

Zone Works

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Renewable Power from California Urban Residuals: An update

Scott Beckner & Jacques Franco

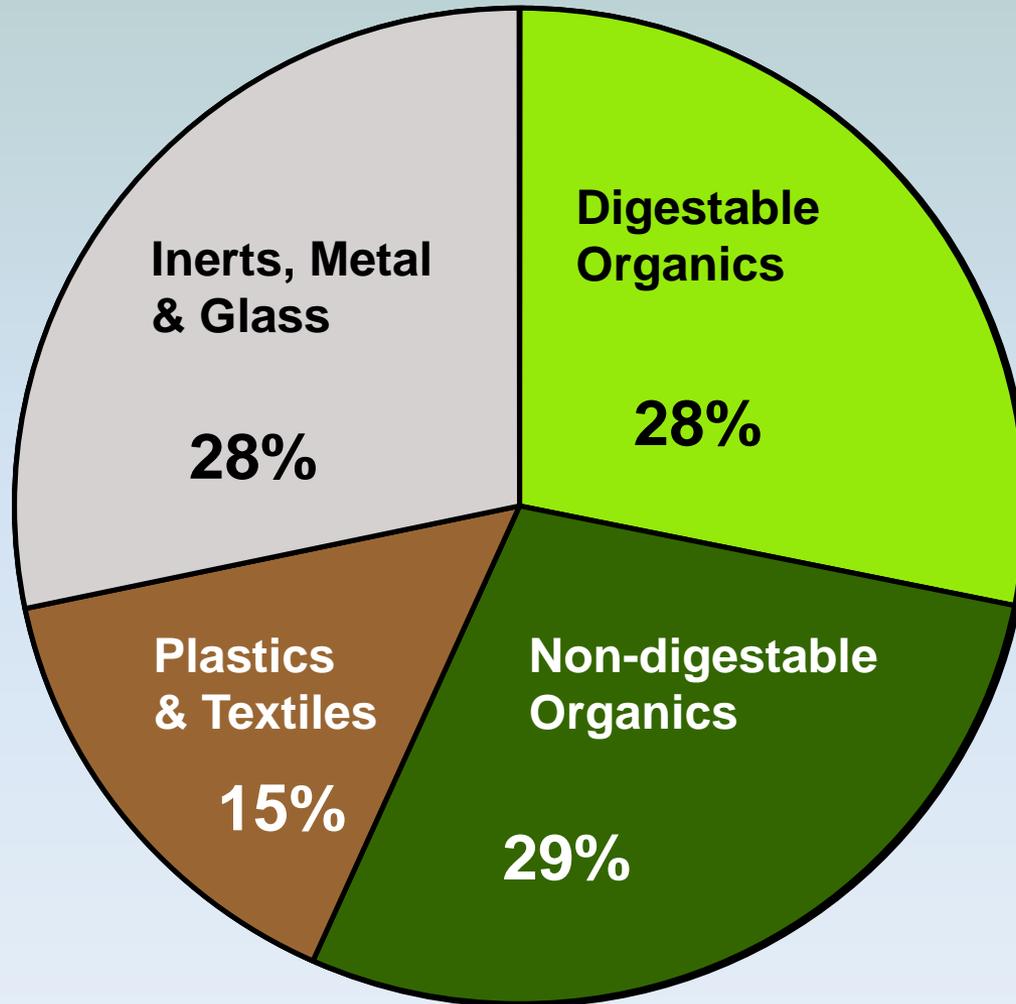
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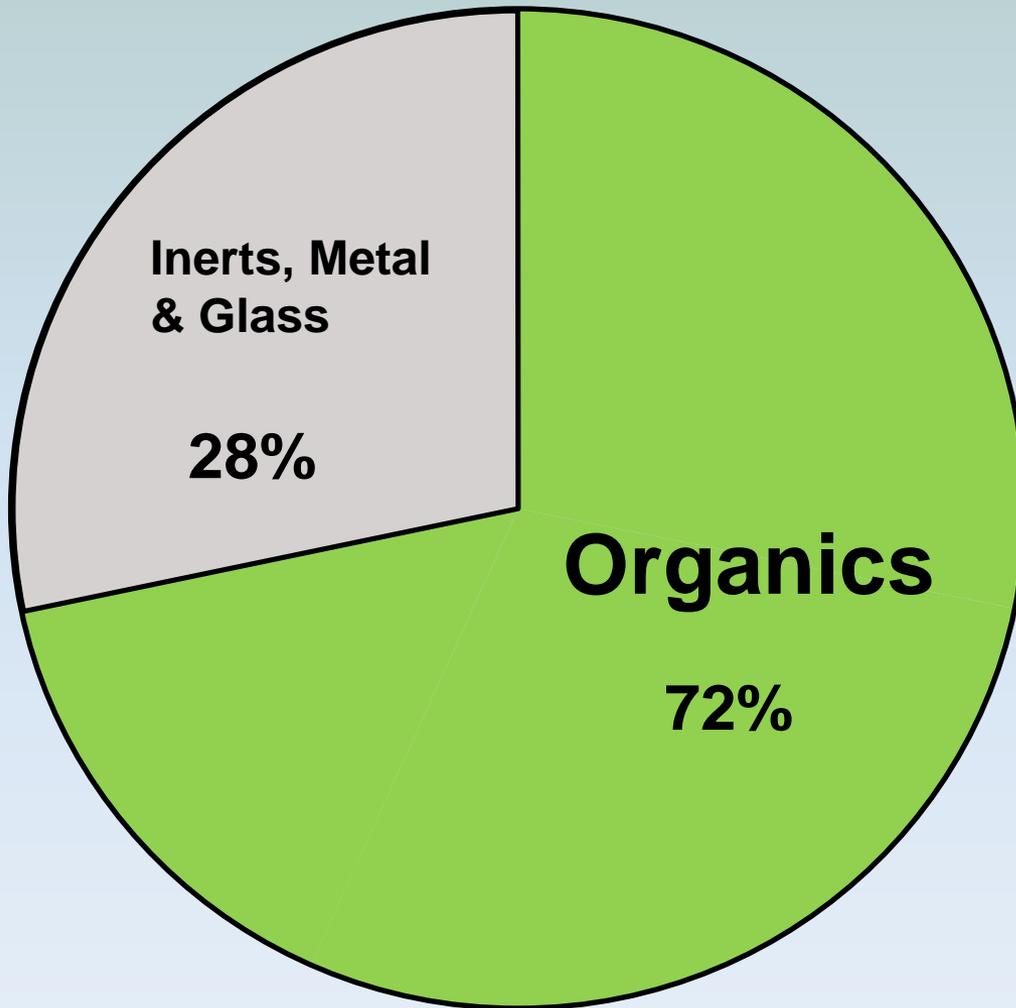


