Pacific Organics Residual Symposium,
September 14 - 15, 2010

Urban Biomass Conversion Technologies Deployment in California – An Update

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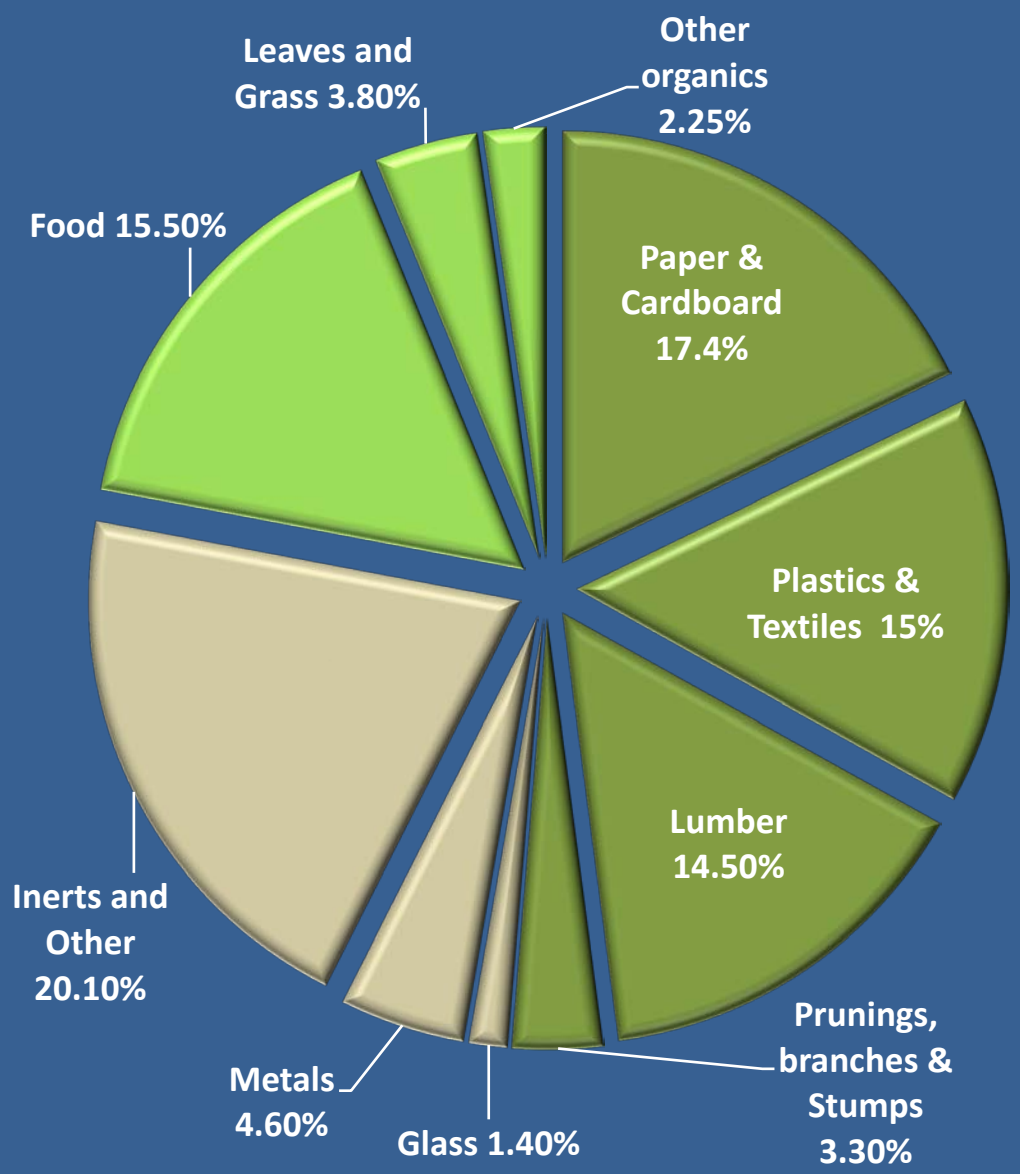
Overview

- Resource base and policy drivers
- Conversion Technologies in a nutshell
- Sample Projects
- CalRecycle Projects & Resources

California landfilled waste stream



- 39 million tons MSW landfilled per year
- 70% carbon based
- About 25% suitable for Anaerobic Digestion
- Energy potential 15,000 GWh/year
- 8% of State electricity

