Silicon Valley Clean Water
Food Waste Co-Digestion Pilot Study

BACWA EXECUTIVE COMMITTEE
DEC 21 2018

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Trivia Quiz

The amount of recyclable organic waste accounts for how many percent of the material Californians dispose in landfills annually[1]

A. **10%**
B. **20%**
C. **40%**
D. **60%**

The answer is C

[1] California Department of Recycling and Recovery (CalRecycle)

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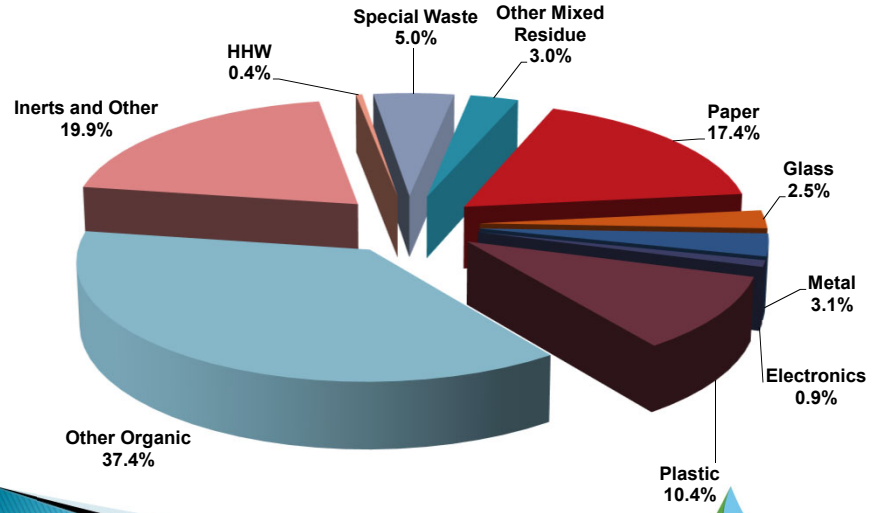
Material Classes in California's Disposed Waste Stream[1]



[1] California Department of Recycling and Recovery (CalRecycle): 2014 Disposal-Facility-Based Characterization of Solid Waste in California

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Policy Drivers to Realize Significant GHG Emissions Reductions

- **AB 939 (1989)**
  - 50% diversion requirements for jurisdiction
- **AB 32 (2006)**
  - ARB scoping plan & reduce GHGs to <1990 levels
- **AB 341 (2011)**
  - 75% reduction, recycling, composting statewide by 2020
- **AB 1826 (2014)**
  - Businesses to recycle organic waste, particularly food waste
- **SB 1383 (2016)**
  - Short-Lived Climate Pollutants (SLCP): Organic Waste Methane Emissions Reductions

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Organic Diversion Options


Composting


Mulching


Food Waste Prevention


Digestion

Sources: compostcab.com, Amerisearch[illegible]_advancingyourhealth.org

SVCW Silicon Valley Clean Water One Drop at a Time

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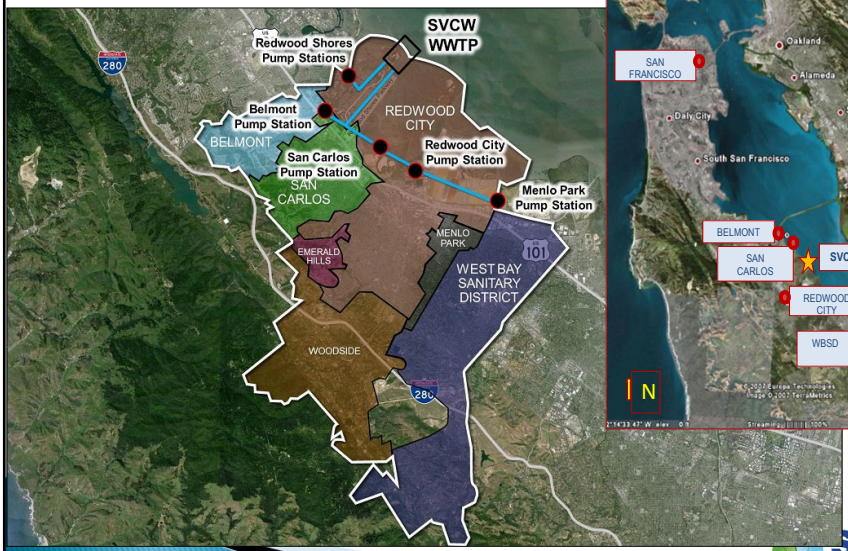
SVCW Service Area



