

# **Co-Digestion Results in Net Energy Producer**

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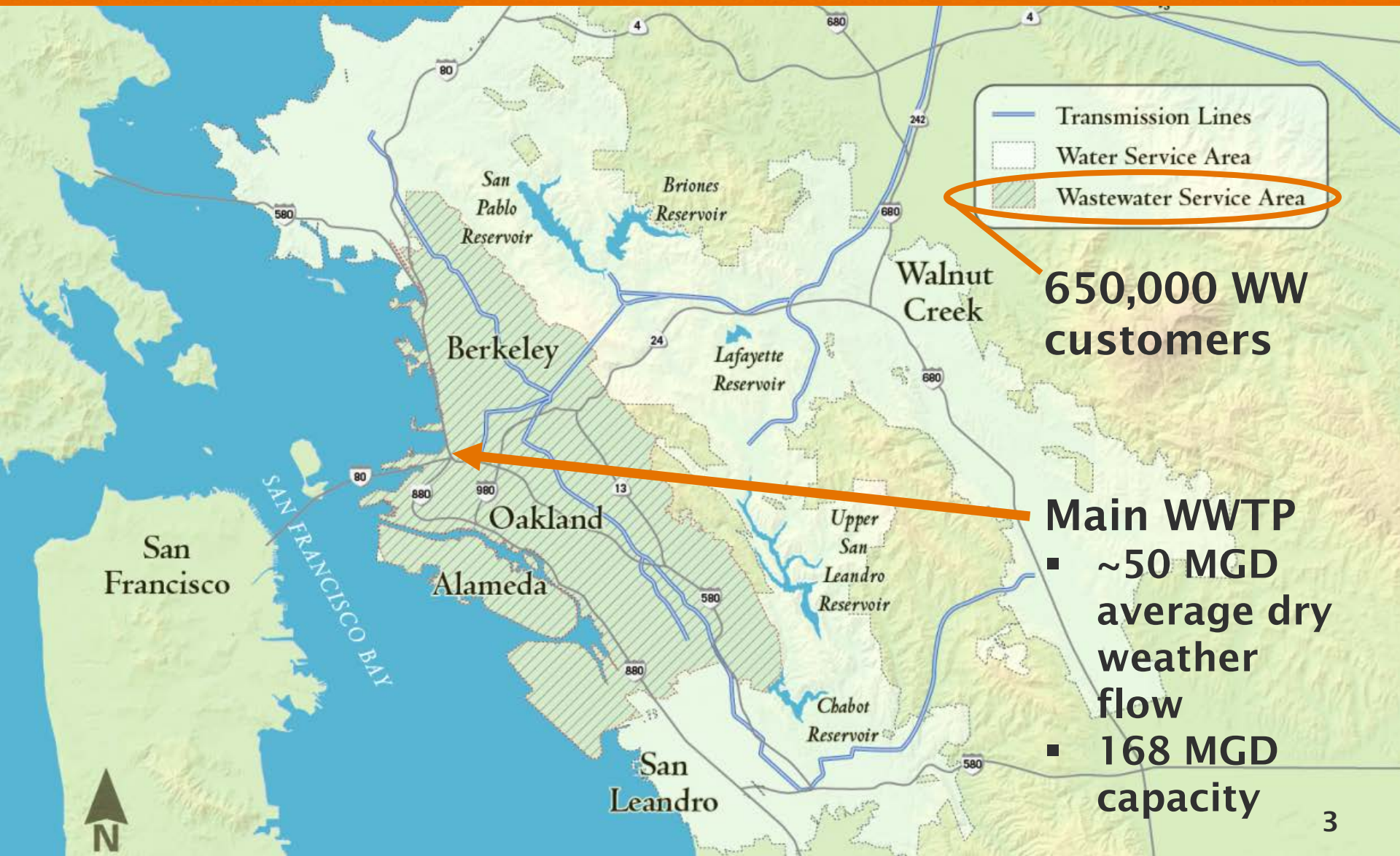
**Presenter: John Hake**  
**East Bay Municipal Utility District**  
**Northeast Digestion Roundtable – October 7, 2016**

