

Zone Works

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CalRecycle's Anaerobic Digestion Initiative: An Update

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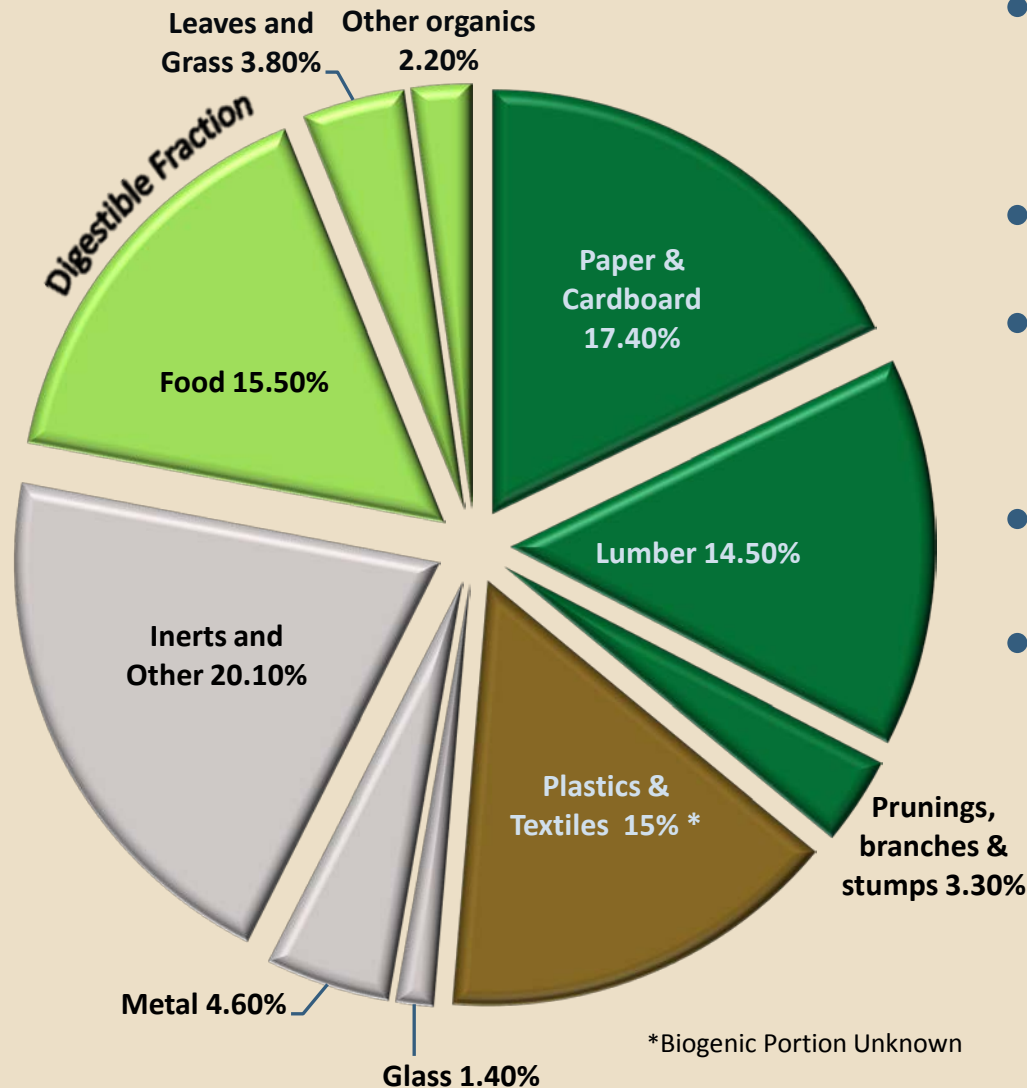
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Overview

- Resource base and policy drivers
- Conversion Technologies pathways
- California Anaerobic Digestion Projects
- Resources

