EBMUD – The Three Hour Tour: The Challenges Behind the Success

Resource Recovery Program
EBMUD

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Overview

• Background
• EBMUD’s Resource Recovery Model
• Key Challenges
• Lessons Learned
Conditions which Set Stage for Reinventing our Plant

• Excess solids digestion capacity

• Strong support from Board of Directors for renewable energy infrastructure and initiatives

• Organizational focus on revenue enhancement, continuous improvement

• Institutional capacity to develop and test innovative processes

Plant Flows
Annual average daily: 80 MGD
Secondary capacity: 168 MGD
Primary capacity: 320 MGD

Oakland, California
• Driving forces are a focus on:
  – Sustainability
  – Environmental stewardship
  – Climate change impacts
  – Economic benefits
EBMUD’s Resource Recovery Model

- Organic Wastes
- Food Waste
- Fats, Oils, and Grease
- Wastewater

‘Resource Recovery’ Facility

- Renewable Electricity
- Biodiesel
- Biosolids Fertilizer
- Recycled Water
Resource Recovery
Trucked Wastes

Start (2002)
- Septage
- Fats, oils, and grease (FOG)
- Food processing waste
- Winery waste

Expanding Scope of Program
- Industrial/commercial process waste
- Animal processing waste (chicken/beef blood, turkey lungs)
- Commercial and residential food wastes

Today

EBMUD accepts ~100 trucked waste deliveries each day
Solid and Liquid Waste Receiving Station
Renewable Energy From FOG

• FOG to Digestion
  – Began acceptance in support of regional FOG control; have been accepting for >10 years
  – Initially had serious O&M problems including scum blanket on primary digesters and FOGbergs
  – Used a private partnership to ‘harvest’ brown grease portion until District was ready for direct digestion

• FOG to Biodiesel
  – Previously explored economics and technical feasibility of FOG to Biodiesel
  – Presently have $1M from California Energy Commission
Renewable Energy From Food Waste

• Largest single organics component in CA solid waste

• In CA, less than 3% currently diverted (mainly to compost)

• Landfill diversion conserves capacity and reduces GHG emissions (organic material degradation in landfills creates un-captured release of methane)

• 3 to 3.5 x energy in a similar volume of sludge

CA Waste Stream Characterization
Source: CIWMB (2009)
Food waste comes from SF Bay Area communities and commercial facilities
Commercial Food Waste Challenges

Contamination

- Glass
- Metals
- Corks
- Cutlery
- Chopsticks
- Oystershells
- Other grit
Preprocessed Food Waste Delivery at EBMUD MWWTP
Summary of Major Food Waste Issues

**Technology** - Removing contaminants which can have impacts downstream; understanding both what you need (spec) where removal best occurs:

- Source (restaurant),
- Third party site
- EBMUD

**Sourcing** – Need a strong link to the stream

- Building new relationships with food waste providers (solid waste haulers, solid waste authorities)
Explored Alternative Uses for Biogas

- “Biomethanation”
  • Pipeline quality natural gas
  • Transportation fuel (CNG, LNG)
- Combined heat and power
  • Fuel cell
  • Microturbine
  • Engine/Turbine
Renewable Energy Initiative
Increased Biogas Production

- Significantly increased biogas production
- Increased renewable energy generation
- Generated tip fees
- Diverted wastes from landfills
First WWTP in U.S. to Become a
Net Electricity Provider

**2012**
- Generation: 6MW
- Demand: 5MW
- Net Sales = 1MW

1 MW ≈ 1,200 households
Key Challenges

Legal Issues

- Accepting wastes outside service area
- Public agencies competing with private companies
- Ownership of renewable energy credits (RECs) and greenhouse gas offsets
Key Challenges

Regulatory Issues

- Addressing new, duplicative regulatory oversight
- Navigating safety/liability issues associated with trucked wastes
- Developing innovative approaches to acceptance of wastes at a POTW
Key Challenges

Permitting Issues

- Incorporating trucked waste program in NPDES permits
- Navigating new permitting arenas
- Developing a trucked waste permit program
- Key Approach: Demonstrating compliance through full-scale tests
Key Challenges
Managing Risk

- Securing trucked wastes to offset financial risk associated with large capital investments
  - Potential loss of existing waste streams, no guarantee of future waste streams

- Ensuring public benefits outweigh potential impacts to maintain program support
• “Stretching” existing job classifications to meet non-traditional POTW work needs
• Organizational change and acceptance with new hazards and responsibilities
• New union bargaining interests related to working conditions (odors, safety, etc.)
• Difficulty in sharing program benefits directly with “on-the-ground” staff
• Utilizing existing workforce/new hires vs. developing public/private partnership
• Choosing not to establish capacity fees for trucked wastes
• Developing pricing structure and rates for truck wastes (tip fees)
• Choosing to pay for specific wastes if net benefit exists
• Impacts to treatment processes and equipment
  • Plugged lines, floating mats, upset digesters, etc.
  • Wear and tear on equipment, etc.

• Requires ongoing research and pilot digestion studies to evaluate new streams

• Significant challenges for O&M Staff
  • Deliveries and impacts are not always regular so operations is challenging
  • Maintenance needs change continuously and are often immediate
Key Lessons Learned

• Digestion Works Well for a Wide Range of Materials
• A “good mix” of waste streams needed to maintain digester health
  - EBMUD has demonstrated operation outside published parameters with careful monitoring
  - Different waste streams has meant different regulatory frameworks (chicken blood); we continue to enter into new unknown territory (solid waste)
Key Lessons Learned

• New Business Model for Public Agency - Balancing traditional O&M perspectives with market-based considerations:
  • 24/7 deliveries
  • Customers that now depend on you – plant shut downs
  • Staff buy-in
  • Energy and Revenue stream is not “locked down”

• Public Perception Issues:
  • There is a high level of interest
  • Public understands need to look for opportunities in renewable fuels/energy
  Managing odors is a key to long term success
Summary

- Adaptive management is key to addressing multiple, unanticipated challenges
- Energy self-sufficiency requires innovative thinking and problem-solving approach
- Journey to energy self-sufficiency is not without risk—competition is real
- Be careful of what you pursue and mindful of unintended consequences
- A public agency must adopt a private sector business mentality to achieve success