California landfilled waste streams



Source: CalRecycle 2008 & 10

California landfilled waste streams



- 31 million tons MSW landfilled in 2010
- ~ 70% carbon based
- About 28% suitable for Anaerobic Digestion
- CBC estimate: embedded Energy potential 11.3 TWh/year
- 10% of CA annual crude oil demand

What is Anaerobic Digestion?

- Organic material decomposes in an oxygen free environment
- Similar to a cow's digestion, AD process creates METHANE
- If released, CH₄ is 25x more potent GHG than CO₂
- CH₄ can be CAPTURED and turned into renewable bioenergy



*Image sources unknown, not for external distribution

Types of AD Facilities

Low Solids/Wet Digestion

- Typically less than ~15-20% solids, usually pumped into digester

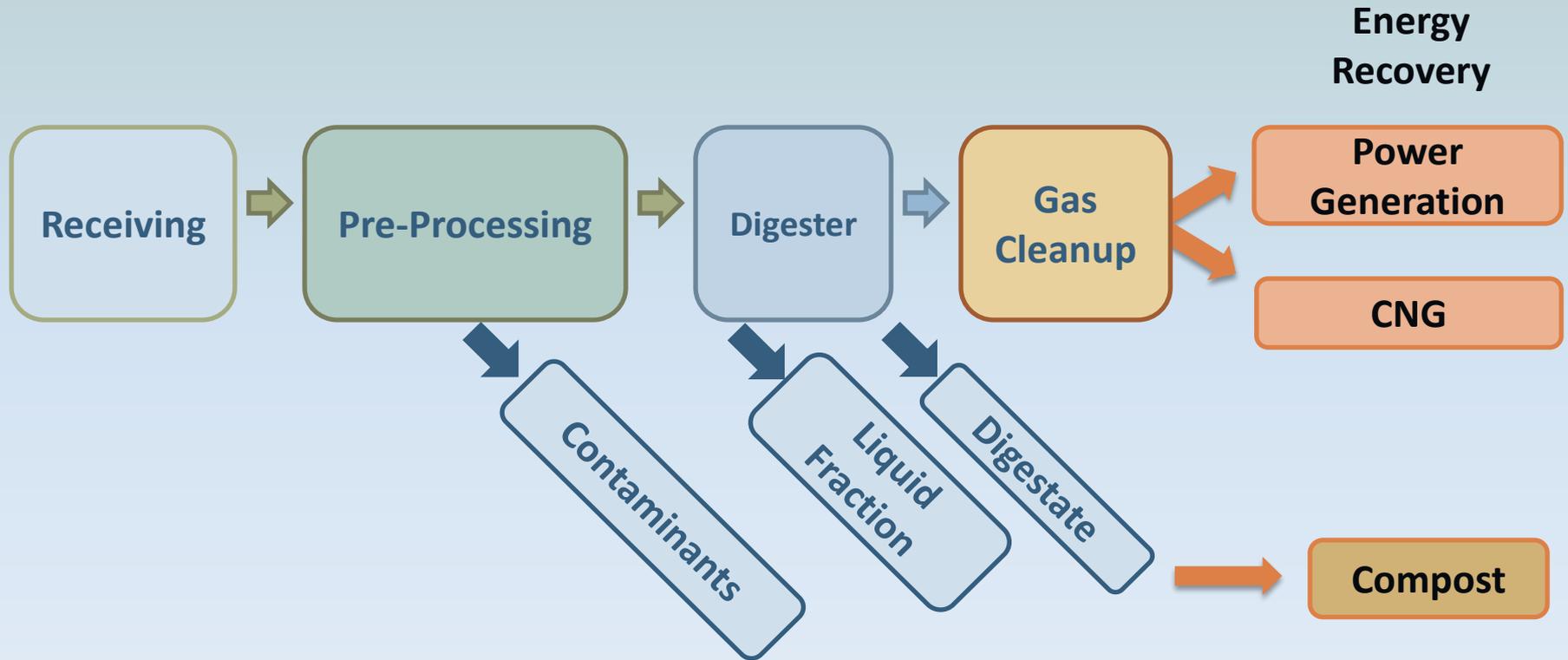


High Solids/Dry Digestion

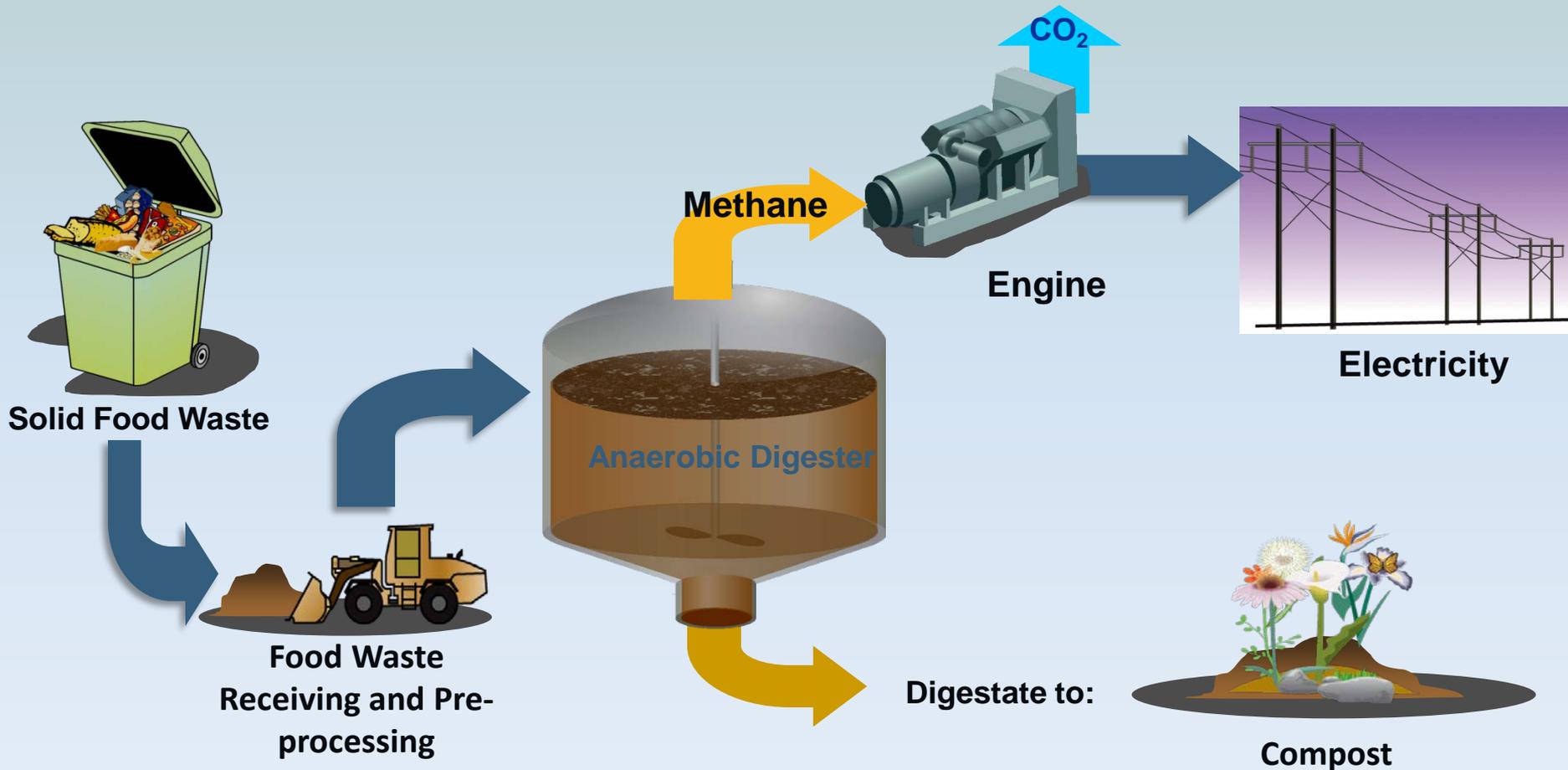
- Typically over ~15-20% solids, “stackable” material, resembles composting



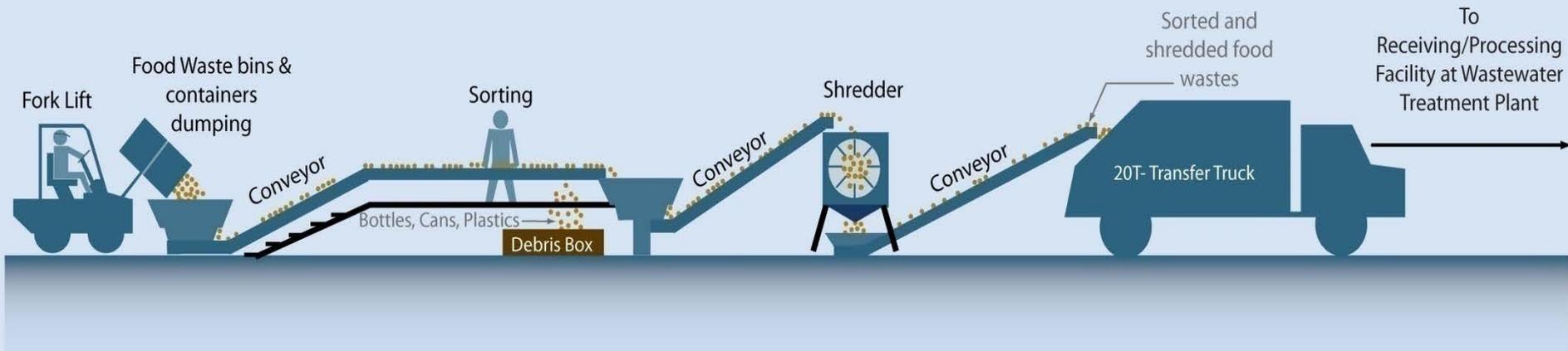
Simplified AD System Schematic



Simplified AD System



Sample Food Waste Pre-processing



California Policy Drivers

(a partial list)