Source: CalRecycle

Conversion Technology Drivers

(a partial list)

1- Lack of new landfill space close to population centers

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

5- CalRecycle Strategic directives 6.1 & 9.2 – Organics diversion and Bioenergy & Biofuels R&D

Feedstocks	Technologies	Products
MSW *	Anaerobic Digestion	Electricity
Green waste	Fermentation	Biogas
Food waste	Gasification	Biodiesel
Paper	Pyrolysis	Ethanol
Wood waste	Hybrid	Hydrogen
Fats Oil Grease		Heat
MRF residuals **		Chemicals
		Syngas
		Liquid Fuels
		Compost

*** MSW: Municipal Solid Waste**

**** MRF: Material Recovery Facility**

Evaluation of Conversion Technologies for Municipal Waste Management

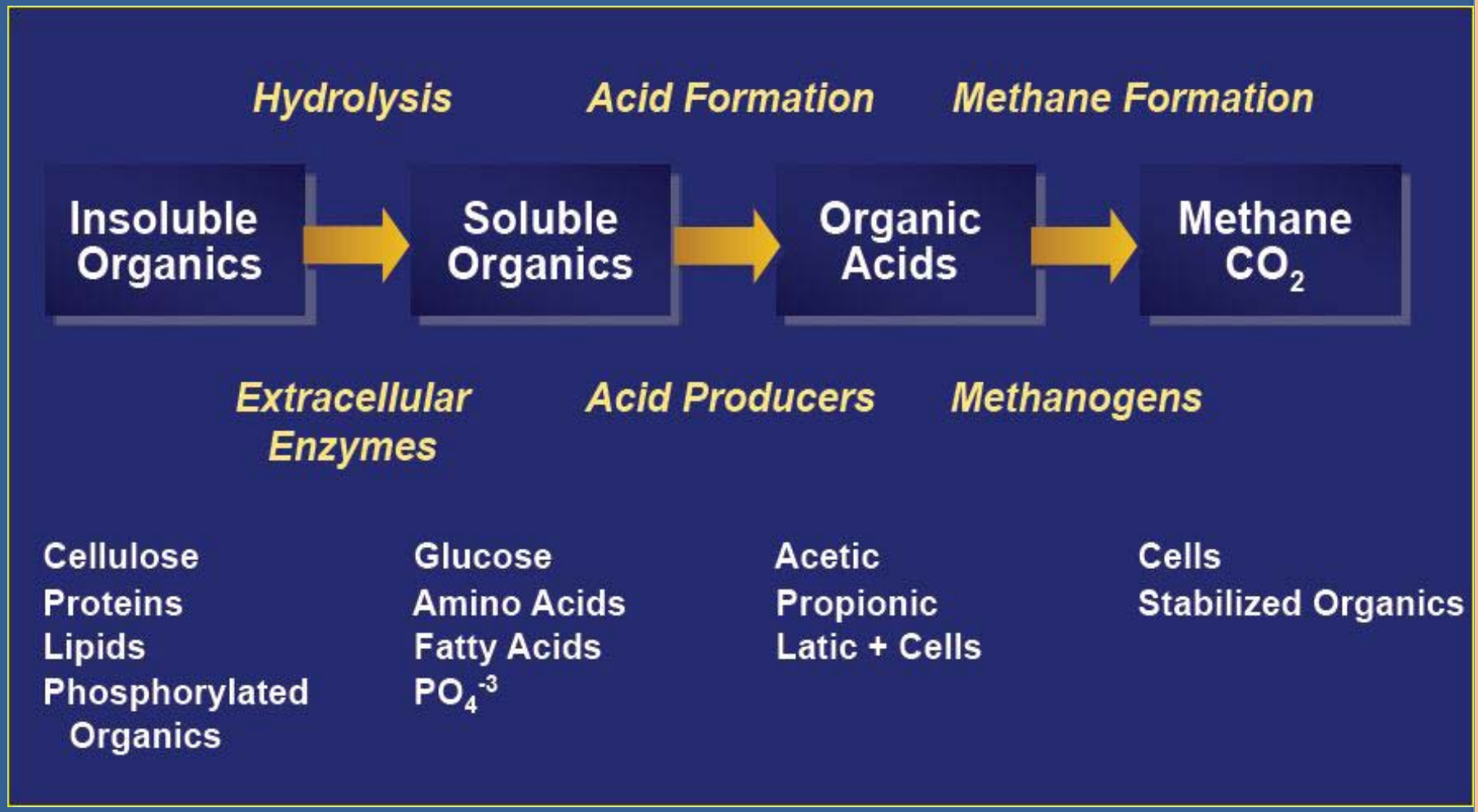
Jurisdiction Sponsored Evaluations (a partial list)

