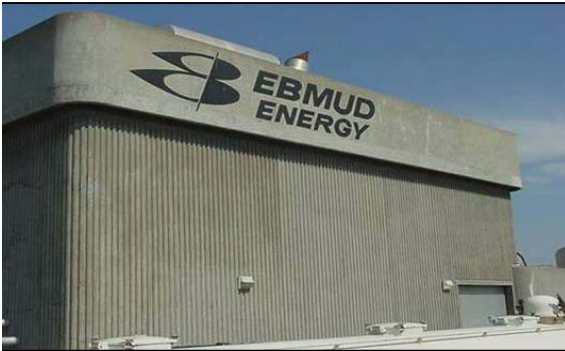


EBMUD – The Three Hour Tour: The Challenges Behind the Success



**Resource Recovery
Program
EBMUD**



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Overview



- **Background**
- **EBMUD's Resource Recovery Model**
- **Key Challenges**
- **Lessons Learned**



East Bay Municipal Utility District



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

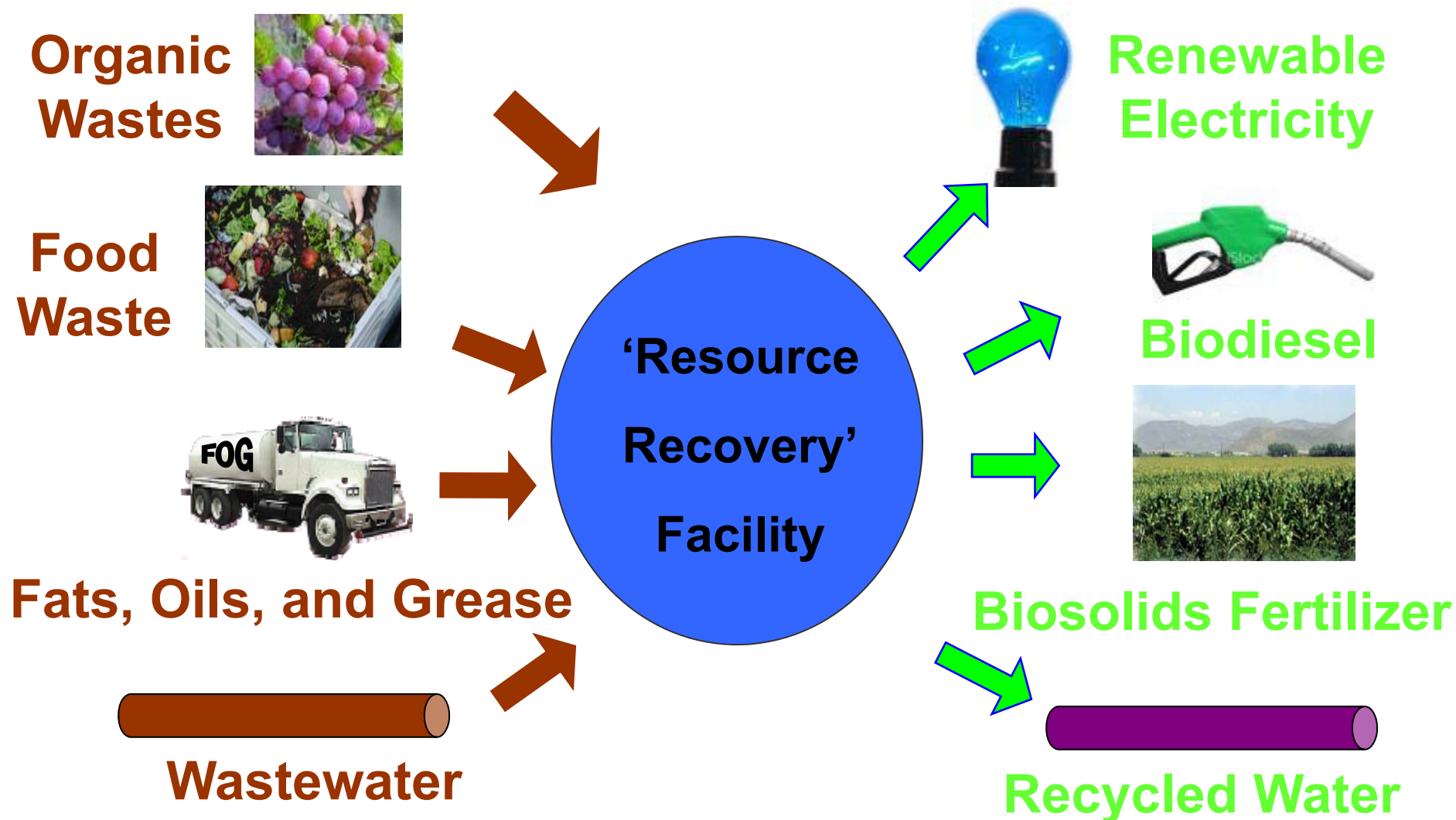
Resource Recovery: Reinventing the WWTP



Discharger → **Protector** → **Provider**

- Driving forces are a focus on:
 - Sustainability
 - Environmental stewardship
 - Climate change impacts
 - Economic benefits

