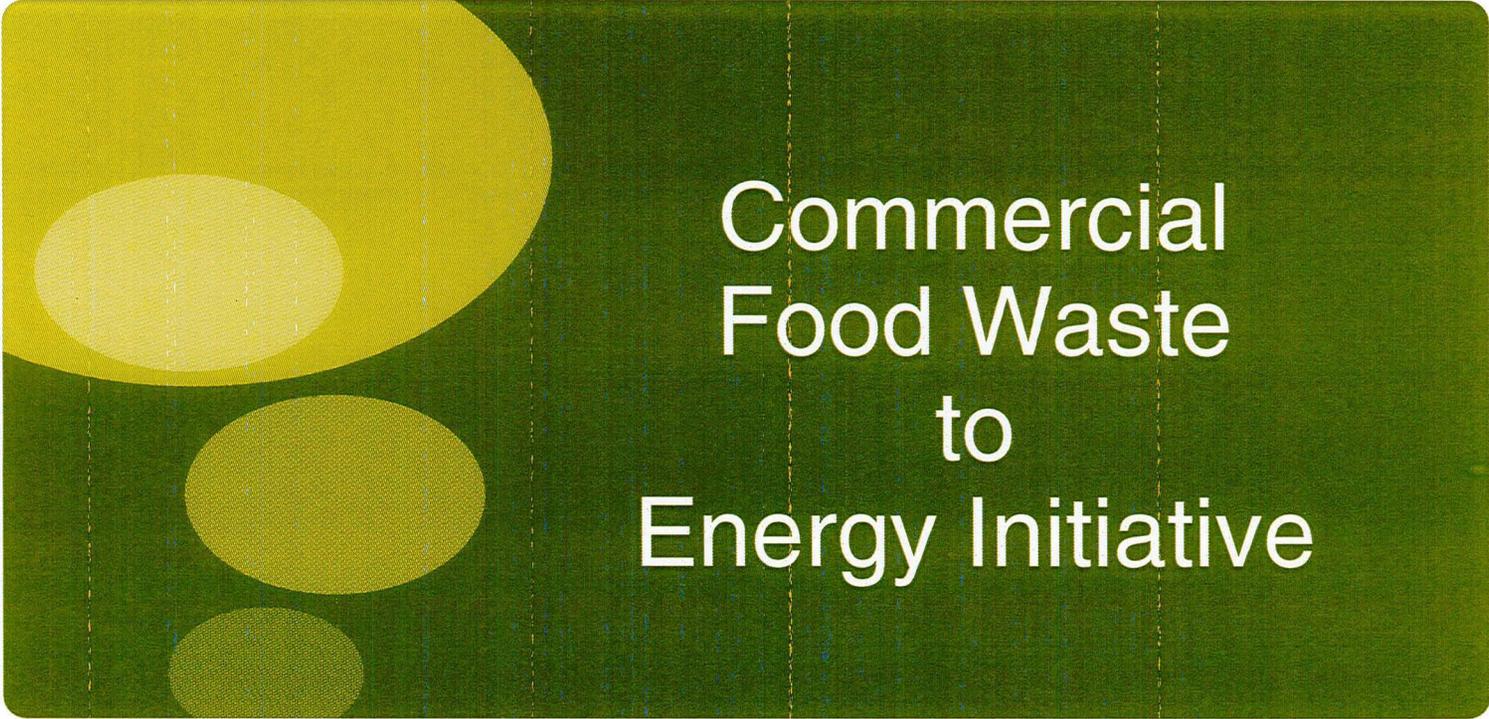
- **Central Marin's Commercial Food-to-Energy (F2E) Initiative**
 - Public-Private Partnership – CMSA and Marin Sanitary Service
 - CMSA and MSS Service Areas
 - F2E Timeline
 - What is F2E?

- **MSS Project Elements**
 - Roll-out plan
 - Equipment Installation Timeline
 - Transfer Station Improvements

- **CMSA Project Elements**
 - Treatment plant F2E/FOG facility
 - Anaerobic Digestion and Energy Production

- **Program Permitting, Benefits, and Next Steps**

- **Questions and Comments**



Commercial
Food Waste
to
Energy Initiative



Central Marin Sanitation Agency

Marin Sanitary Service

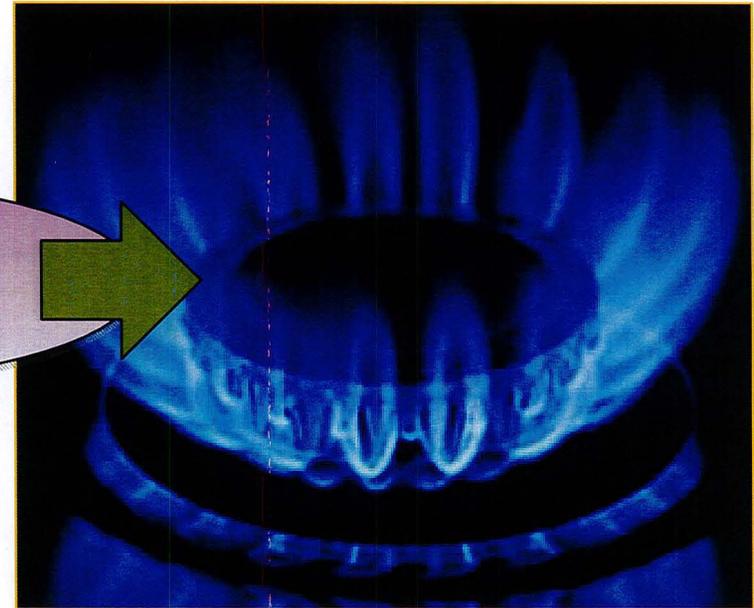
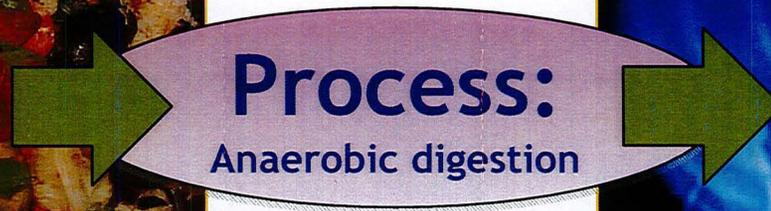
CONSERVATION - OUR EARTH, OUR MISSION, OUR JOB