- City of Los Angeles
- County of Los Angeles
- City & County of Santa Barbara
- Salinas Valley Solid Waste Authority
- Cities of San Jose, Tulare, San Diego & Santa Cruz

Evaluation of Conversion Technologies for Municipal Waste Management

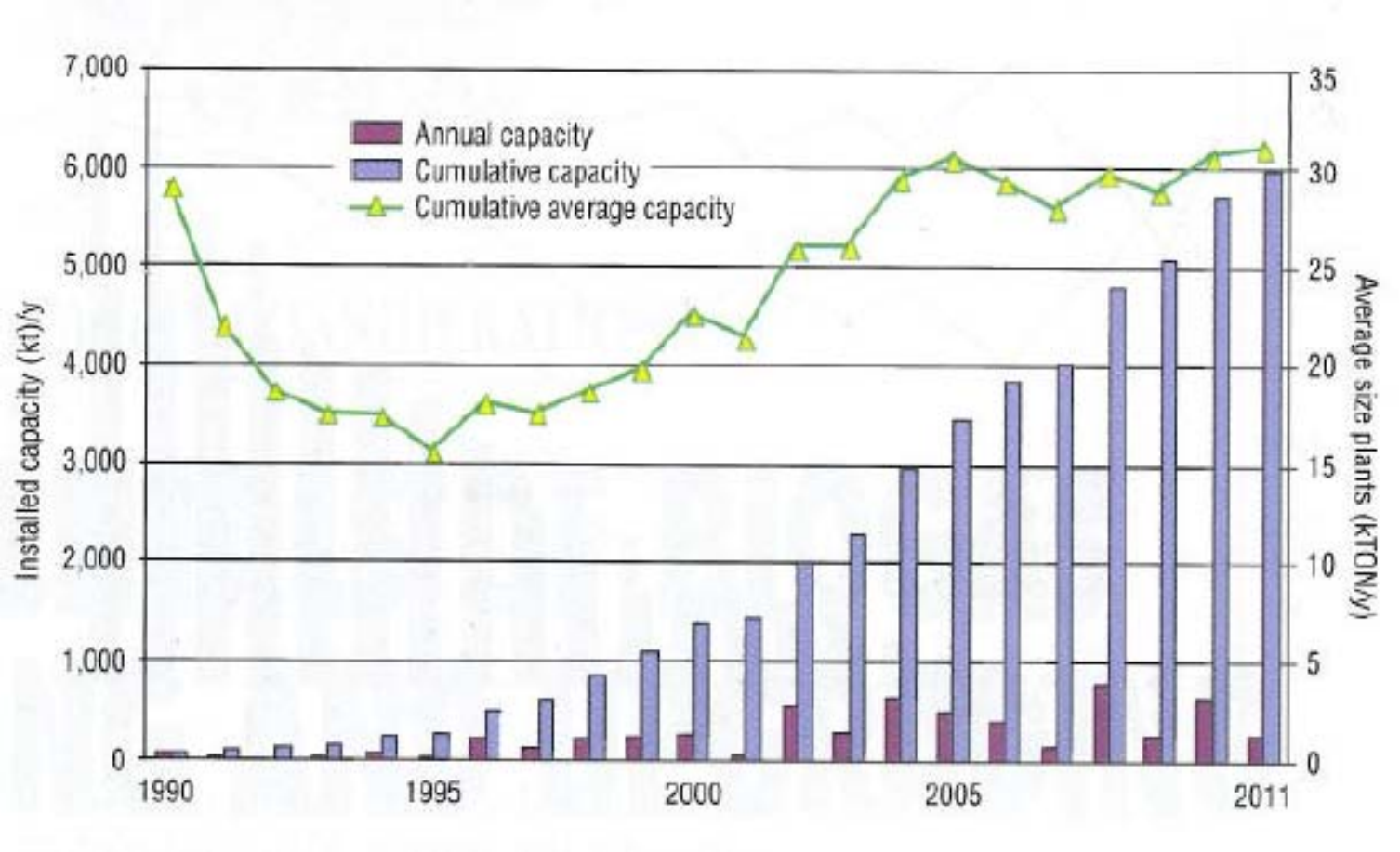
- **Jurisdiction Sponsored Evaluations** (partial list)
  - City of New York
  - Taunton, Massachusetts
  - Toronto, Ontario, Canada
  - San Lucie County, Florida
  - Delaware Solid Waste Management Authority
  - Connecticut Resources Recovery Authority