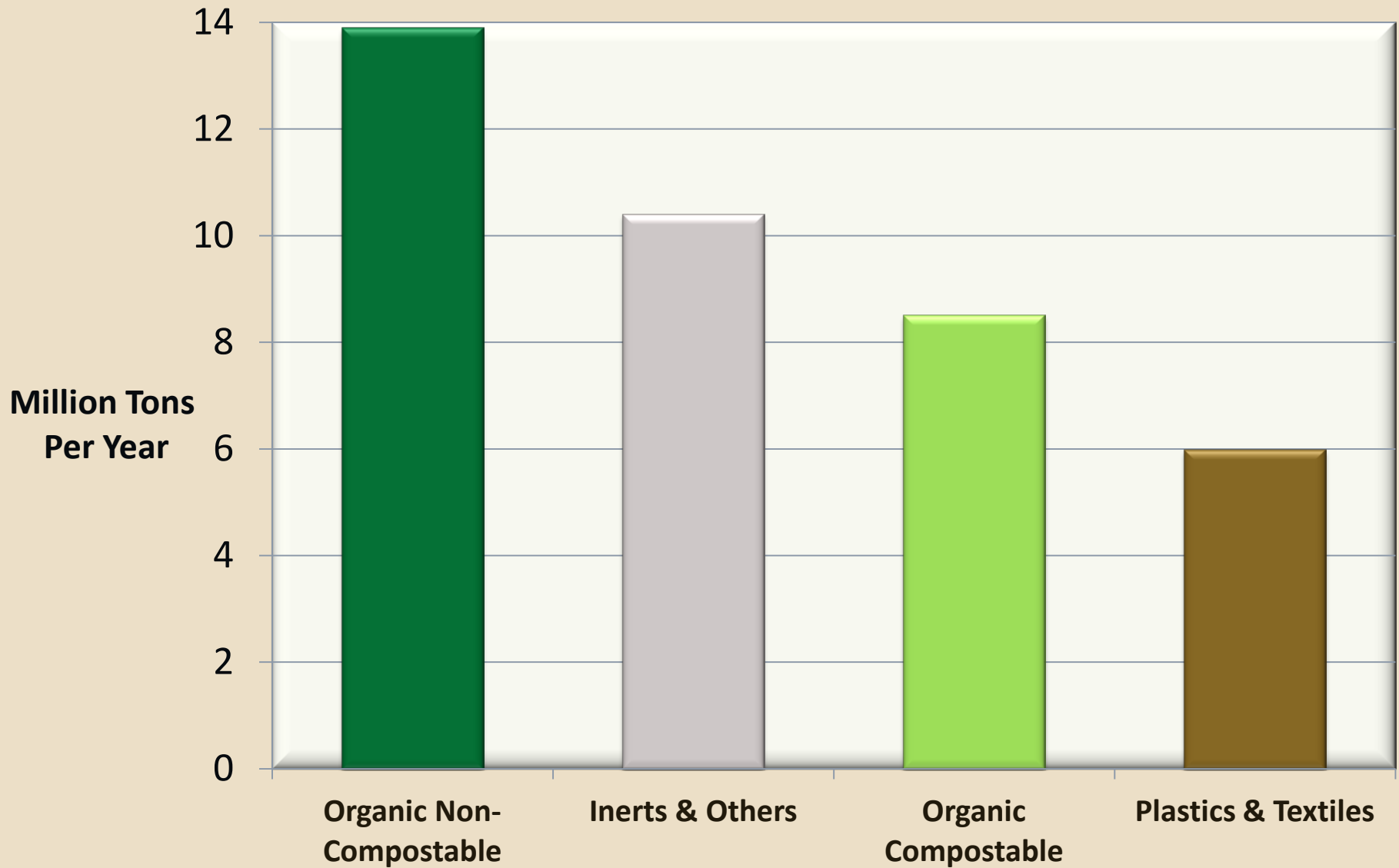
California landfilled waste streams



- 39 million tons MSW landfilled per year
- ~ 70% carbon based
- Energy potential 15,000 GWh/year
- 5% of CA power demand
- About 22% suitable for Anaerobic Digestion

Source: CalRecycle 2007 & 08

California Landfilled Waste Streams



Source CalRecycle 2007-08

California Policy Drivers

(a partial list)

- 1- Lack of landfill space close to population centers & other local
Jurisdiction goals
- 2- **AB 32** - Global Warming Solutions Act of 2006
Anaerobic Digestion measure
- 3- **Renewable Portfolio Standard** - 33% by 2020
- 4- **Low Carbon Fuel Standard** - Deliver automotive energy by
2020 with 10% less greenhouse gases than 2010

Feedstocks

Technologies

Products



Solid waste



Green waste



Food waste



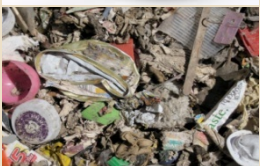
Paper waste



Wood waste



Fats Oil Grease



MRF residuals **

Anaerobic Digestion

Fermentation

Gasification

Pyrolysis

Hybrid

Electricity

Biogas

Biodiesel

Ethanol

Hydrogen

Heat

Chemicals

Syngas

Liquid Fuels

Compost

** MRF: Material Recovery Facility

Feedstocks

Technologies

Products



Solid waste



Green waste



Food waste



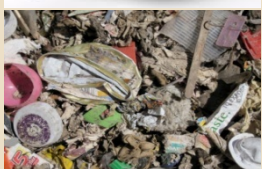
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MRF residuals **