EBMUD's Resource Recovery Model



Resource Recovery Trucked Wastes

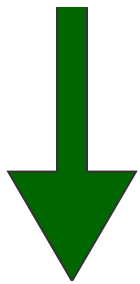


Start
(2002)



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

Expanding
Scope of
Program



Today

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



EBMUD accepts ~100 trucked waste deliveries each day

Solid and Liquid Waste Receiving Station



Renewable Energy From FOG

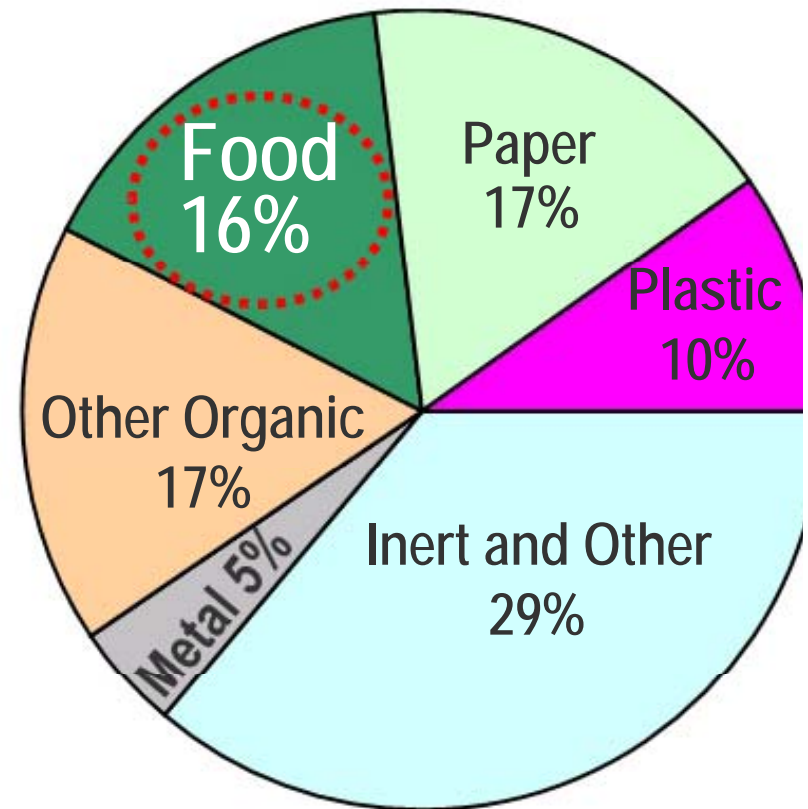


- FOG to Digestion
 - Began acceptance in support of regional FOG control; have been accepting for >10 years
 - Initially had serious O&M problems including scum blanket on primary digesters and FOGbergs
 - Used a private partnership to ‘harvest’ brown grease portion until District was ready for direct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