# Presentation Overview



- EBMUD Background
- Intro to Resource Recovery (R2) Program
- Biogas Production and Utilization
- On-site Renewable Energy Generation
- Feedstock Portfolio and Food Waste
- Co-digestion Challenges
- Next Steps and Lessons Learned

# EBMUD Background Service Area



— Transmission Lines  
- - - Water Service Area  
▨ Wastewater Service Area

**650,000 WW customers**

- Main WWTP**
- ~50 MGD average dry weather flow
  - 168 MGD capacity

# EBMUD Background

## Excess Digestion Capacity



- 11 in-service anaerobic digesters (1.8 MG each)
- Canneries facility was designed to serve: **20**
- Remaining canneries: **0**



# R2 Program Overview

## Trucked Waste



- Began accepting trucked waste in 2002
- 4,000 trucks/month
- 20 million gallons/month non-hazardous liquids
- Trucked wastes received 24-7, 365 days/year

2002 ● **Septage Receiving**  
**\$1M**



2004 ● **Solid-Liquid Receiving**  
**\$7M**



2014 ● **Blend Tank Receiving**  
**\$13M**



# R2 Program Overview

## Renewable Energy Generation



- Savings of ~\$2M on plant power costs
- Electricity export revenue of ~\$1M/year
- First wastewater treatment plant in N. America to produce more electricity than plant demand

1985 ● Three  
2.2 MW  
engines



2013 ● 4.5 MW  
Turbine  
\$13M



# R2 Program: Materials Accepted



<http://www.ebmud.com/water-and-wastewater/wastewater-treatment/resource-recovery-trucked-waste-program>

- Septage
- FOG
- Process Water
- Grey Water
- Sludge
- Liquid Organics
- Solid Organics (food waste)

The screenshot shows a web browser window with the URL <https://www.ebmud.com/water-and-wastewater/wastewater-treatment/resource-rec...> and a tab titled "Resource Recovery: Trucke...". The page content includes:

### Resource Recovery: Trucked Waste Program

EBMUD's excess wastewater treatment capacity allows us to provide an environmentally friendly and economical disposal alternative. EBMUD treats a variety of liquid and solid wastes from outside of our service area, and offers **competitive rates** and a convenient **disposal location** seven days a week, 365 days a year.

The documents below are PDF files which can be viewed and printed with Adobe Acrobat Reader, a free software.

**Permitting**  
There are two main avenues to permit your waste: 1) Generator of waste obtains a Permit and has it hauled, or 2) Generator hires an approved hauler to obtain a Permit and haul waste.  
Follow these easy steps to have your waste stream reviewed.

1. If your company already has a Permit, fill out the Trucked Non-Hazardous Material Acceptance Agreement (MAA) below. The MAA should only be submitted by a company with an existing Permit or is in the process of applying for one. Send the form along with appropriate lab data and Material Safety Data Sheets to [rrwaste@ebmud.com](mailto:rrwaste@ebmud.com) or fax to (510) 287-1530.
2. If necessary, call (510) 287-1336 to obtain a list of Approved Permitted Haulers who can profile your wastestream, or use the Waste Disposal Permit Application packet below to apply for your own Permit.
3. Use the Wastestream Information Form if the process generating the waste is more complex than space allows on the MAA.

Trucked Non-Hazardous Material Acceptance Agreement	25.85 KB
Trucked Non-Hazardous Permit Application Packet	166.53 KB
Wastestream Information Form	20.87 KB

**Currently Accepted Waste Streams**

- Winery wastes (lagoon/pond, lees, product) -- (see brochure below)
- Portable toilet/septic tank wastes
- Fats, oils, and grease (FOG)
- Food processing (liquids and solids) waste
- Food scraps
- Animal processing waste
- Rendering facility waste
- Municipal water and wastewater sludge
- Industrial/commercial process wastes
- Storm water/Groundwater

**Popular Pages in Wastewater Treatment**

- Permit Programs
- Wastewater Control Ordinance & Discharge Limits
- Pollution Prevention in Schools
- Mercury
- Wastewater Collection
- Sewer Lines (managed by cities)
- News