Anaerobic Digestion

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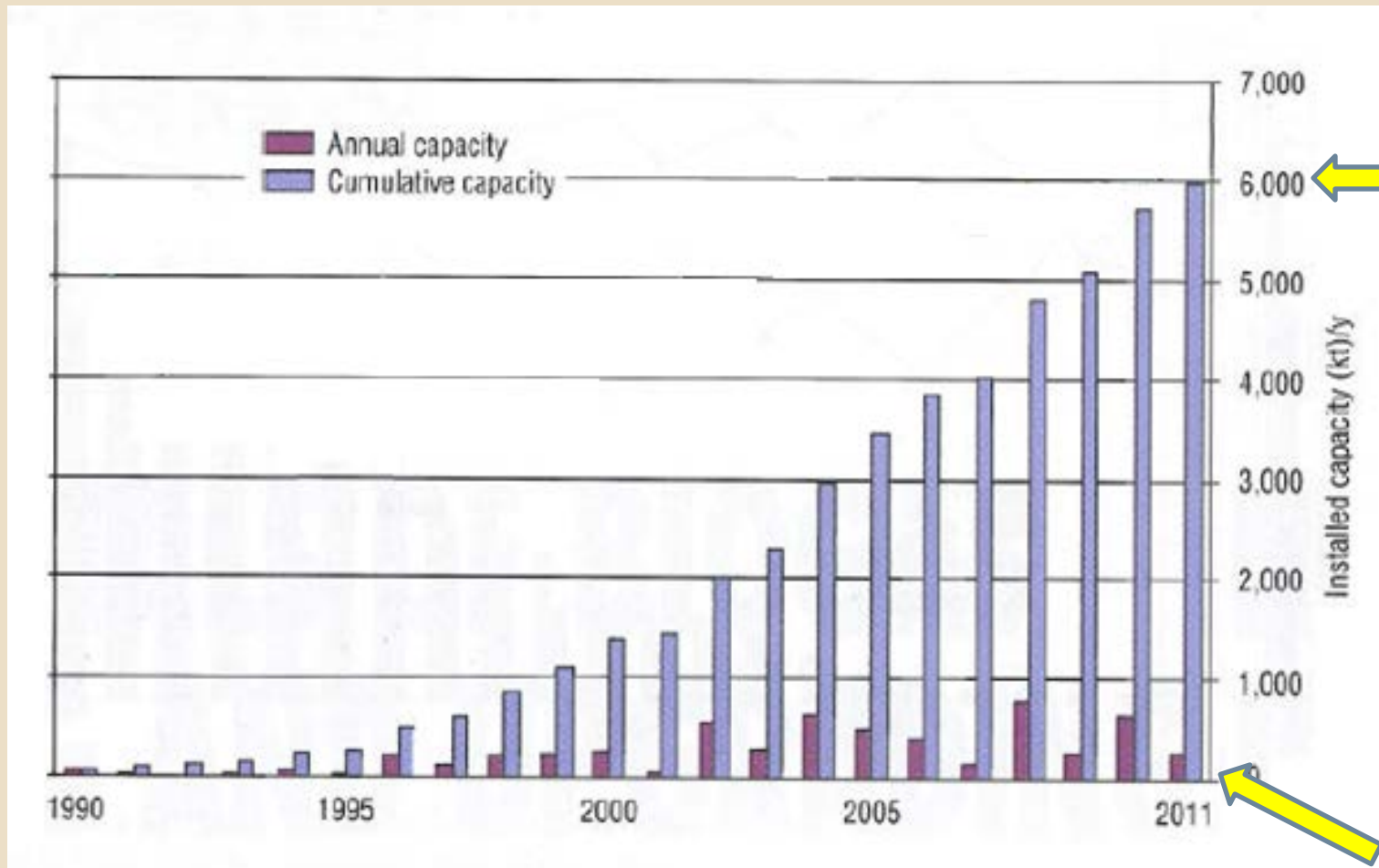
** MRF: Material Recovery Facility

Evaluation of Conversion Technologies for Municipal Waste Management

Jurisdiction Sponsored Evaluations (a partial list)