Commercial and Residential Food Waste Source Material



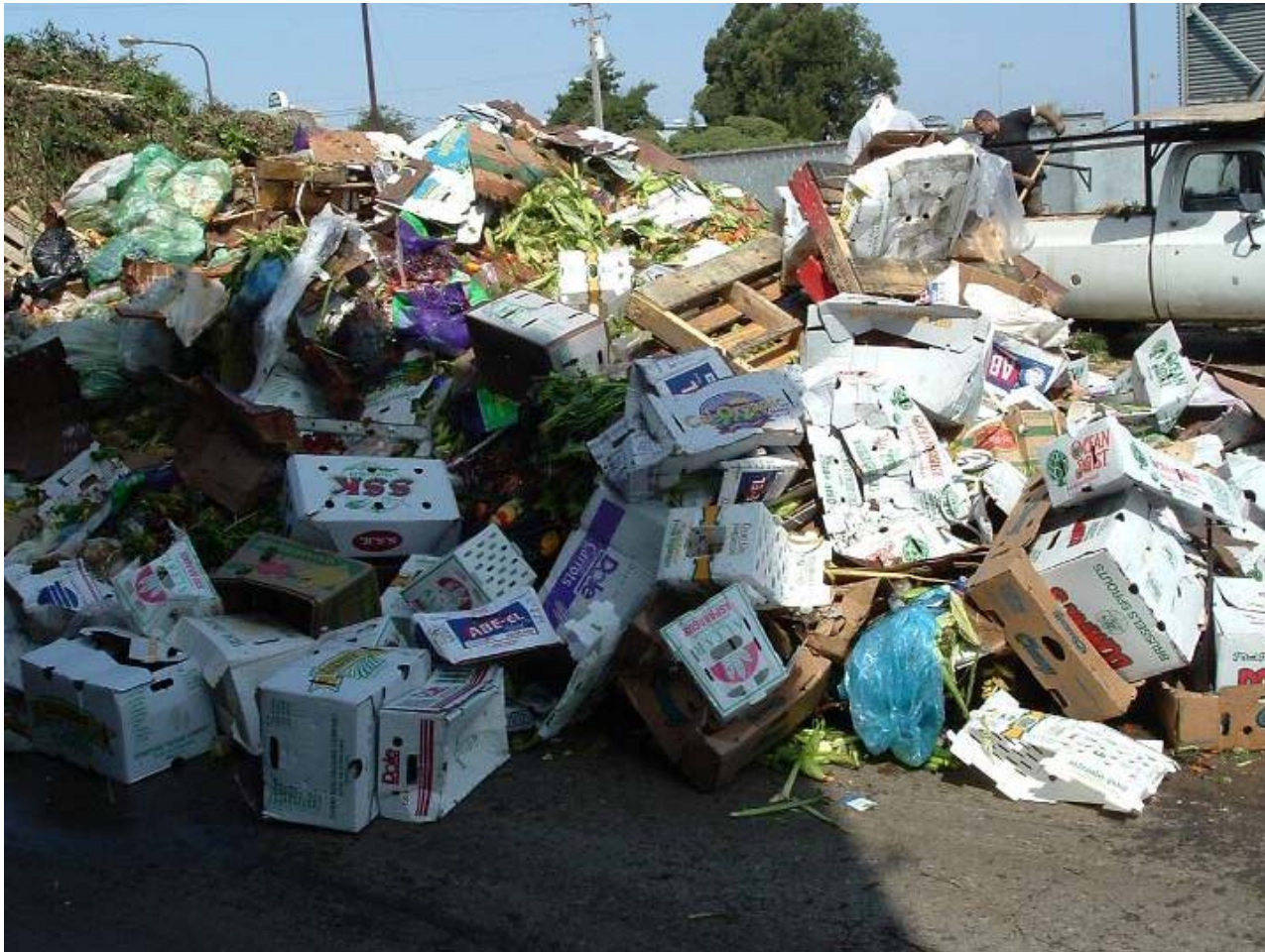
Food Waste Collection Bins



“High Quality” Food Waste

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



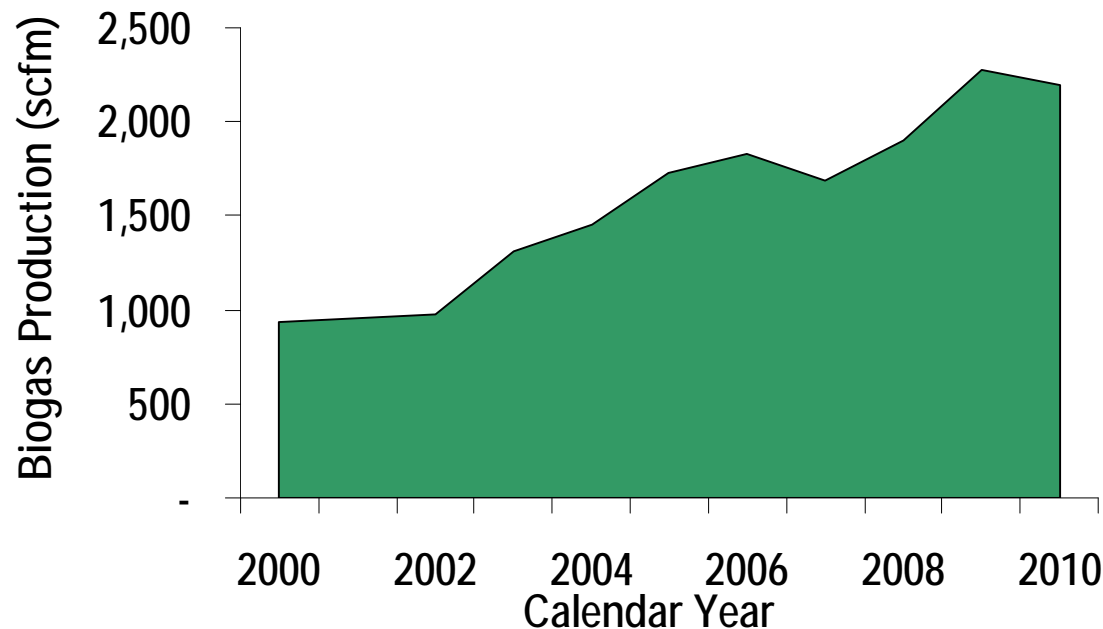
- “Biomethanation”
 - Pipeline quality natural gas
 - Transportation fuel (CNG, LNG)
- Combined heat and power
 - Fuel cell
 - Microturbine
 - Engine/Turbine