# Material Acceptance Procedure



EBMUD follows a rigorous procedure designed to:

- Protect wastewater treatment plant personnel
- Meet operational needs, including:
  - Process considerations
  - Odors
  - Biological systems
- Ensure compliance with all environmental permits and regulations (NPDES, air, biosolids, and pretreatment)



# Materials Acceptance Steps



1. Material characterization
2. Material evaluation
3. Permitting
4. Load and material tracking
5. Site orientation
6. First load confirmation sample
7. Field audit program

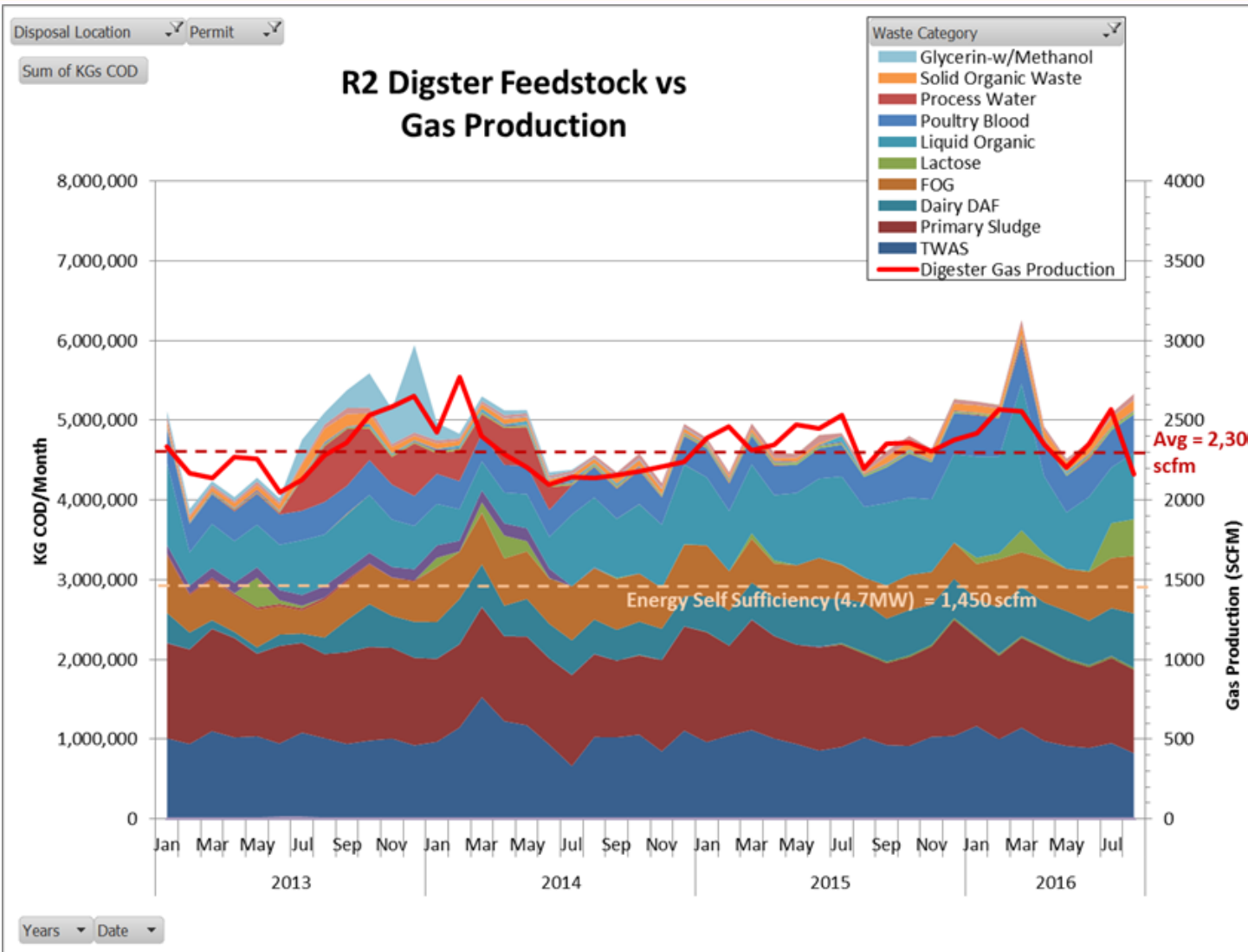
# Current R2 Program Status



- 250 customers
- 30 material sub-types
- 100-150 trucks per day
- 3-4 MW generated continuously from trucked-in high-strength materials