Commercial Food Waste to Energy



Central Marin Food Waste



Biogas (methane)

CMSA – Aerial View



Public-Private Partnership



Central Marin Sanitation Agency

- A public agency
- About 120,000 customers in Central Marin
- 41 employees
- Treatment & disposal of about 11 million gallons of wastewater per day; peak flow = 115 MGD
- Treatment & beneficial reuse of biosolids
- Regulatory function – industrial, commercial businesses, restaurants, and dental offices
- Public education – Marin County
- Various contract services to local agencies

Public-Private Partnership



Marin Sanitary Service

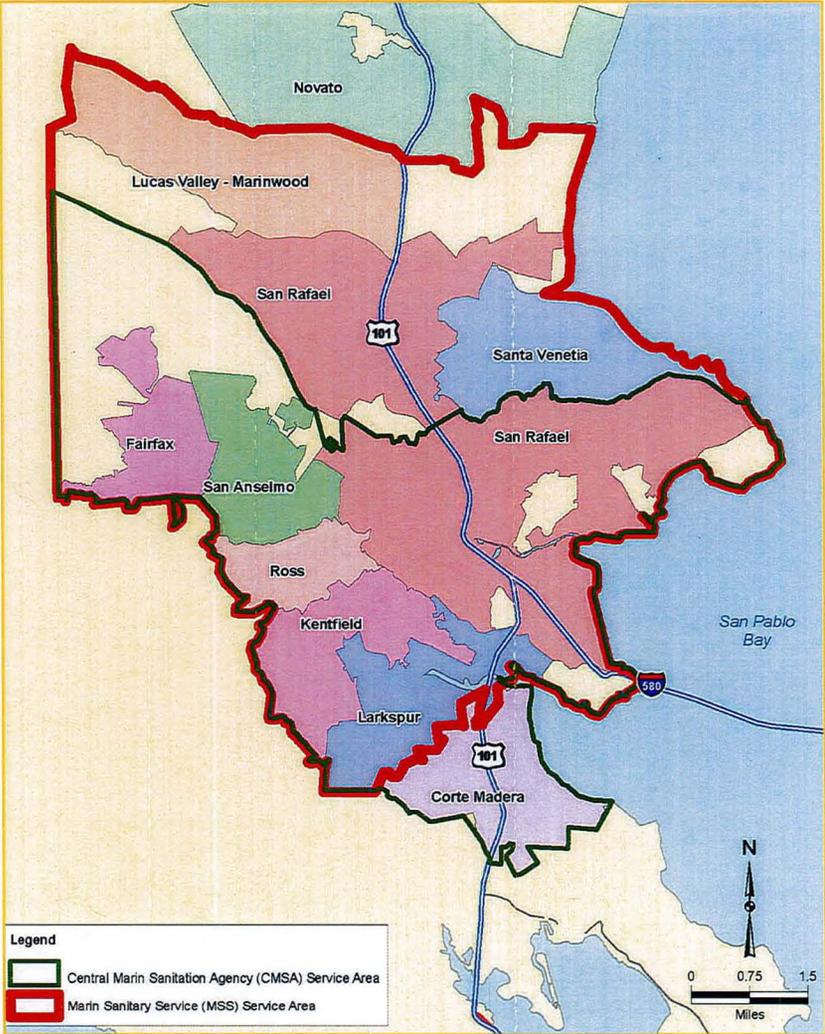
CONSERVATION - OUR EARTH, OUR MISSION, OUR JOB



- **Marin Sanitary Service (MSS)** a private company
 - Provides solid waste (SW) collection and recycling services to Marin County since 1948.
 - Serves nine jurisdictions within the County of Marin
 - Serves > 33,000 accounts providing refuse, recycling, and yard waste collection processing
 - Processed over 270,000 tons of solid waste, organics, and recyclables in 2011



