Becoming a Net Energy Producer with Surplus Power to Sell

May 12, 2015

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Presentation Overview

- Setting the Baseline
- Surplus Capacity Provides Opportunity
- The Vision
- Resource Recovery Program
- Surplus Power Sales
Background: Baseline Power

• Baseline Power Usage
  - 4 to 5 MW
  - Energy-intensive uses:
    • Pure oxygen production (HPOAS)
    • Secondary mixing
    • Influent power pumping

• Baseline Power Generation (prior to 2002)
  - 2.4 MW (from municipal sludges only)
  - Three 2.2 MW engine-generators (1985)
  - Most electricity used on site
• EBMUD has excess digester capacity
  – Planned acceptance: waste from 20 canneries in the service area
  – Remaining canneries in service area: None
  – Capacity: 168 million gallons/day
  – Average influent flow: 60 million gallons/day
Opportunities

• Use Underutilized Assets
  – Excess digestion capacity

• Reduce Operational Costs
  – More heat + electricity = lower utility bills

• Generate Revenue
  – Tip Fees
  – Surplus Power Sales

• Reduce Carbon Footprint
  – EBMUD was one of largest users of purchased electricity in Alameda County
Green Factory Concept
(started circa 2002)

- Organic Wastes
- Food Waste
- Fats, Oils, and Grease
- Wastewater
- Renewable Electricity
- Biodiesel
- Biosolids Fertilizer
- Recycled Water
Diversifying Benefits from Public Wastewater Treatment Infrastructure

Energy Generation
Surplus Power Generation

- How does EBMUD generate a renewable energy surplus?
Resource Recovery Program: Materials Accepted

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

Solid/Liquid Waste Receiving Facility
Materials Portfolio

R2 Waste Streams by Volume

63% Low Strength Waste

37% High Strength Waste

High Strength Waste by Volume

48% Food Processing and Sludge

31% FOG

21% Protein
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 trucks per typical day
- 3-4 MW generated continuously from trucked-in high-strength materials
Environmental Benefits of Resource Recovery Program

- High quality local treatment
- Productive use of food scraps which otherwise produce methane gas emissions and leachate at landfills
- Acceptance also of high-salinity materials
- Renewable power generation
Power Production Trend

Percent of Plant Power Demand Met by Onsite Generation

Calendar Year

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Turbine Project Benefits

- Supports District’s strategic goal of maximizing renewable energy sources and reducing greenhouse gas emissions
  - Utilize excess biogas and eliminate flaring
  - Become net energy producer + sell excess green energy
- Increases electrical power reliability
Expanded Facility – 11 MW Capacity

New Turbine Facility (4.5 MW)  Existing Engines (6.5 MW)
Gas Turbine

- Solar Turbines Mercury 50 Recuperated Gas Turbine

- Generator
- Recuperator
- Turbine/Combustor
- Compressor
Gas Conditioning System

System is designed to reduce or remove:

- Siloxanes
- Water vapor
Sale of Power to Port of Oakland

- Under old PPA with PG&E EBMUD was not being paid for Renewable Energy Credits (RECs)
- In 2011 surveyed potential renewable energy buyers
- Selected Port of Oakland and negotiated a PPA
- 5 year term (2012-2017)
- Fixed price for power and REC
- Local generation used locally
Future Growth: Food Scraps

- High energy potential
- Significant fraction of disposed solid waste
- Diversion from landfill through digestion
- Digestion may be the highest and best use of food residuals

1 truck/day will power 260 homes
Program Challenges

- **Processing**
  - Stability
  - Contaminants
  - Odor

- **Truck Traffic**
  - Freeway access
  - Internal plant safety
  - Changes in neighboring land uses

- **Energy Production**
  - Scheduling
  - Conditioning
  - Flaring
Key Achievements

- Shift from being a large user of purchased electricity to being a net energy producer
- Diversion of wastes from landfills and associated GHG emissions reduction
- Sale of surplus power to neighboring public agency – local benefits
Questions? Contact:

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