SVCW Silicon Valley Clean Water One Drop at a Time

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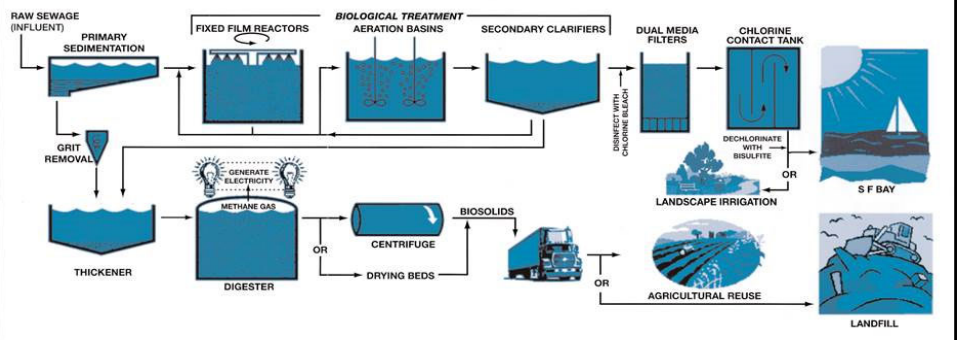
Wastewater Treatment Process Diagram



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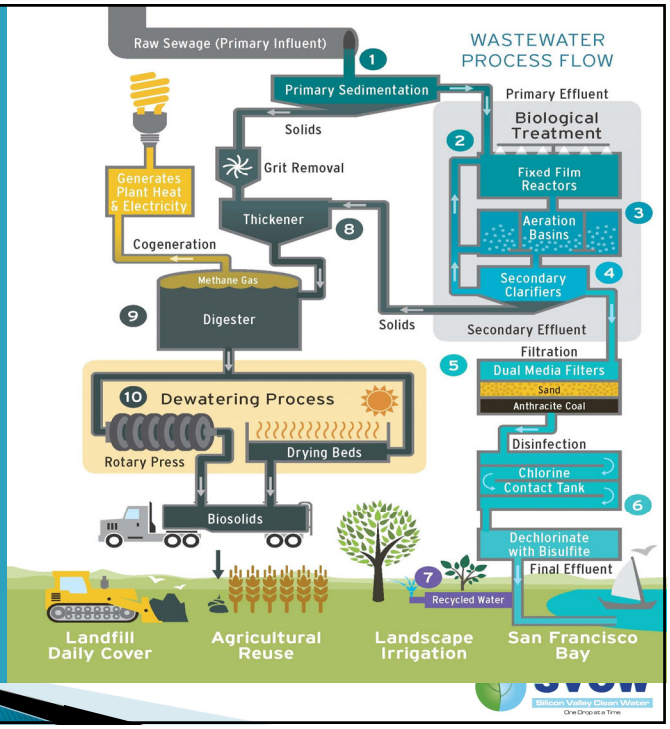
SVCW Treatment Plant Process



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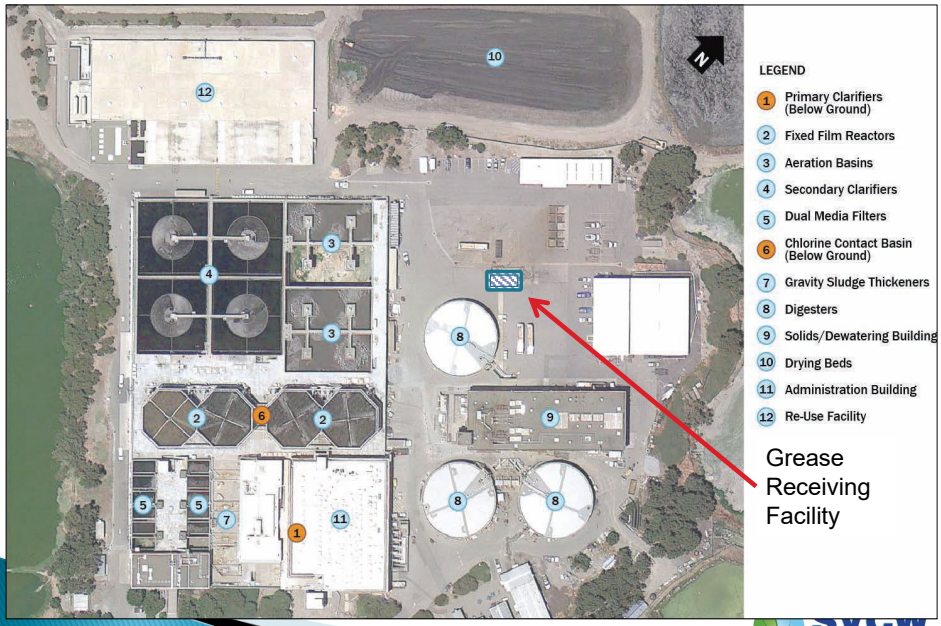