CMSA and MSS Service Areas

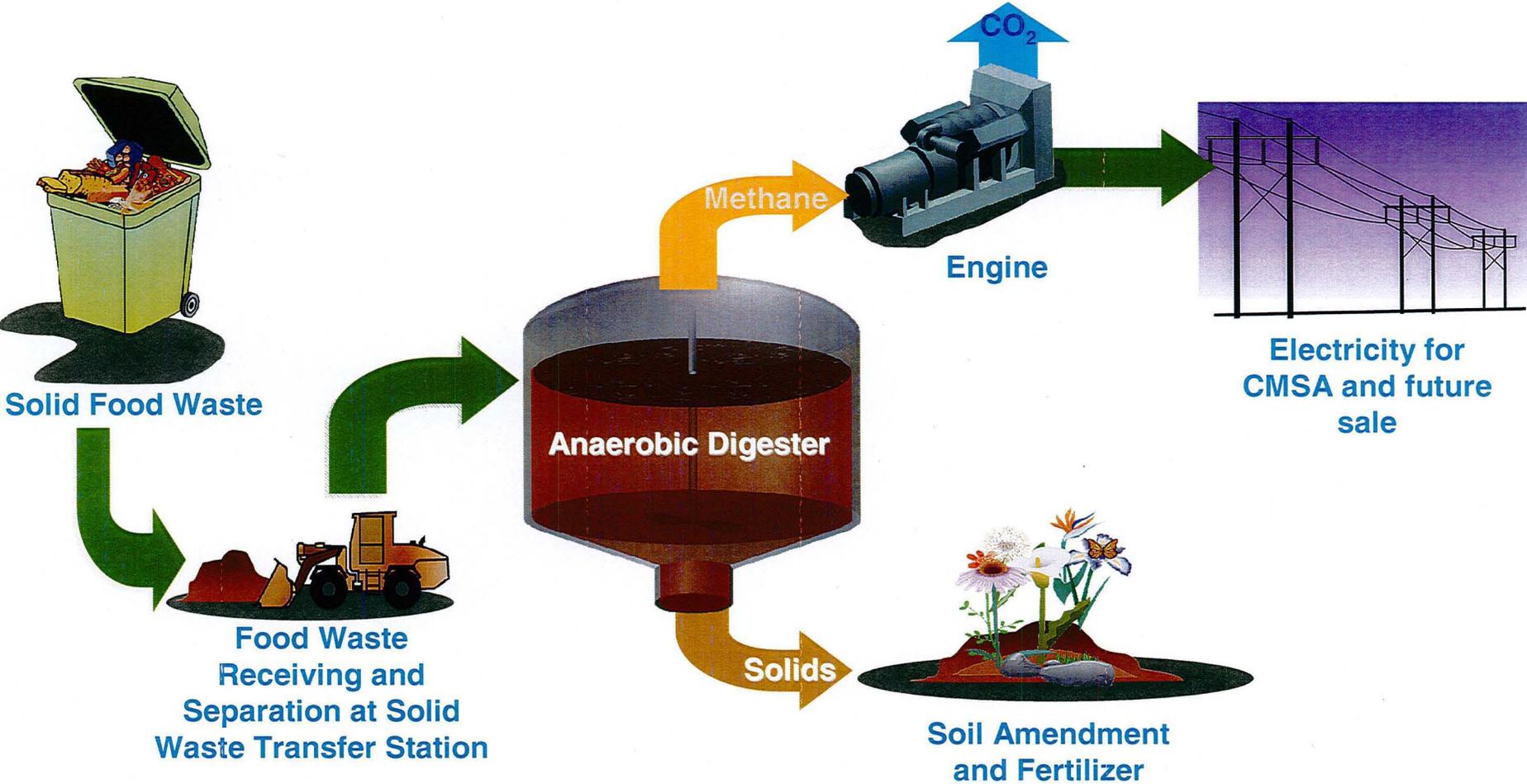


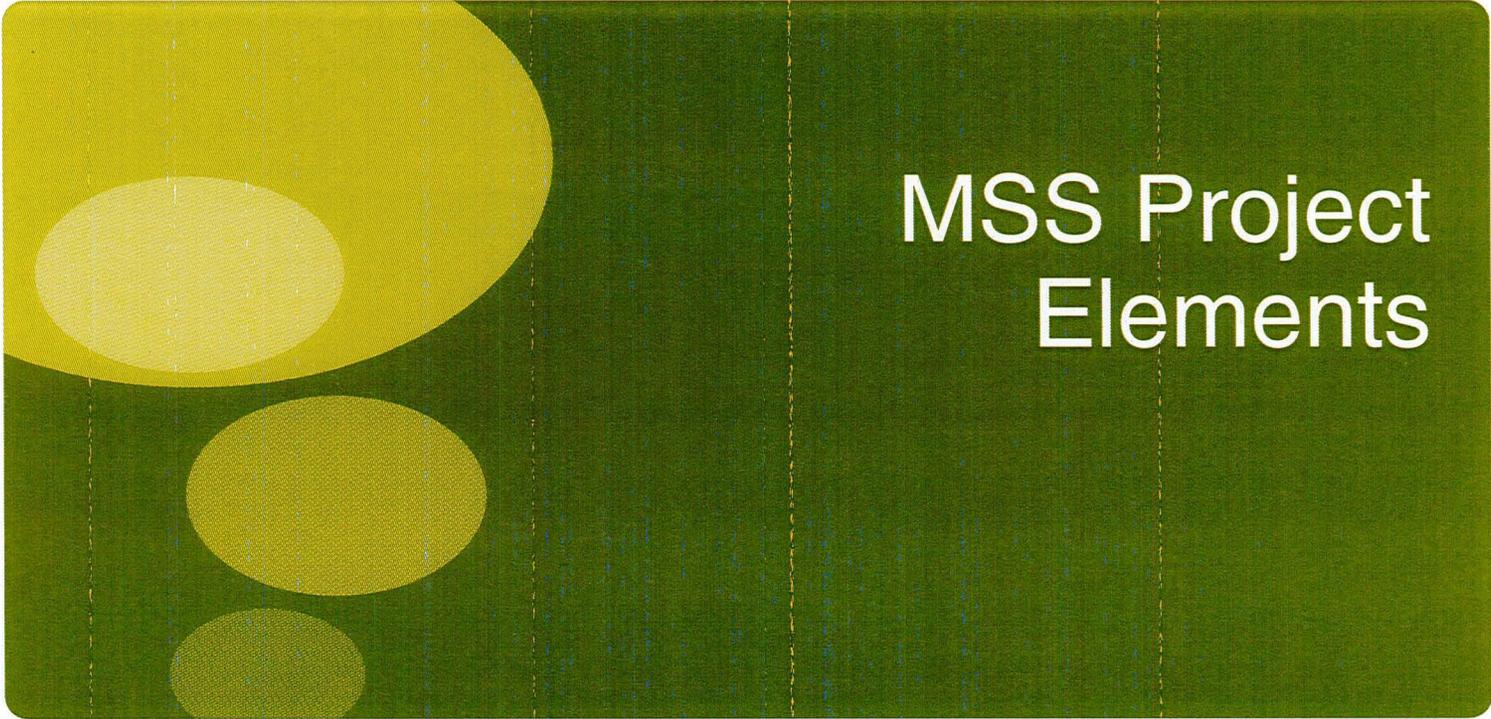
F2E Timeline



- 2008-2009
 - Methane Capture Feasibility Study completed - joint project by CMSA/City of San Rafael/MSS
- 2009-2010
 - Presentation to cities/town
 - F2E Predesign completed – focus on CMSA facilities
 - CEQA review completed
- 2010
 - F2E integrated into CMSA Digester Improvement Project
- 2011
 - MoU for F2E program executed between MSS and CMSA

What is Food to Energy?