- City of Los Angeles
- County of Los Angeles
- City & County of Santa Barbara
- Salinas Valley Solid Waste Authority
- Cities of San Jose and Glendale

European Anaerobic Digestion Installed Capacity



Source: De Baere & Mattheeuws, Biocycle – Feb '10

Anaerobic Digestion of Food Waste in Waste Water Treatment plants

(A partial list)

- East Bay Municipal Utility District
- Sacramento Waste Treatment plant and SMUD
- Central Marin Sanitation, San Rafael
- Humboldt Co. Waste Authority
- Victor Valley Wastewater RA



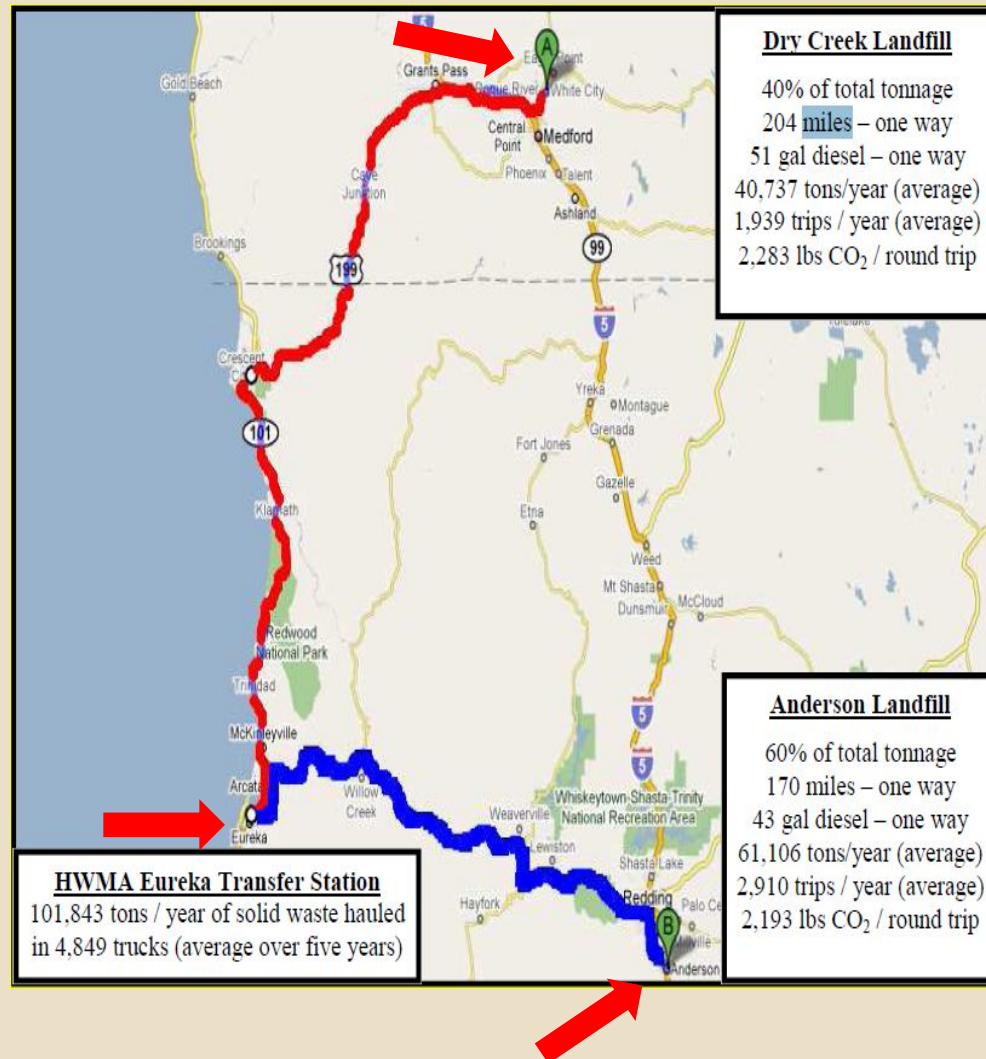
Photo: J. Franco – City of San Jose WWTP

East Bay Municipal Utility District Food Waste Digestion Project



Photos by EBMUD

Humboldt Food Waste Digester



2010 Feasibility Study: www.hwma.net/counter.php

Central Marin Sanitation - Marin Sanitary Service - F2E Project



Stand Alone Anaerobic Digestion Projects

(A partial list)