Anaerobic Digestion



Credit: Bob Gillete, Carollo Engineers

European Installed Anaerobic Digestion 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 Co. Regional WWTP – SMUD**
- **City of San Rafael – Central Marin Sanitation**
- **City of Riverside**
- Humboldt Co. Waste Authority

Photo: J. Franco – City of San Jose WWTP

East Bay Municipal Utility District
Food waste digestion project

Photos by EBMUD

Planned California AD projects (partial list)

Inland Empire Utility Agency (IEUA), Chino

- Food Waste
- Phase 1: 200 tpd (up to 500 tpd)

Zero Waste Energy, San Jose

- Post MRF organics, 150,000 tpy

Planned California AD projects (partial list)

- Sacramento Transfer Station

Throughput : Around 120 tpd (Two phases)

Source separated black bin (46% organics)

Partnership with SMUD & US DOE funding

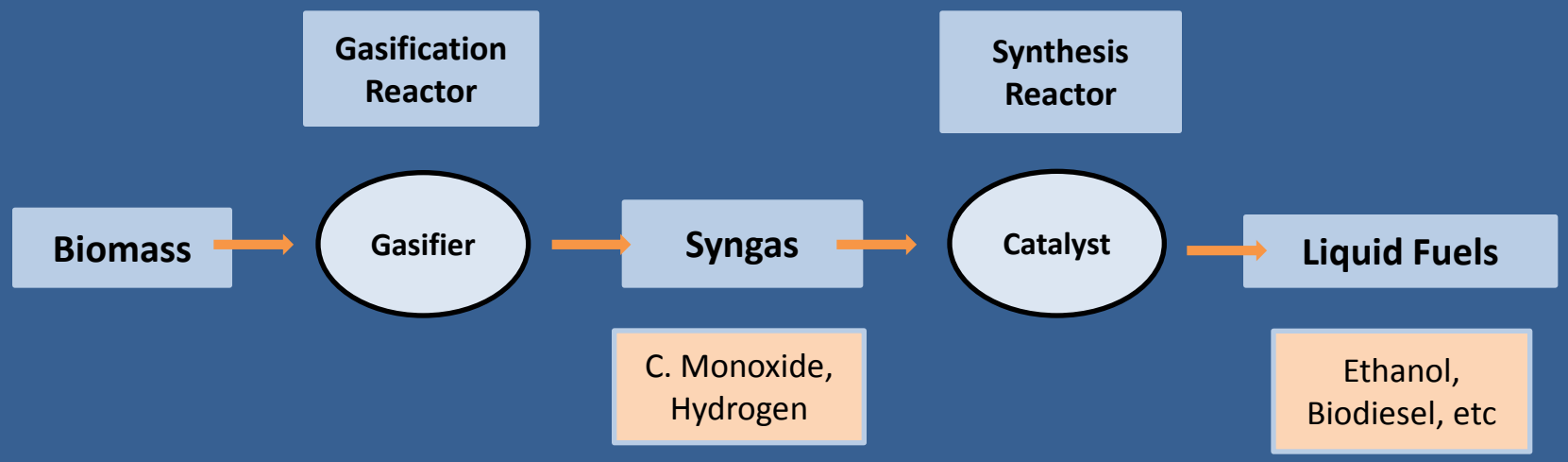
Developer: Real Energy (Napa)

Technology Vendor: Ros Roca (Spain/Germany)

Proposed CR&R, Perris AD Project (150 tpd)

- Will digest various organic residuals
- In negotiations with City and County of Los Angeles
- ArrowBio technology developed in Israel (facilities in Australia & Israel)

Simplified conversion of biomass to liquid fuels (Gasification)



Phoenix Energy LLC., Merced Gasifier

Feedstock:
Waste wood pallets (4,000 tons/year)

Generating Capacity: 750 Kwh

Power purchase agreement with PG&E in place

Funding: CalRecycle's Recycling Marked Development Zones (RMDZ) loan

Loan Info:
www.calrecycle.ca.gov/RMDZ/Loans/

Photo: *Jacques Franco, CalRecycle*

Dixon Ridge Farms Walnut Shell Gasifier, Yolo Co.