MSS Project Elements

Food Waste to Energy



- Food is the **largest single source of waste in California**
 - ~16% percent of the Commercial waste stream
 - ~25% of the Residential waste disposed
- The primary goal of Food Waste to Energy (F2E) is the **diversion of organic waste from the landfill** and the creation of energy.

F2E in Marin County
A Public and Private Partnership
In Foodwaste to Energy
Collection and Processing



Marin Sanitary Service

PATTY GARBARINO, PRESIDENT

AND



Central Marin Sanitation Agency

AUGUST 17, 2010

Food Waste to Energy



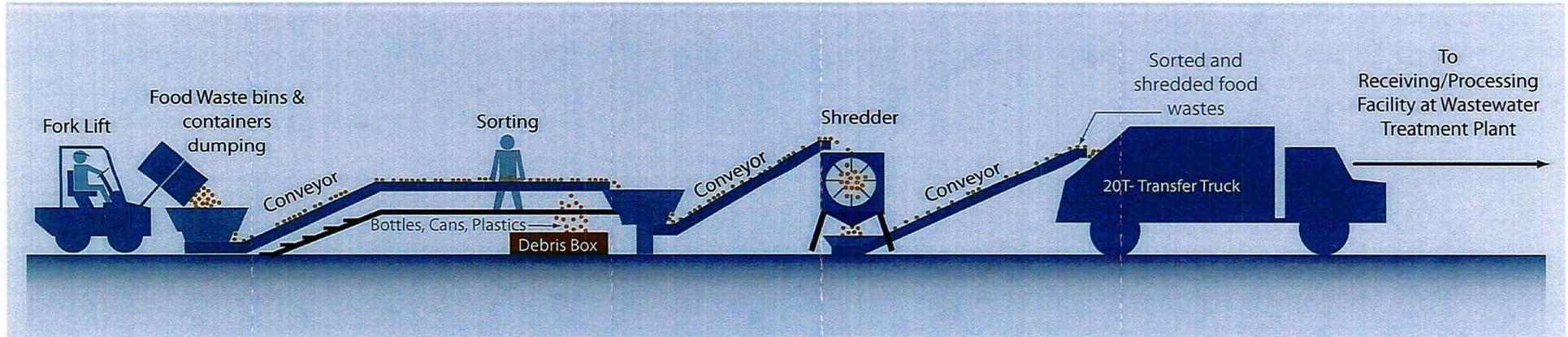
- In a 2008 Marin Sanitary Service (MSS) Waste Characterization study performed by Cal Recovery it was found that 27.1 % or 4,700 tons of solid waste sent to Redwood Landfill by MSS, is food waste.
- There are over 200 large food waste generators (restaurants, delis, grocery stores) in the MSS service area.
- Mill Valley Refuse has expressed interest in the program, and has 50-60 food waste generators in their area
- The amount of food waste expected to be set out for collection in these areas is estimated to be between 10-15 tons per day between the two haulers.

MSS Roll Out Plan

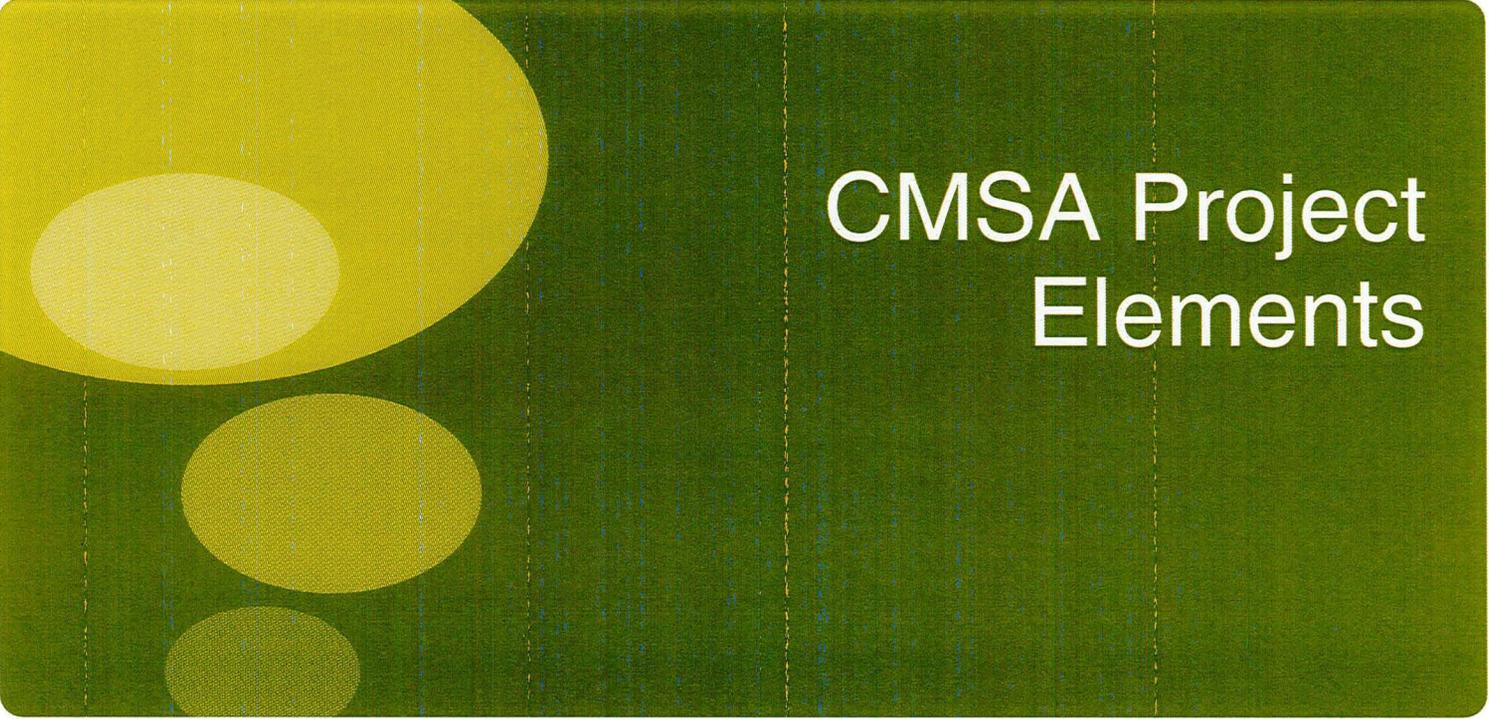
- **Pre-consumer** commercial food waste would be collected and then transferred to the MSS Transfer Station for processing to remove contamination and then transported to CMSA.
 - Eventually include **post-consumer** food waste
- Roll-out plan will be used by MVRS and MSS
 - Recruit top 20-25 commercial food waste producers
 - Continue adding incrementally
 - Program outreach
 - Kitchen staff training
 - Frequent monitoring