- Inland Empire Utility Agency, Chino
- Zero Waste Energy LLC, San Jose
- CR&R, Perris
- City of Orange

Photo: J. Franco – City of San Jose WWTP

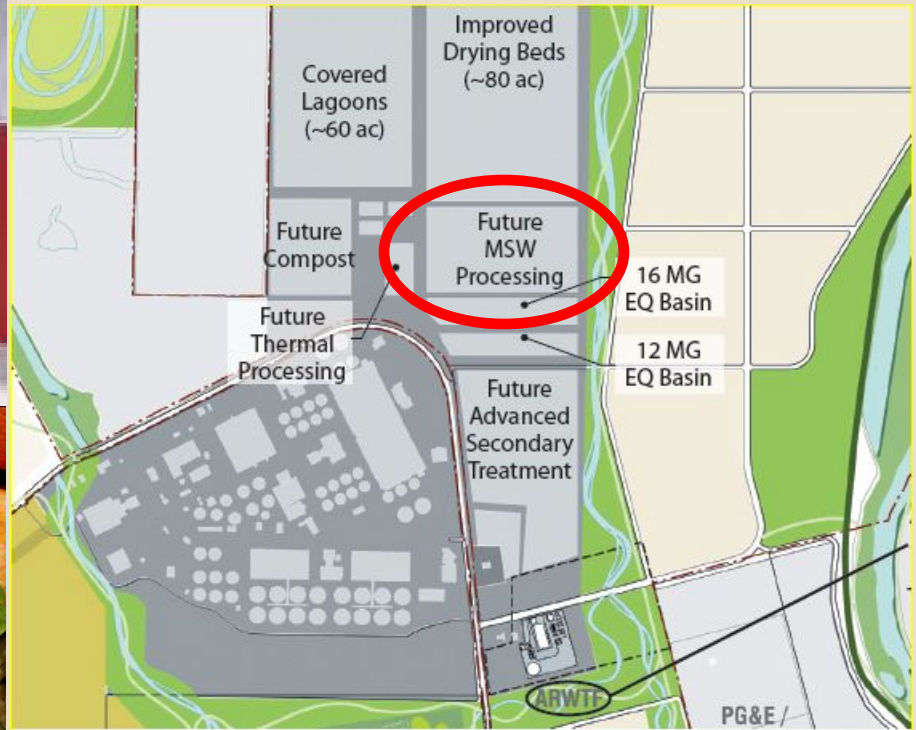
Inland Empire Utility Agency (IEUA), Chino



Food waste slurry tank

Photos: J. Franco, CalRecycle 12/10

Zero Waste Energy LLC, San Jose



CR&R, Perris AD Project

(150 tons per day)



City of Orange Material Recovery Facility Pilot



CA Urban Residuals Digestion Projects

(A partial list – Nov 2011)

Project	Status	Feedstock	Estim Tip Fee	Public Private	Location Type	Technology
East Bay MUD, Oakland	In operation (Phase I)	Food Wastes (Post consumer)	\$46	Y	WWTP	Wet, Thermophilic, One Stage
IEUA - Environ, Chino	In operation (Phase I)	Food Waste (Pre consumer)	–	Y	Next to WWTP	Wet, Thermophilic, One Stage
Central Marin, S. Rafael	In Construction	Food Waste (Post consumer)	\$22	Y	WWTP	Wet, Thermophilic, One Stage
CR&R, Perris	Pre-construction	Post MRF Residuals	–	Y	MRF	Dranco H. Solids, Thermo One stage
Zero Waste, S. Jose	Pre-construction	Post MRF Residuals	\$100	Y	Landfill	Dry Fermentation

Summary

(partial list)

- **Anaerobic digestion (AD) offers various potential environmental and economic development benefits**
- **Urban Biomass residuals can provide about 5% of CA power demand**
- **Over twenty anaerobic digestion projects in CA in various stages of operation, construction and development**
- **California in a lead position in the US, but Europe leads overall**
- **Stay tuned by signing for CalRecycle's CT listserv**

Resources

CalRecycle Conversion Technologies (CT) page:

www.calrecycle.ca.gov/Organics/Conversion/

CT mailing list: www.calrecycle.ca.gov/Listservs/

California Energy Commission AB 118 funding:

<http://www.energy.ca.gov/altfuels/index.html>

Jurisdictions CT Evaluation Reports:

www.calrecycle.ca.gov/Organics/Conversion/Events

Questions?

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www.calrecycle.ca.gov/Organics/Conversion

Listserv: www.calrecycle.ca.gov/Listservs/