AB 32 - Global Warming Solutions Act of 2006

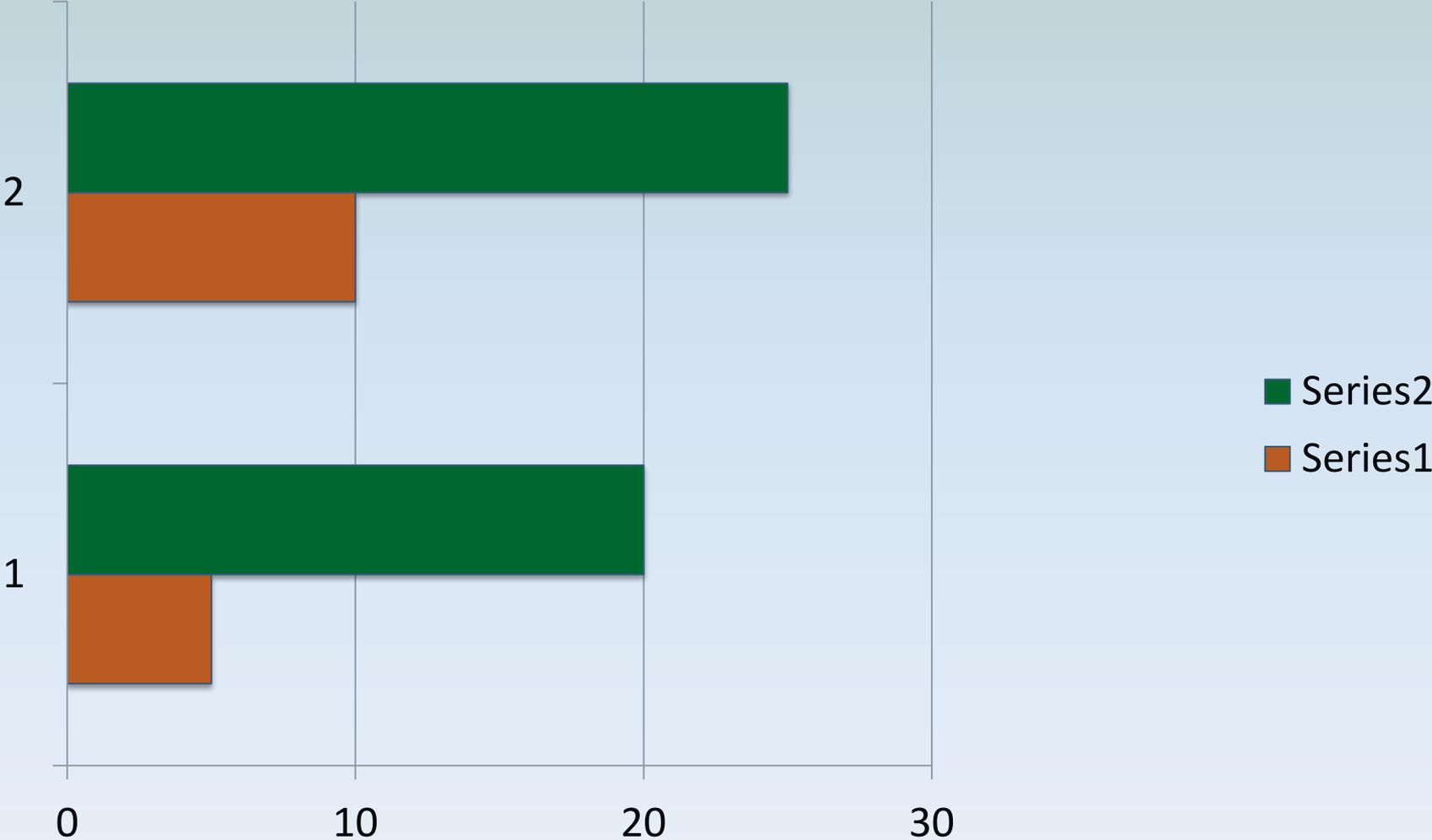
2013 scoping plan: possible phase out of organics in landfills