# Biogas Production

## High strength waste contribution



**Roughly 2/3 of  
of biogas from  
R2 wastes**

# Biogas Utilization

## Current Flaring Patterns



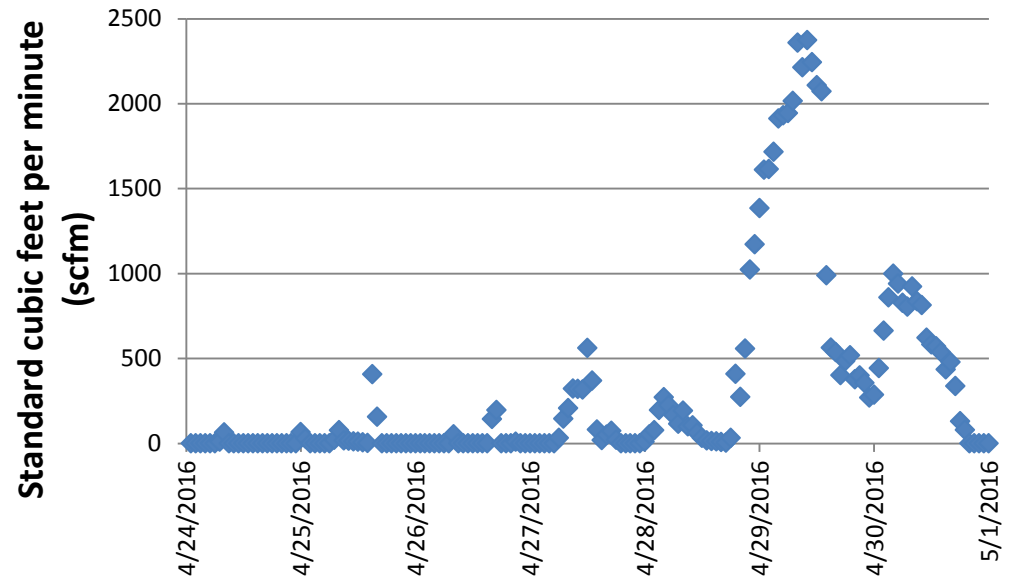
Biogas Utilization	2015 Volume (cubic ft)	% of Total
Turbine	533,000,000	47%
Engines	471,000,000	41%
Boiler	5,000,000	0.4%
Flare	137,000,000	12%

**Total 1,145,000,000**

High strength wastes are delivered on no particular schedule. EBMUD often flares at the end of the week as deliveries increase and biogas production exceeds generation capacity.