Improvements at the MSS Transfer Station



- Food waste will be collected and transported to MSS where it will be emptied into a collection bunker which will feed a series of processing belts allowing staff to remove contaminants
- Food waste can be collected by Mill Valley Refuse and transported to the MSS transfer station for processing.
- Clean food waste will be ground to <math><1\text{''}</math> and loaded into watertight dumpsters for transport to the CMSA plant for processing

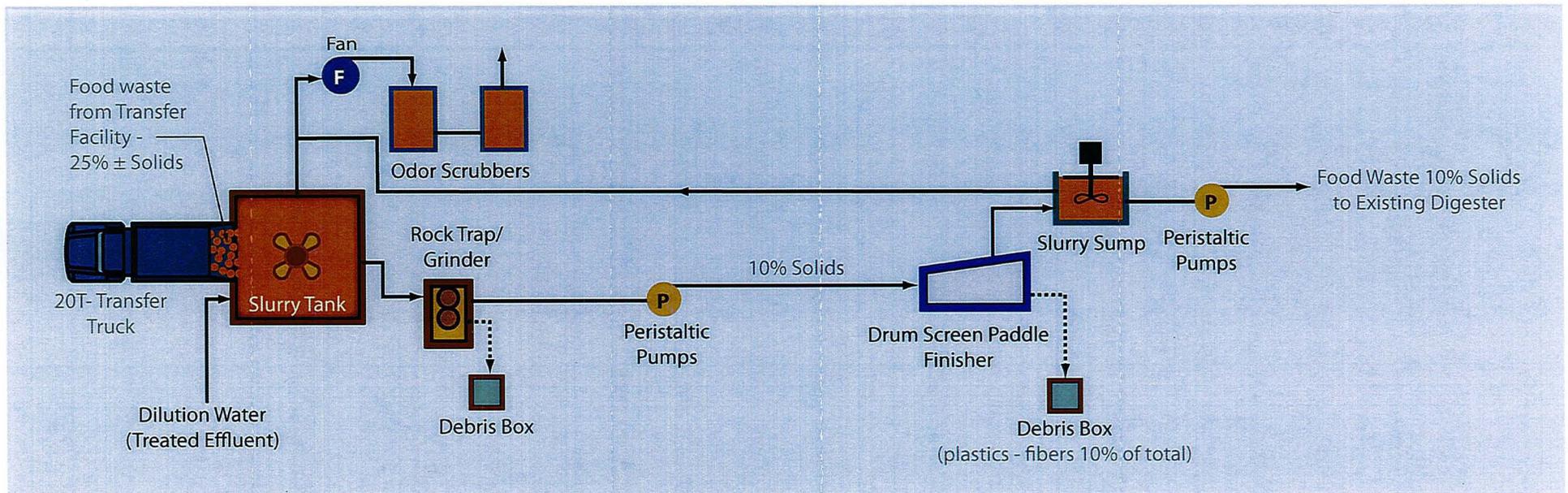


CMSA Project Elements

Improvements at CMSA's Wastewater Treatment Plant



New Receiving/Processing Facility at Wastewater Treatment Plant



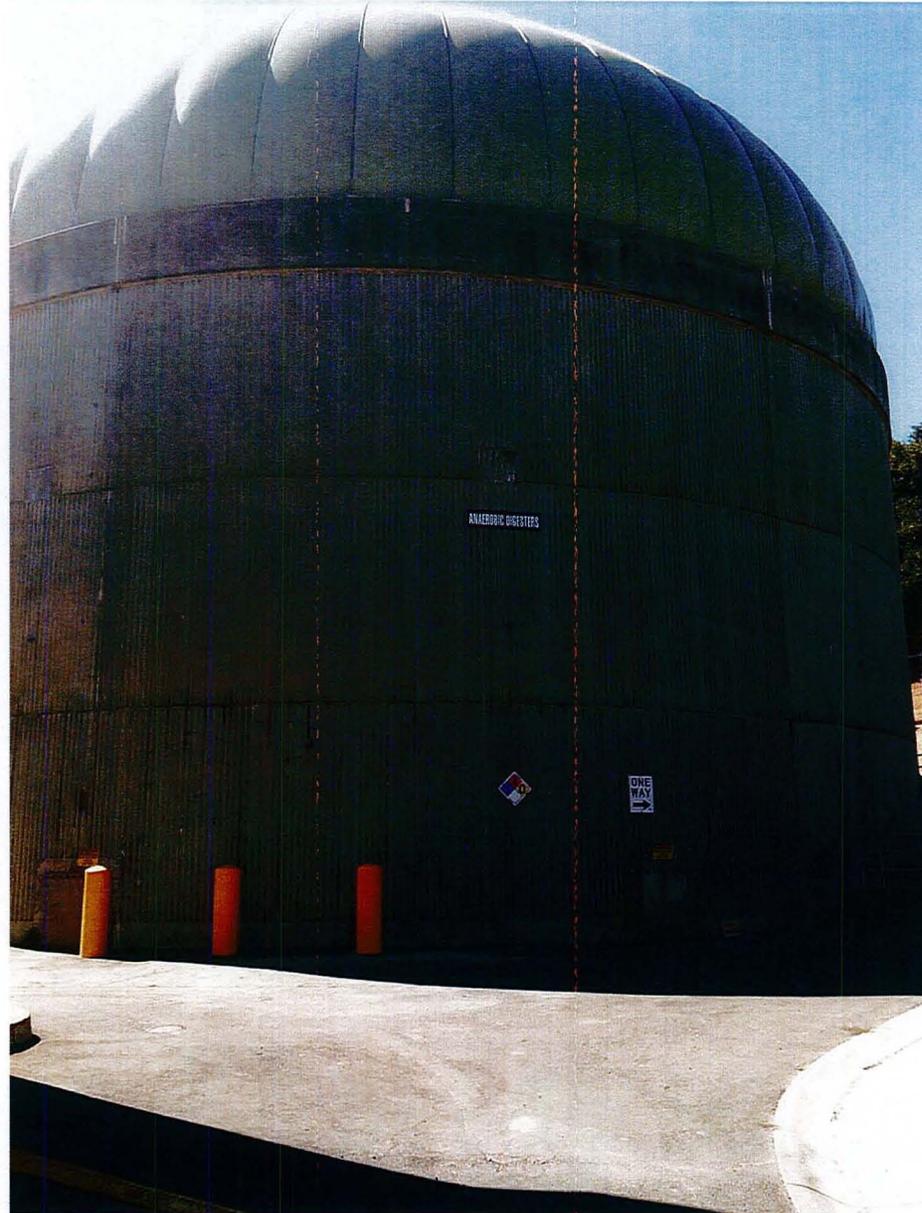
F2E/FOG Facility – October 2012



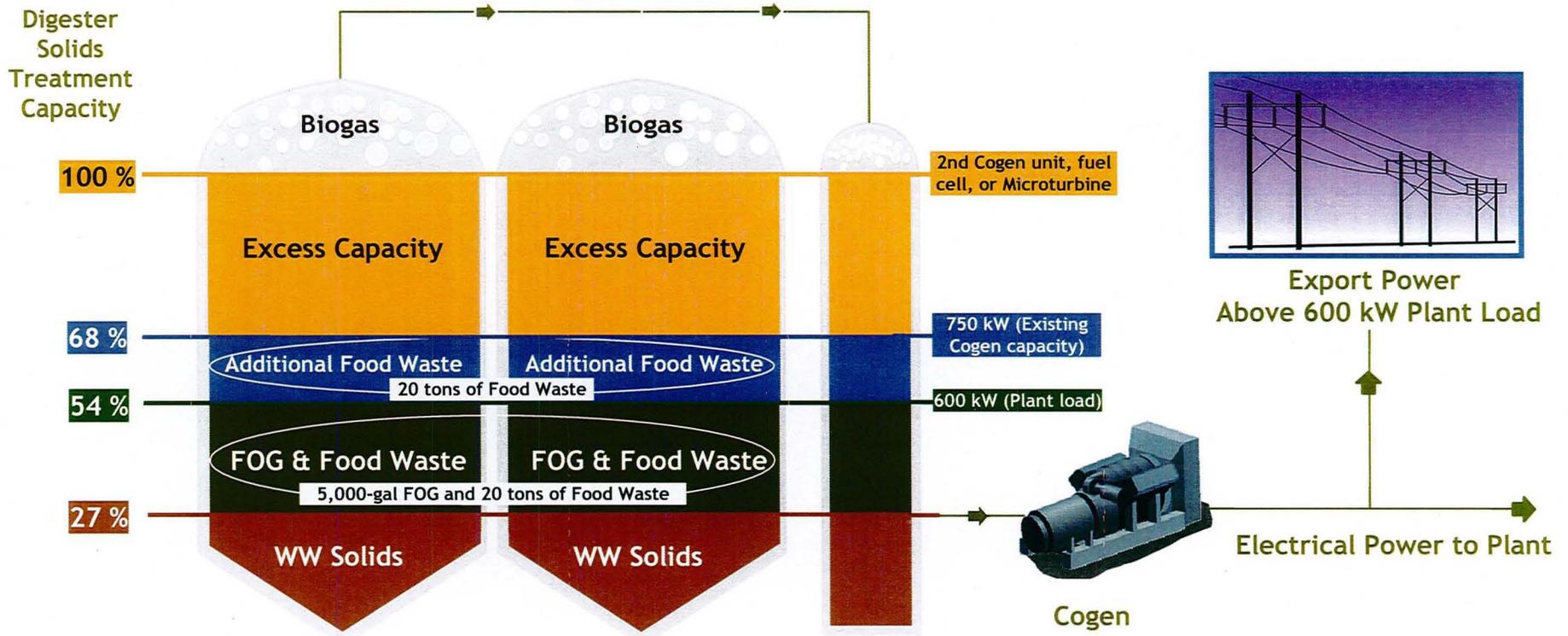
Drum Screen Paddle Finisher



Digestion - Anaerobic Digesters



CMSA Capacity for FOG and Food Waste



Biosolids Residuals

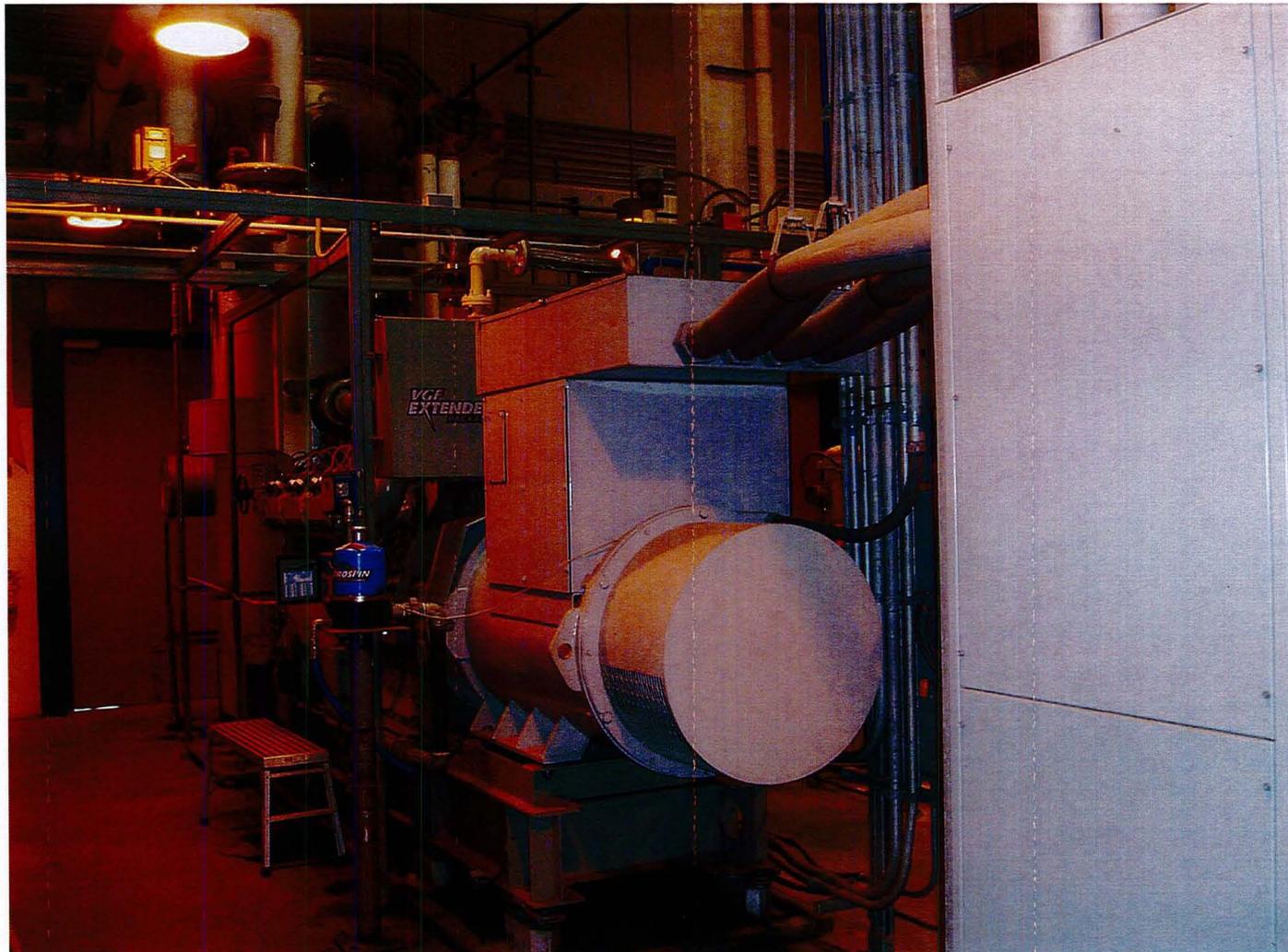