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Co-Digestion at SVCW


Fats, Oils and Grease Program since 1980s


Excess Digester Capacity


Food Waste Exploration since 2009


Food Waste Pilot - Now


Food Waste Full-Scale - Future

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Window of Opportunity

- In 2014 SVCW and SBWMA executed an MOU to collaborate

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Advancements in Technology

- OREX Press: extracts organic from waste
- Recology installed it at San Francisco Facility
- SBWMA is implementing a similar facility at Shoreway in San Carlos
- Pilot @ SVCW to test the technology under CEC research project
- Recology, San Francisco is currently supporting the pilot by providing the feedstock organics that will set the foundation for full-scale facility

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Organic Extrusion Press (OREX)

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FW Pilot Project

- **Goal:** feasibility study under CEC research project
- **Feedstock:** Recology, San Francisco
- **Receiving Facility:** modified existing Grease Receiving Facility
- **Organics feedstock**: 35% solids
- **Feed rate target:** 5-7 tons/day
- **Permit:** air permit required for receiving facility

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Site for Pilot Facility

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Pre-Processing @ Recology

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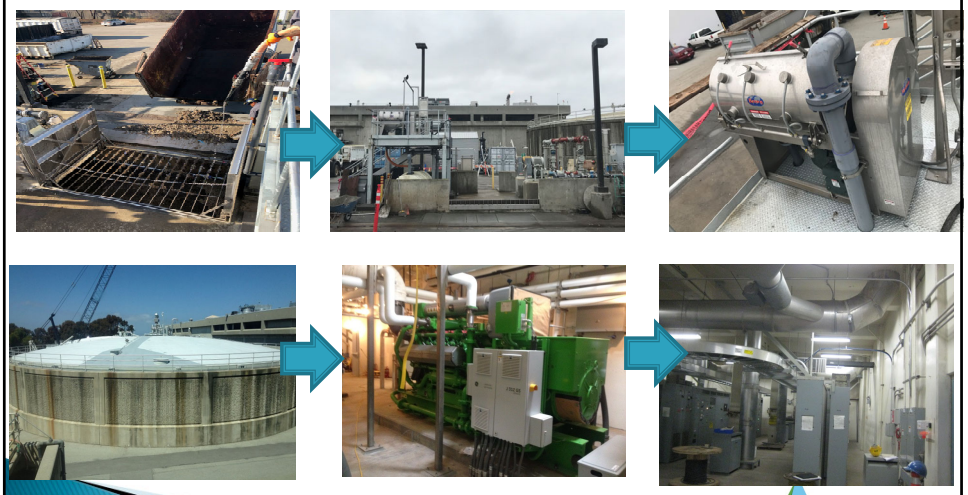
Post-Processing @ SVCW



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Impact of Food Waste Co-Digestion

Bucknell University Lab Results

- Two samples collected in April 2016

Sample	Total COD (mg/L)	Soluble COD (mg/L)	TS (%)	VS (%)
Commercial Food Waste (April 2016)	550,000	134,000	40.4	34.6
Residential Food Waste (May 2016)	361,200	108,200	31.8	23.6

Commercial food waste (April 2016) had a higher organic content (~50% higher Total COD and 25% higher soluble high COD) than Residential food waste (May 2016)