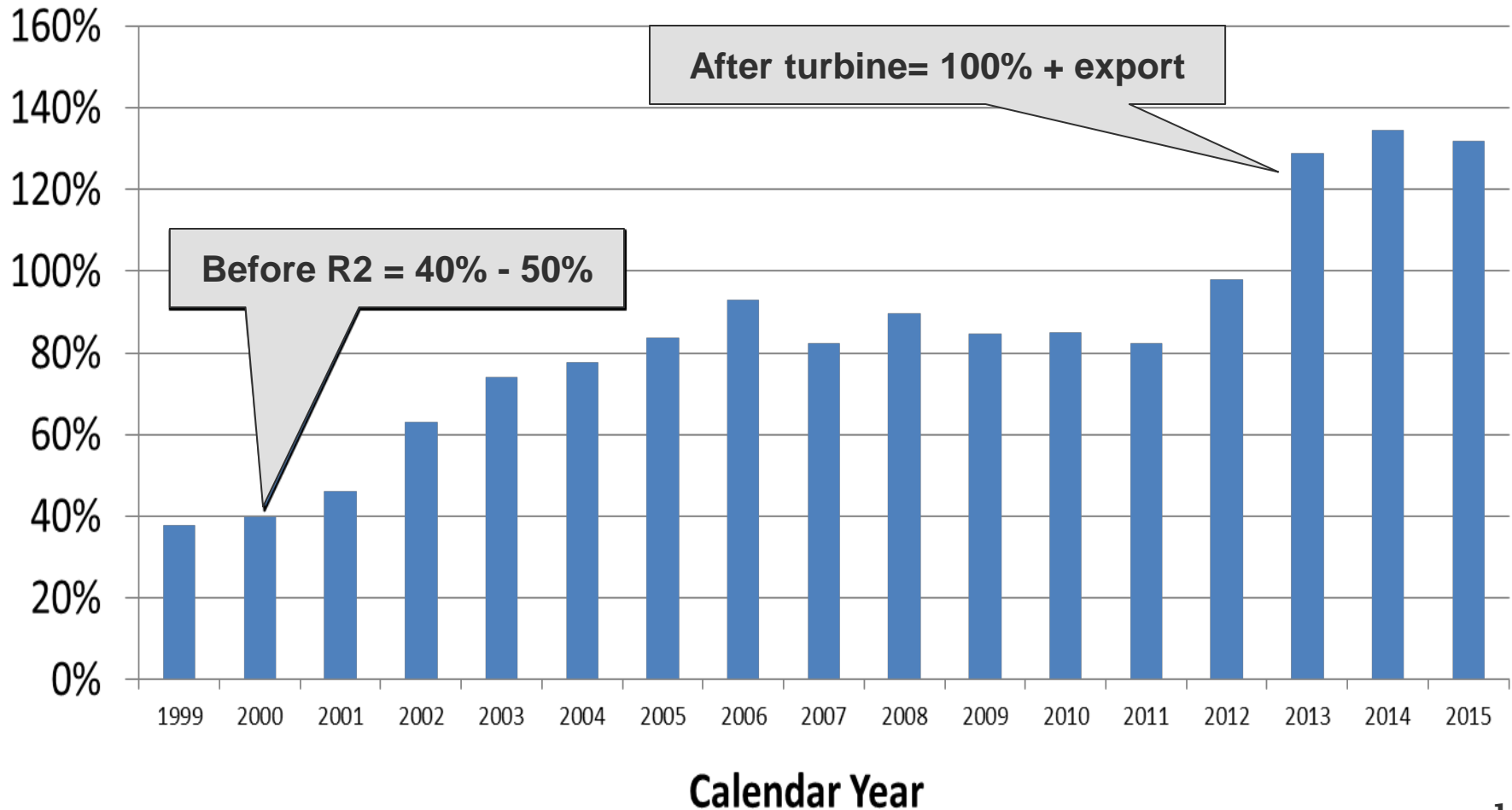
**Flaring - Week of April 24, 2016**



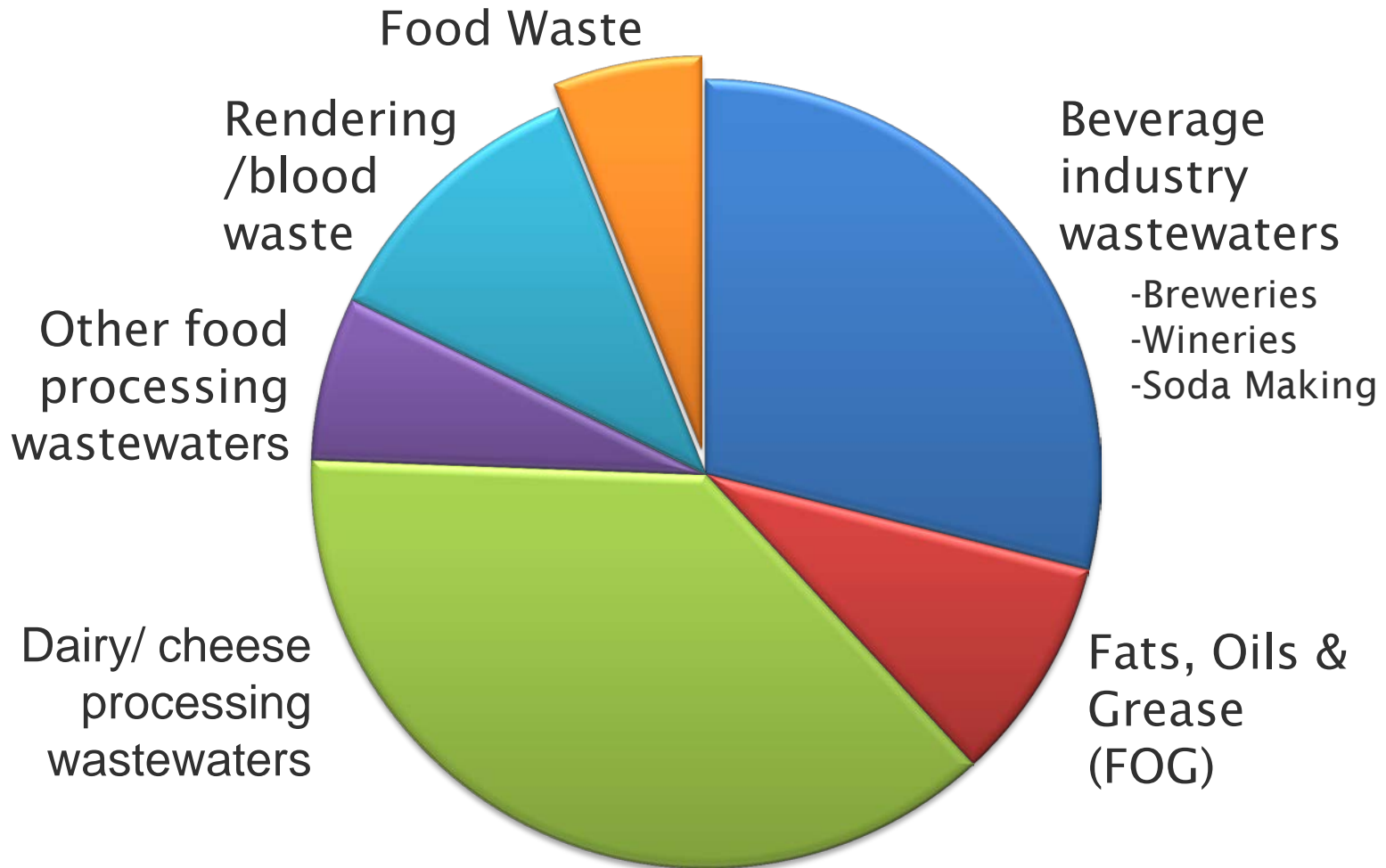
# Onsite Renewable Energy Generation



## % of WWTP demand met by