

**East Bay Municipal Utility District**

## Sustainability Efforts at EBMUD

ACWA Workshop  
 Big Green Machines: Transitioning Oregon Wastewater Utilities  
 February 11, 2010

Presented by David R. Williams  
 Director of Wastewater  
 East Bay Municipal Utility District

## Topics

- Introduction to EBMUD
- Sustainability Efforts
  - Recycled water
  - Photovoltaic
  - Hydropower
  - Fleet
  - Waste to energy
- Renewable energy credits and greenhouse gas offsets
- POTW as a “green factory”

ebmud.com

## EBMUD

### Wastewater

- Secondary treatment capacity = 168 MGD.
- ADWF ~ 80 MGD
- Max available digester volume is 18 MG
- Max on-site power generation capacity is 6.5 MW




ebmud.com

## EBMUD (continued)

### Water

- 230 MGD
- 5 water treatment plants
- 4 water supply reservoirs
- Aqueduct conveyance system



ebmud.com

## Recycled Water Facilities


- Richmond – 4 MGD to major oil refinery (exist.) + 3.5 MGD in construction
- Oakland/Berkeley – 2.9 MGD for landscape irrigation, commercial, industrial uses
- San Ramon Valley – 2.4 MGD for landscape irrigation



ebmud.com

## Photovoltaic Solar Facilities

- Sobrante – 600,000 kWh
- Adeline – 40,000 kWh
- Walnut Creek – 830,000 kWh (planned)



(all figures are annual generation)

ebmud.com

## Hydroelectric Power

- Two Hydropower Plants
  - Pardee 30 MW
  - Camanche 10 MW
- Average Annual production ~ 185,000 MWh/yr
- Offsets ~ 70,000 MT of CO<sub>2</sub> annually



ebmud.com

## EBMUD Car Pool Fleet

- In 2001, EBMUD started a pilot program to test day-to-day use of Prius gas-electric hybrids in its car pool fleet
- Today, all of EBMUD's sedans are hybrids
- Annual savings:
  - 12,000 gallons of gasoline
  - 103 MT of CO<sub>2</sub> emissions



ebmud.com

## WASTE TO ENERGY: EXPANSION AND DEVELOPMENT



ebmud.com

## Existing On-site Generation

- Three 2.2 MW IC engines
- Avg. Output is about 4.0 MW
- Historically met ~40% of plant load, now meets ~90%



ebmud.com

## Resource Recovery (R2) Program

- Objective: Utilize excess digestion capacity
- High strength wastes added directly to digesters to increase gas production
- Digester gas fuels a 6.5 MW on-site Power Generation Station (PGS)



ebmud.com

## Unique Conditions at EBMUD

- Excess digester capacity available
- Plant site on network of major interstate highways
- Economies of scale
- Limited alternatives in major urban area
- In-house expertise to perform research

ebmud.com

## High-Strength Waste Examples

- Started with:
  - Septage
- Progressed to:
  - Fats, oils, and greases (FOG)
- Expanded program includes:
  - Food processing waste
  - Winery waste
  - Industrial/commercial process waste
  - Animal processing waste
  - Municipal and agricultural lagoon wastes

ebmud.com

## Acceptance of Liquid & Solid Wastes

High Strength Waste Deliveries  
100,000 – 175,000 gpd



ebmud.com

## Food Waste Background

- Food waste is the largest single category of municipal solid waste in CA (16%) or 5.6 million tons (CIWMB, 1999)
- Key component for meeting mandated solid waste diversion goals (state law, AB 939)
- Composting is the most common diversion method
- Composting limitations:
  - Net energy consumer, long process (90 days)
  - Air quality concerns (VOCs)
- Anaerobic digestion has been successfully used to treat municipal sludge, but has not been widely used in the US for food waste.

ebmud.com

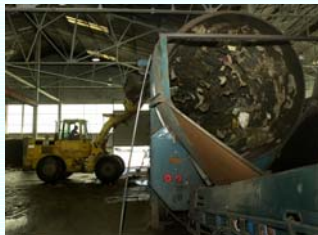
## Food Waste Source



- Food waste comes from Bay Area communities and commercial facilities

ebmud.com

## Off-site removal of large contaminants



- Local waste management company hauls and pre-processes food waste anaerobically digested at EBMUD


ebmud.com

## Food Waste Delivery at MWWTP



ebmud.com

### District Food Waste Processing



PULP-to  
Digesters

POMACE  
-to Landfill

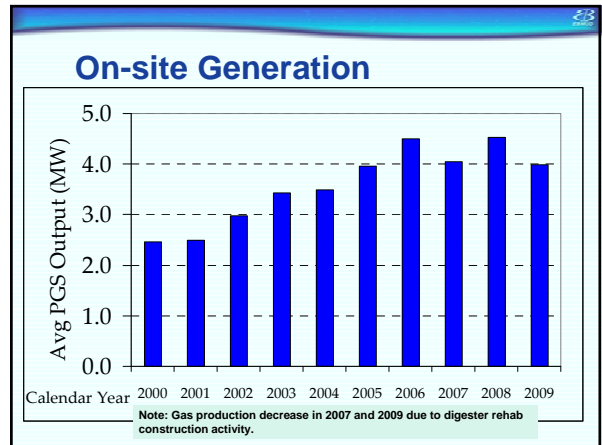
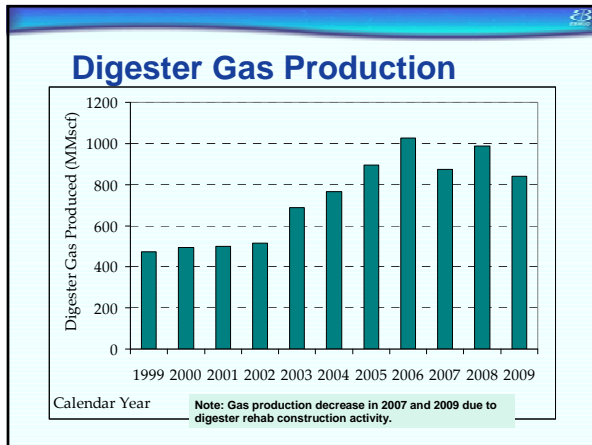
➤ EBMUD patented this process

