Waste to Biogas in the Pacific Southwest

California Bioresources Alliance Symposium
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U.S. EPA Pacific Southwest Region
Overview

- Overview of R9 Sustainable Infrastructure program
- Challenges facing WWTF biogas projects
- Funding
- Co-digestion
- EPA Research & Resources
Sustainable Infrastructure (SI) Goals

- Water Efficiency
- Energy Efficiency
- Water Recycling
- Renewable Energy Production
  - Today’s emphasis is on biogas production
    - Cross Media Benefits
      - Improves Air Quality & Water Quality; Generates Renewable Energy; Mitigates Climate Change
    - Great opportunity in Region 9, especially in CA
      - At least 450 MW from WWTFs (CEC Report, 2009)
Energy Use at Water & Wastewater Facilities

- Energy represents the largest controllable cost of providing water services to the public, and is generally on the order of 30-60% of a city’s energy bill.
Barriers to biogas production

- Capital costs/Funding
- WWTF flow
- Compliance (Air and Water)
- Technology
- Willingness to consider co-digestion, and availability of co-digestable materials
- Knowledge of biogas value, incentives/credit markets
Funding Solutions

- Public Private Partnerships
- Incentives
- Bonds, Loans, and Loan Guarantees
- Grants

www.epa.gov/region9/waterinfrastructure/funding.html
Co-digestion at WWTFs

- **Shrink pay-back periods**
  - Increase biogas production through the co-digestion of high-strength organic waste

- **Reduce landfill loads**
  - Food waste is our biggest missed opportunity

- **Use existing infrastructure**
  - In CA, 137 WWTPs with ADs have ~15-30% excess capacity
EPA R9 Research & Resources

• Research
  o Evaluating the Air Quality, Climate Change, and Economic Impacts of Biogas Management Technologies
  o Co-digestion White Paper

• Resources
  o Co-Digestion Economic Analysis Tool (COEAT)
    ▪ http://www.epa.gov/region9/organics/coeat/
  o Permitting tool Kit
  o Waste to Biogas Mapping Tool (W2B)
    ▪ www.epa.gov/region9/biogas
Waste To Biogas Mapping Tool

This tool is designed for decision-makers with significant technical expertise in the fields of waste disposal, state and local governments, and non-profits. To submit comments on how to improve the tool, contact us section.

The Waste to Biogas Mapping Tool is an interactive map created to connect organic waste producers (e.g., wastewater treatment facilities) for the purpose of biogas production through food scraps and fats, oils, and grease (FOG) to a wastewater treatment plant or dairy digester. Composting while reducing greenhouse gas emissions, providing a renewable energy source, and diverting waste from the landfill.

Street address, zip, or city: 94105

Input New Address

Programs In Your State:
- Dairies
- Dairy Digesters
- Fat/Oil/Grease Collection Sites
- Food Processing Facilities
- Wastewater Treatment Facilities With Digester
- Organics Collection Programs
- Landfills
- Fat/Oil/Grease Haulers

Search distance: 50 miles
Calculating Total Technical Potential

• Detailed Explanation on-line
• See “Mapping Updates” tab

Waste To Biogas Mapping Tool

The Waste to Biogas Mapping tool (W2B) is a tool that provides information on the potential for converting waste to biogas in the Pacific Southwest, Region 9. It includes updated data for various categories such as Food processing facilities, Dairies, Dairies with digesters, and Wastewater Treatment Facilities. Two new categories have been added: those with biogas potential and those with energy potential.

Please note that W2B only has landfill information for CA, and has facility number information for CA, AZ, and NV.

The most substantial changes were made to the following categories: Dairies, Dairies with Digesters and Wastewater Treatment Facilities (WWTF). EPA Region 9 has estimated a total technical energy potential for CA dairies and WWTFs throughout Region 9. To demonstrate how one facility’s energy potential compares to others region-wide, the updated W2B mapping tool graphically represents energy potential with blue flames. The number of blue flames symbolizes a given range of total technical energy potential. Please see the chart below.
### WWTF assumptions

- Calculated Electricity Potential w/ and w/out co-digestion of FOG for 158 WWTFs in R9

<table>
<thead>
<tr>
<th>Without co-digestion</th>
<th>With Co-digestion</th>
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</thead>
<tbody>
<tr>
<td>Flow based on ‘09 Annual Biosolids report</td>
<td>Same</td>
</tr>
<tr>
<td>1 MGD equates to 26 kW &amp; 2.4 MMBtu/day</td>
<td>Same</td>
</tr>
<tr>
<td>Co-digestion capacity estimate: <strong>1/10% of flow</strong></td>
<td></td>
</tr>
<tr>
<td>Methane potential based on 1 WWTF (Millbrae)</td>
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<tr>
<td>Electricity generation averaged from 4 engine types</td>
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<tr>
<td>90% efficiency</td>
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</tbody>
</table>
EBMUD in Oakland, CA

- ADWF 67 MGD; Design Flow 168 MGD
  - i.e. Ample excess capacity: 4 empty digesters @ 2 million gallons each

- Surrounded by organic waste!
  - W2B identifies 974 Food Processing Facilities & 11 communities with Organic Collection Programs—all within a 50 mile radius

- W2B estimated 36,859 MWh; In 2012, EBMUD generated 42,000 MWh

- By co-digesting a volume of food waste equal to <1% of ADWF, biogas generation more than doubled
Hill Canyon in Thousand Oaks, CA

- ADWF 9.5 MGD; Design Flow 14 MGD
  - ~.9 million gallons excess digester capacity

- Surrounded by organic waste!
  - W2B identifies 668 Food Processing Facilities, 1 community with an Organic Collection Program, 11 FOG haulers—all within a 50 mile radius

- W2B estimated 5,177 MWh; In 2012, Hill Canyon generated 4,600 MWh (a very bad year)

- By co-digesting a volume of food waste equal to ~.2% of their ADWF, Thousand Oaks generates 2.5 x as much biogas
Updates?

- National WWTF data using www.biogasdata.org
- National LMOP & AgSTAR datasets
- Updated CA dairy data
- Updated estimates for food waste potential
- National Organic Collection Program data
- Updated, more targeted NAICS data for the entire country?

<table>
<thead>
<tr>
<th>NAICS Code</th>
<th>Industry Description</th>
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<tr>
<td>445110</td>
<td>Grocery stores</td>
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<tr>
<td>311511</td>
<td>Fluid Milk Manufacturing</td>
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<tr>
<td>311520</td>
<td>Ice Cream &amp; Frozen Dessert Manufacturing</td>
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<td>Poultry Processing</td>
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<td>Soybean and Other Oilseed Processing</td>
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<td>Creamery Butter Manufacturing</td>
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<td>Animal Slaughtering</td>
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<td>Seafood Product Preparation &amp; Packaging</td>
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<tr>
<td>312130</td>
<td>Wineries</td>
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<td>Meat Processed from Carcasses Processing</td>
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<td>Fats and Oils Refining and Blending</td>
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<td>311513</td>
<td>Cheese Manufacturing</td>
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Questions?

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www.epa.gov/region09/waterinfrastructure