onsite generation



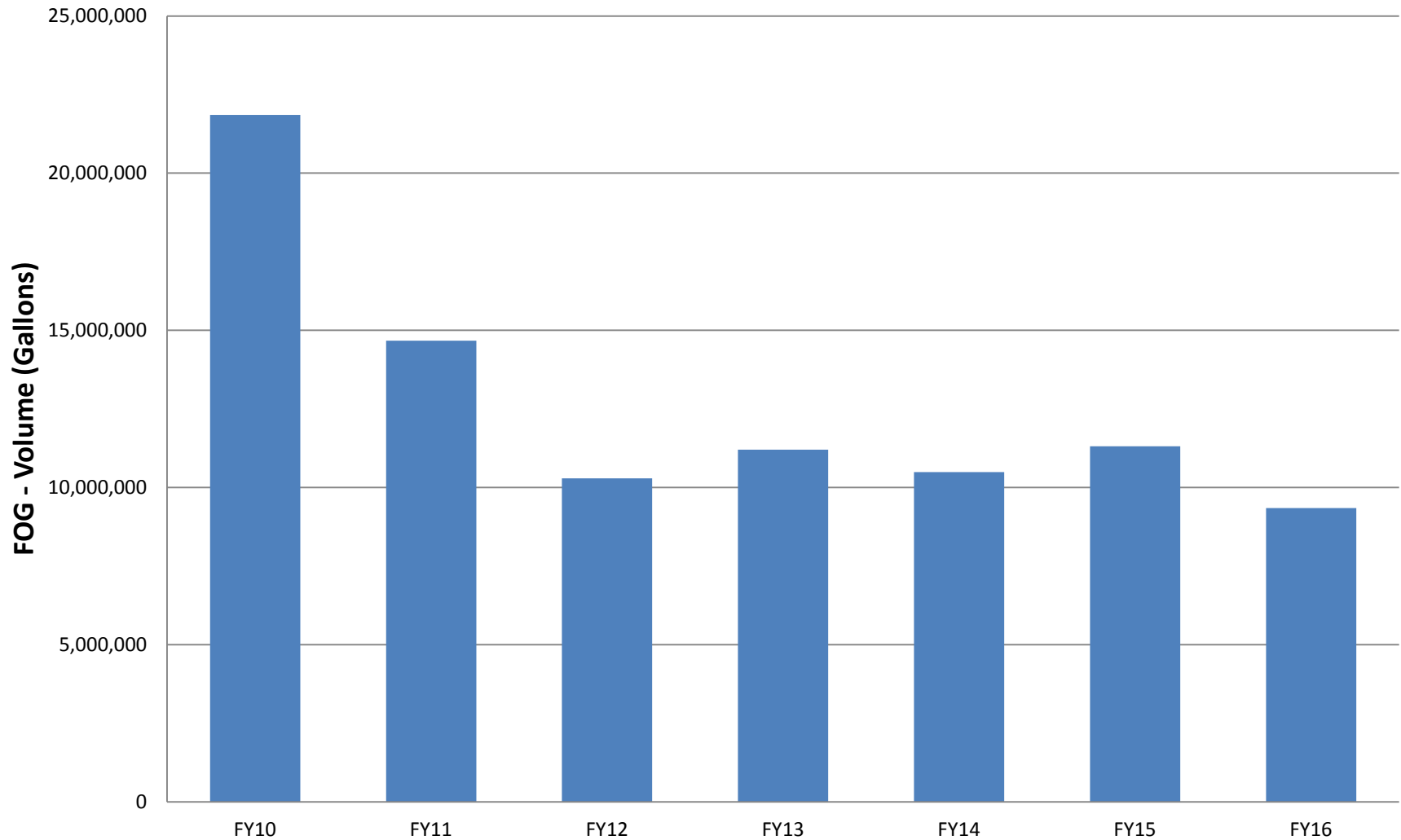
# R2 Program Feedstock Portfolio



**FY 2016 High-Strength Wastes**

# R2 Program Overview

## Declining FOG Deliveries



# Welcome to Food Waste





# Existing Food Waste Program Preprocessing SSO Offsite



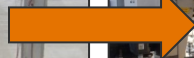
1. Source separated organics (SSO) on transfer station tip floor