### Food Waste Contaminants


- Food waste contaminants led to processing problems- plugging, equipment damage.
- Contaminants included:
  - Silverware, chopsticks, shells, bottle caps, plastics.
- EBMUD staff investigated processes to remove contaminants.



ebmud.com




### Trap Grease to Biodiesel Pilot



➔

### Biodiesel Pilot Production

Constructed a 100-gallon batch facility



Produced 1,300 gallons of biodiesel

## Biodiesel Pilot Results

- **QUALITY:** Biodiesel from brown grease can meet all ASTM quality requirements with the exception of ultra low sulfur
- **VEHICLE COMPATIBILITY:** No short term vehicle maintenance or performance issues
- **SIMILAR TO COMMERCIAL:** Feasible to use brown grease biodiesel or commercial biodiesel
- **TRUST:** Our drivers and mechanics gained some confidence in the fuel
- **VALUABLE BYPRODUCT:** Glycerin may be digested to produce more biogas



ebmud.com

## NEW REVENUE OPPORTUNITIES Renewable Energy Credits and Offsets



ebmud.com

## Renewable Energy Credits (REC)

- A REC is the environmental attribute associated with the renewable energy
- Aka “green tag”
- Typically sold in units of MWh
- Unbundled from the electricity it could be sold separately

ebmud.com

## Renewable Portfolio Standard

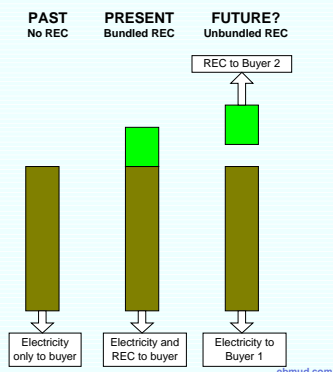
- California's RPS is 20% by 2010 for investor-owned utilities (IOUs)
- IOUs might meet the RPS by purchasing RECs



“20% by 2010!”

ebmud.com

## Expected Evolution of REC Sales in California

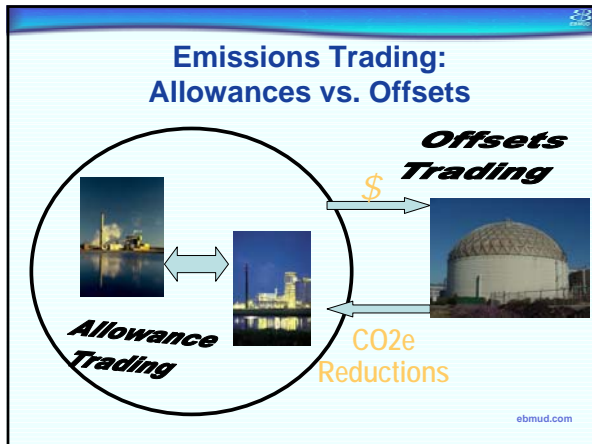


ebmud.com

## Greenhouse Gas Markets

- AB 32 requires GHG emission reductions to 1990 baseline levels by 2020 (~25%)
- California Air Resources Board (CARB) is drafting cap and trade regulations to reduce emissions
- Greenhouse gas (GHG) offsets are a potential component of cap and trade system

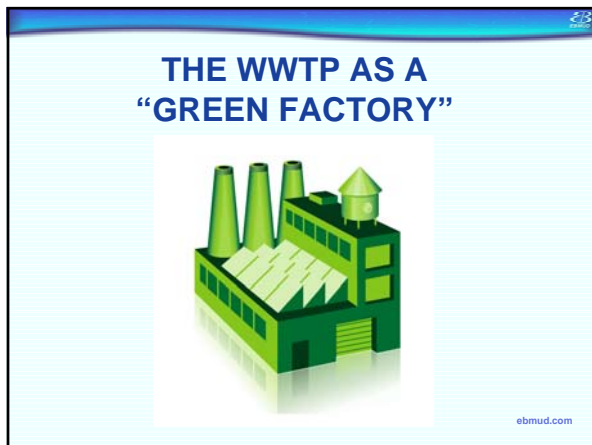
ebmud.com



### Revenue Opportunities?

- For WWTPs with renewable generation:
  - Green premium for power or REC sale
  - Possible GHG offset revenue for waste diversions, e.g., food wastes diverted from landfills

ebmud.com



### A New Role for WWTPs?

- Historically: A protector
- New Role: A provider
- Forces driving new role:
  - Natural resource scarcity
  - Climate change
- Producing green products can help to reduce WWTP's carbon footprint

ebmud.com