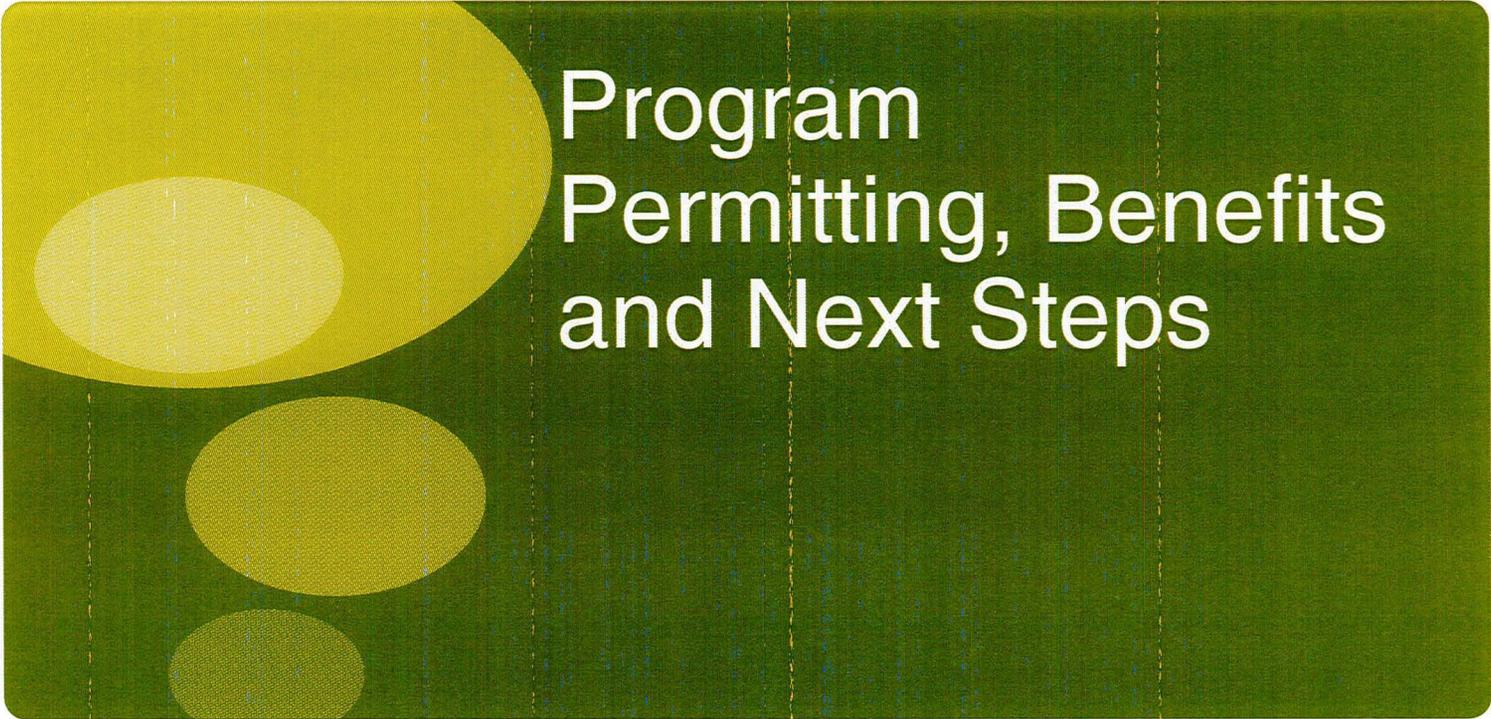
Digestion and Energy Production at CMSA



- CMSA has been in the digestion and energy generation business for 25 years
 - Existing biogas provides for about 9-12 hours/day power
 - Natural gas used for remaining hours during day
- Food waste and Grease (FOG) digest to produce biogas to offset natural gas usage
- CMSA average energy demand is 600kW/hr
 - Excess engine (150 kW +/-) capacity – Can be Sold!
 - Save on electricity expenses