2. Food waste after grinding



3. Off-loading at EBMUD



4. Contaminant removal at EBMUD



# MSW Organics Fraction Ongoing Pilot Study

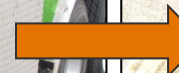


1.  
Press at  
offsite  
facility



2.  
Reject from  
offsite  
press

3. Off-  
loading at  
EBMUD



4.  
Contaminant  
removal at  
EBMUD

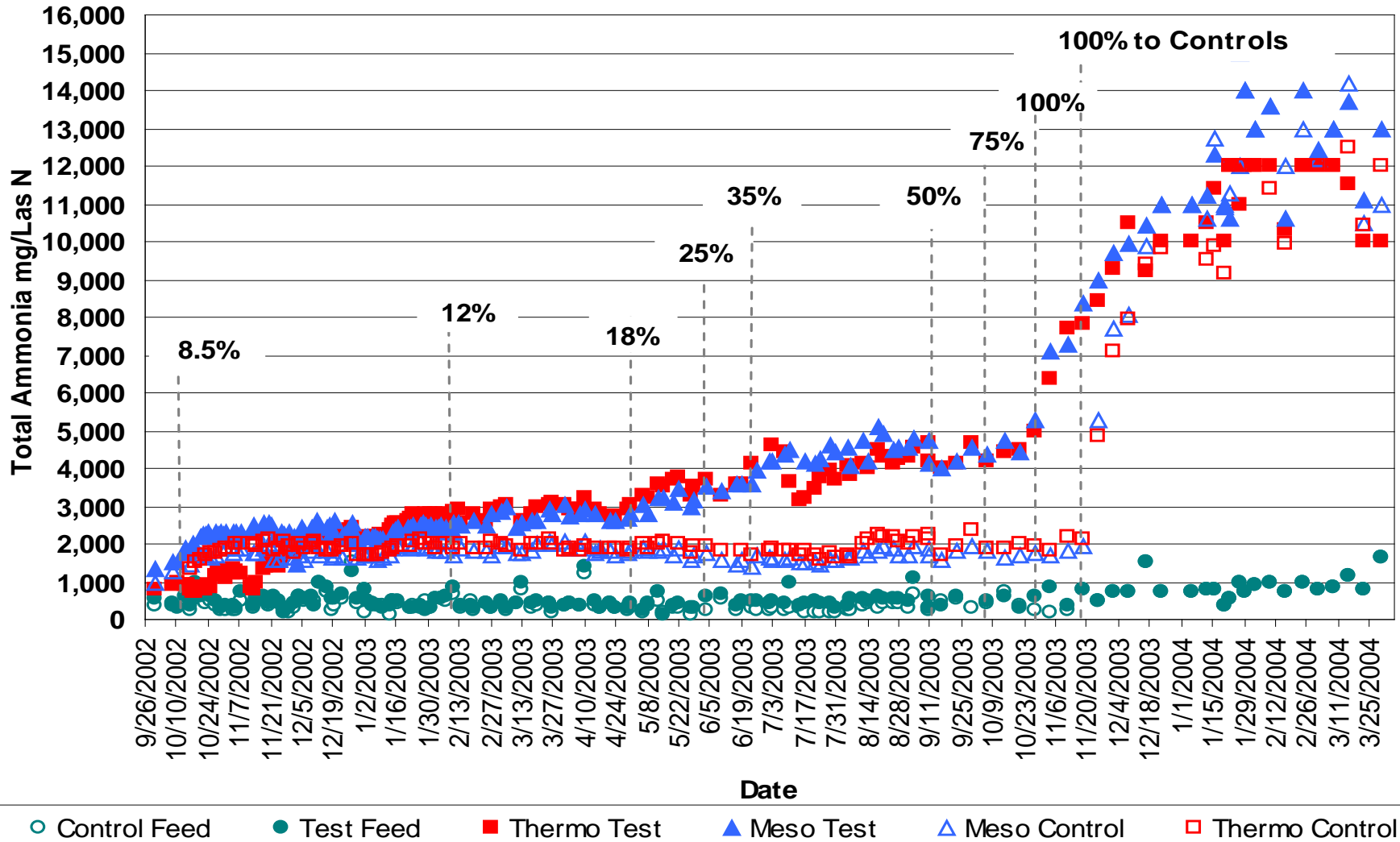
# Codigestion Challenge Food Waste Contamination



**Key need: Pre-processing trains that remove contaminants to protect infrastructure**

# Codigestion Challenge

## Poultry Blood - Ammonia Toxicity



# Codigestion Challenge

## Fats, Oils, and Greases (FOG)

### Meso Test Digester

Developed indigestible scum layer



### Thermo Test Digester

Greater ability to digest long-chain fatty acids



# Next Steps and Lessons Learned



- Continue focus on food waste with:
  - Pilot studies
  - Development of partnerships
  - Investigation of FW program expansion
- Keeping in mind:
  - Resource Recovery requires innovative thinking and problem-solving approach
  - Adaptive management is key to addressing multiple, unanticipated challenges
  - Resource Recovery is not without risk, competition is real



## Q&A

### Contact info:

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[www.ebmud.com](http://www.ebmud.com)