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Respirometry Data

Sample	Commercial Food Waste (April 2016)	Residential Food Waste (May 2016)
Mass of food waste added (g)	10	10
Total COD (mg/L)	550,000	361,200
Total gas production (ml)	2,735	1,966
Gas production (ml/g food waste)	273.5	196.6
Gas production (cu.ft./ton of food waste)	9,660	6,940
Methane content	70%	70%
Methane production (cu.ft/ton of food waste)	6,760	4,860

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Gas Production Estimate

SVCW gas production from sludge 232,970 cu.ft/day*

Scenario	Commercial Food Waste (April 2016)	Residential Food Waste (May 2016)
Addition of 1 Ton food waste (cu.ft)	9,660	6,940
Addition of 20 Ton food waste (cu.ft)	193,200	138,800
Addition of 100 Ton food waste (cu.ft)	966,000	694,000
Addition of 140 Ton food waste (cu.ft)	1,352,000	972,000

* - 85,000 gpd sludge, 4.7 % solids, 85% VS, 55% VS destruction and 15 cu.ft/lb VS destroyed

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Estimated[1] Ammonia Increase

Species	Digester			
	Control	20% FW	35% FW	50% FW
Sodium (mg/L)	69	90 (31%)	110 (61%)	122 (77%)
Ammonium (mg N/L)	924	936 (1%)	995 (8%)	1001 (8%)
Free Ammonia – NH_3 (mg N/L)	718	728 (1%)	774 (8%)	778 (8%)
Potassium (mg/L)	123	156 (27%)	184 (49%)	201 (63%)
Magnesium (mg/L)	12	10 (-10%)	12 (5%)	12 (2%)
Calcium (mg/L)	53	54 (2%)	58 (10%)	60 (13%)

[1] *City of Roseville average soluble cation concentrations measured during the steady-state period for each digester*

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Regional Board Load Target 2024

Table 2. Load Target Feasibility in 2024

Discharger	Annual Average July 1, 2017 - June 30, 2018	Projected 2024 Performance Annual Average + (Annual Average x 1.5% x 5 years)	2024 Load Targets	Buffer Load Target - Projected Performance
	kg N/day	kg N/day	kg N/day	kg N/day
South Bay				
Burlingame	350	376	453	77
EBDA	9,369	10,072	10,835	763
Millbrae	331	356	357	0.41
SFIA	170	182	183	1.3
Southeast Plant	9,203	9,894	11,855	1,962
San Mateo	1,470	1,581	1,783	202
San Bruno	1,377	1,480	1,416	-63
SVCW	3,072	3,302	3,050	-252
South Bay Total	-	**27,242**	**29,933**	**2,691 (9.0%)**
Lower South Bay				
Palo Alto	2,075	2,231	2,908	677
San Jose/Santa Clara	5,224	5,616	6,645	1,029
Sunnyvale	1,041	1,119	1,351	232
Lower South Bay Total	-	**8,966**	**10,904**	**1,938 (18%)**

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Regional Board Load Target 2029

Table 3. Load Target Feasibility in 2029

Discharger	Annual Average July 1, 2017 - June 30, 2018	Projected 2029 Performance Annual Average + (Annual Average x 1.5% x 10 years)	2024 Load Targets	Buffer Load Target - Projected Performance
	kg N/day	kg N/day	kg N/day	kg N/day
South Bay				
Burlingame	350	402	453	51
EBDA	9,369	10,775	10,835	60
Millbrae	331	381	357	-24
SFIA	170	195	183	-11
Southeast Plant	9,203	10,584	11,855	1,272
San Mateo	1,470	1,691	1,783	92
San Bruno	1,377	1,583	1,416	-167
SVCW	3,072	3,533	3,050	-482
South Bay Total	-	**29,143**	**29,933**	**790 (2.6%)**
Lower South Bay				
Palo Alto	2,075	2,387	2,908	521
San Jose/Santa Clara	5,224	6,008	6,645	637
Sunnyvale	1,041	1,197	1,351	154
Lower South Bay Total	-	**9,591**	**10,904**	**1,313 (12%)**

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Study Results Timeline

- SVCW expects to have the actual results from pilot study available in April 2019
- Will come back and update on
  - Digester gas production
  - Dewaterability
  - Nutrients loading, etc…

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Questions

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