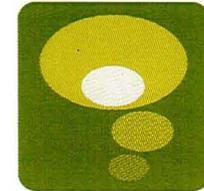
750 kW (1000 hp) Engine Generator





Program Permitting, Benefits and Next Steps

Permitting



■ For CMSA

- Discussions with Marin County Environmental Health Services (CalRecycle Local Enforcement Agency - LEA)
- LEA and CalRecycle site visit and discussions
- Submitted an Enforcement Agency Notification – approved in October 2012

■ For MSS

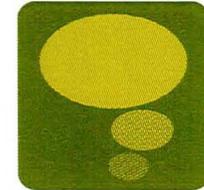
- Two amendments to the MSS SWFP were filed
- The purpose of these amendments was to identify the design and operations that mitigate or control potentially adverse environmental impacts.
- Received LEA approval August 7, 2012

Benefits of F2E Program



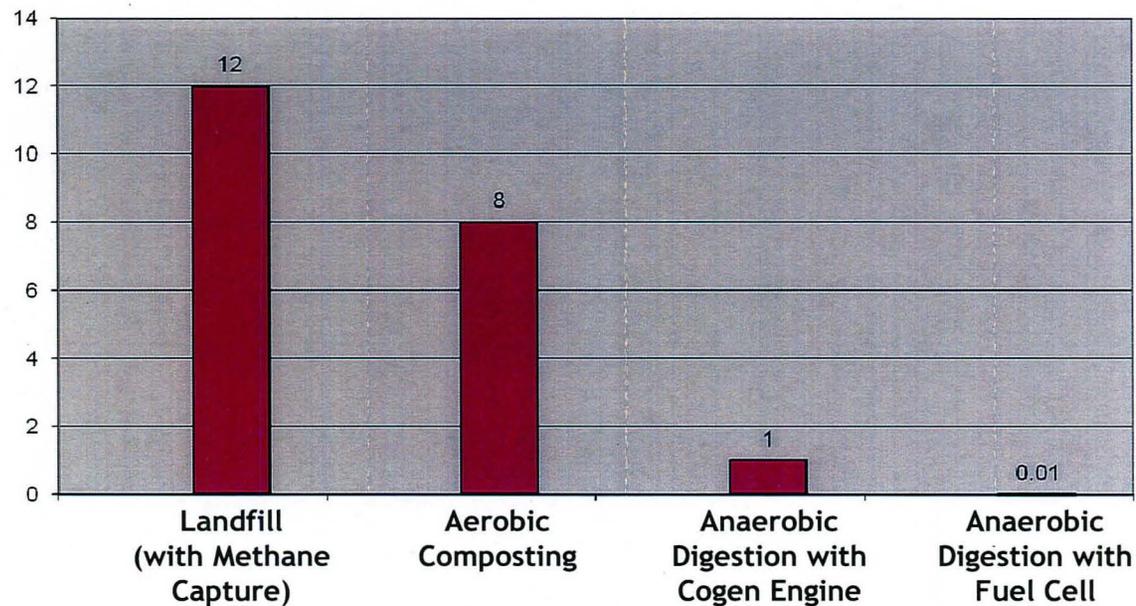
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- Potential for CMSA to export energy (future)
- Reduces green house gas emissions – *2,000 metric tons*
- Reduces landfilling of food waste
- According to a report by the East Bay MUD facility, 10 tons of food waste per day will power 80-140 homes for the year

Benefits: Reduces Carbon Footprint



- Less CO₂ than landfill or composting
- Less CO₂ from shorter truck halls
- Renewable energy replaces energy from fossil fuels

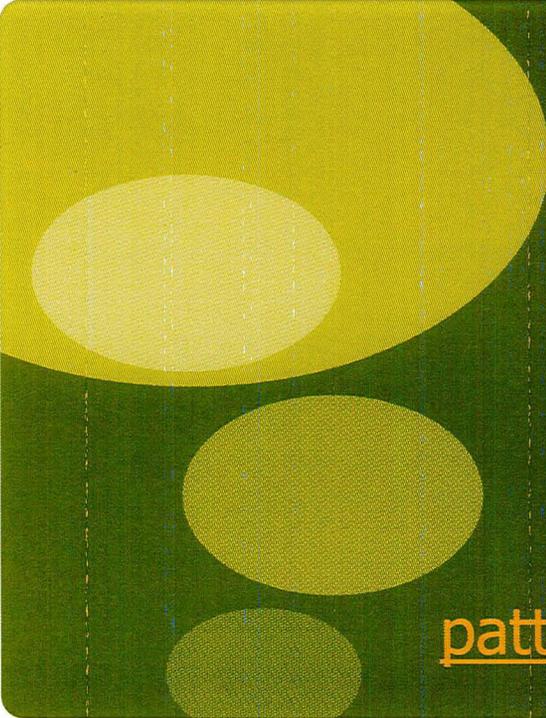
Greenhouse Gas Carbon Dioxide Equivalent of Commercial Food Waste



Next Steps



- Complete construction of CMSA facility – fall 2012
- MSS and CMSA to develop F2E program agreement—fall 2012
- Transfer station improvements by MSS to begin – late 2012-early 2013
- Education and training of MSS commercial facility staff--early 2013
- Recruitment, education and training of large food waste generators—early 2013



Questions or Comments?

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