CalRecycle - AB 341 - 75% Diversion

Low Carbon Fuel Standard - Reduce Carbon Intensity of transportation fuels by 10% by 2020

Status of California AD Facilities

(Number of Facilities)



Food Waste digestion in or next to Wastewater Treatment plants

(A partial list)

- East Bay Municipal Utility District, Oakland
- Central Marin Sanitation, San Rafael
- LA Sanitation, Carson plant
- Inland Empire UA, Chino
- Sacramento Regional Sanitation
- City of Tulare WWTP
- Encina Wastewater, Carlsbad



Photo: J. Franco – City of San Jose WWTP

Central Marin Sanitation - Marin Sanitary Service - F2E Project



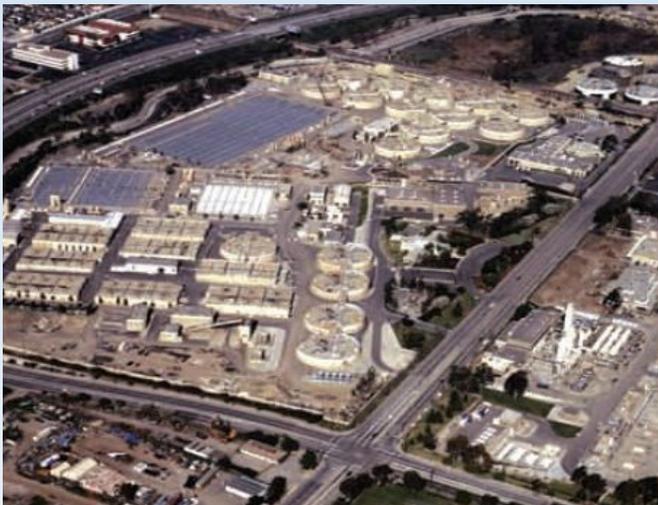
LA Sanitation Compton plant pilot



280 million gallon per day
Serves 3.5 million residents
Produces 1400 tons biosolids @ day

Scale Up of earlier trials

1st phase: 84 tpd
food waste slurry



Power generation,
Organics diversion,
power & CNG
production



Stand alone Anaerobic Digestion Projects

(A partial list)

- Zero Waste Energy Dev, San Jose
- Monterey RWMD Dry AD Pilot, Marina
- Ralph's AD project, Compton
- UC Davis READ project, Clean World
- Tajiguas LF, Santa Barbara Co.
- Anaheim-Anaergia-Republic, Orange Co.

Monterey Dry AD Pilot, Marina



Photo credits Monterey Regional Waste Management District & Jacques Franco

Zero Waste Energy Dev., San Jose



Photo credits: Zero Waste Energy & Jacques Franco

Ralph's AD project, Compton

- **Location:** Food distribution center next to creamery
- **Feedstock:** unsold food & creamery waste water
- **Process:** pre-processing & wet digestion
- **Power generation:** Three micro turbines 250 kw ea.
- **Benefits:** GHG's, fossil fuels, traffic, diversion, etc



Photo credit: Feed Resource

Stand alone AD Projects that will produce transportation fuels

- Blueline, ZWED, South San Francisco
- Sacramento BioDigester, Clean World
- CR&R, Perris, Riverside Co.

Sacramento BioDigester – Clean World



Photo credits: Clean World

Resources

CalRecycle Conversion Technologies (CT) page:

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

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

Digesting Urban Organics Forum presentations 2012

Search DUOR at www.calrecycle.ca.gov/

List of California AD projects:

www.calrecycle.ca.gov/Organics/Conversion/adprojects13.pdf

Summary

Twice as many operating projects as 15 month ago + improving “pipeline”

Jobs, environmental, renewable E benefits - The only negative carbon intensity fuel

Each project driven by a different set of circumstances

Stay tuned: Sign for CalRecycle’s Technology listserv

Questions?

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www.calrecycle.ca.gov/Organics/Conversion

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