Project Funding: CA Energy Commission & others

Photos: Jacques Franco

UC – West Biofuels Biomass to Power & Ethanol pilot project, Woodland, CA

- **Dual Bed Gasifier design**
- **Capacity:** 5 tons per day
- **Production Cost Goal:**
  Less than $60 per barrel of oil equivalent
- **Phase 1:** Wood chips
- **Phase 2:** Post Material Recovery Facility residuals

Photo: Jacques Franco

UC – West Biofuels Biomass to Power & Ethanol project

Sample Phase II feedstock: Post Material Recovery Facility Residuals

Dockside Green - Nexterra Waste Wood Gasifier, Victoria, BC - Canada

Photos: Jacques Franco

Research Projects and Resources

- UC Davis Biogas Energy Project

  aka Anaerobic Phased Solids Digester

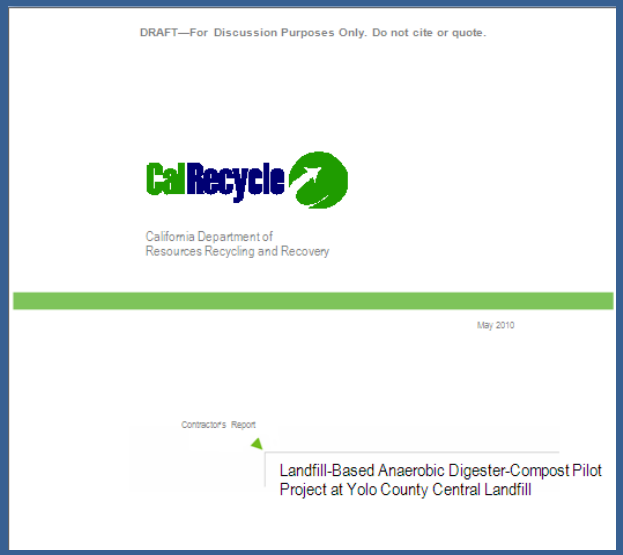
- Yolo County Landfill. In-Situ AD compost Project
- Rotary Drum Reactor technology assessment project
- AD Programmatic Environmental Impact Review

UC Davis Biogas Energy Pilot Project

Photo: Ruihong Zhang, UC Davis

Yolo County Landfill
In-Situ AD Compost Pilot Project

Photo: Ramin Yazdani, Yolo Co.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CalRecycle

California Department of
Resources Recycling and Recovery

May 2010

Contractor's Report

Landfill-Based Anaerobic Digester-Compost Pilot Project at Yolo County Central Landfill

5/10 - Landfill-Based Anaerobic Digester-Compost Pilot Project at Yolo County Landfill

UCD Rotating Drum Reactor Project

Source: Ruihong Zhang, UC Davis

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Resources Recycling and Recovery

May 2010

Contractor's Report

Integration of Rotary Drum Reactor and Anaerobic Digestion Technologies for Treatment of Municipal Solid Waste

6/10 – Integration of Rotary Drum Reactor & AD technologies for the treatment of MSW

Recent CalRecycle Publications

Conversion Technologies Status Survey (4/09)

Current Anaerobic Digestion Technologies Used for MSW organics treatment (3/08)

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

Anaerobic Digestion Programmatic EIR

Preparation of an Environmental Impact Report to assess the environmental impact of siting new anaerobic digestion facilities in California.

Draft report due in the Fall

Contact: Ken Decio, 916-341-6313

Resources

CA Energy Commission AB 118 funding:

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

Jurisdictions Conversion Technologies Evaluation Reports:

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

Resources

- CalRecycle Conversion Technologies (CT) page:
  www.calrecycle.ca.gov/
- CT mailing list: www.calrecycle.ca.gov/Listservs/
- California Biomass Collaborative Forum
  biomass.ucdavis.edu/

Questions?

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