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



Net Electricity Provider



Electrical
Grid



Wastewater
Treatment Plant

2012

Generation: 6MW

Demand: 5MW

Net Sales = 1MW

1 MW \approx 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



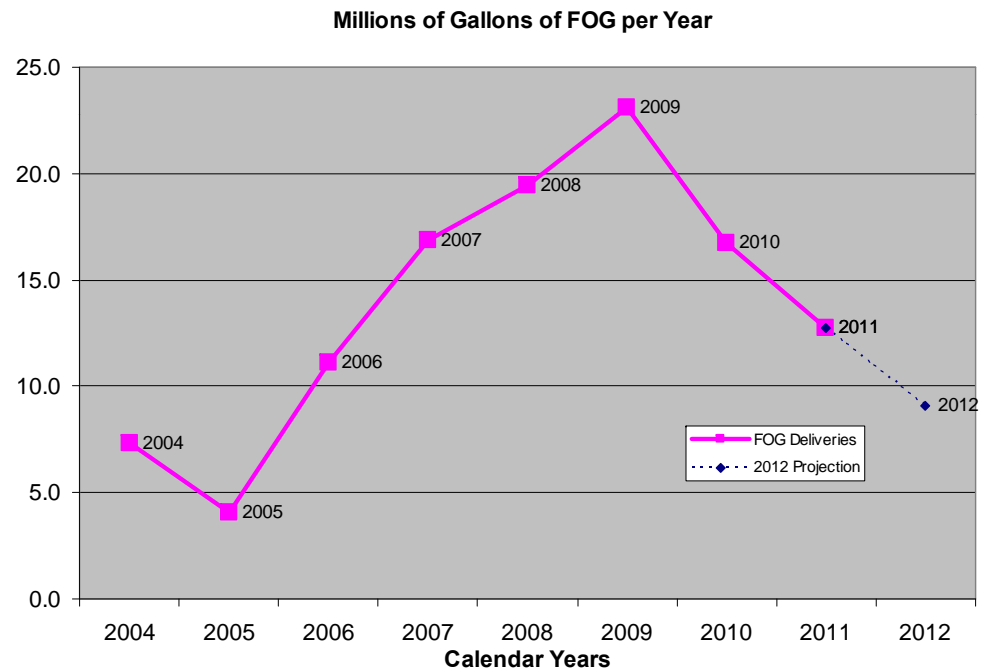
- Incorporating trucked waste program in NPDES permits
- Navigating new permitting arenas
- Developing a trucked waste permit program
- Key Approach: Demonstrating compliance through full-scale tests



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



Key Challenges

Labor Issues



- “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

Key Challenges Financial



- 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

Key Challenges Technical



- 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



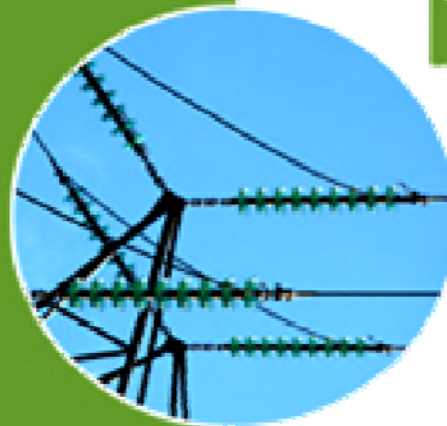
- Digestion Works Well for a Wide Range of Materials
- A “good mix” of waste streams needed to maintain digester health
 - EBMUD has demonstrated operation outside published parameters with careful monitoring
 - Different waste streams has meant different regulatory frameworks (chicken blood); we continue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