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Conversion Technology Overview for Los Angeles County

Los Angeles County Public Works Environmental Programs Division

Public Works
LOS ANGELES COUNTY

November 21, 2024

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Agenda

1. Introductions
2. Description of Conversion Technologies (CT)
3. History of County Support for CT Development
4. Background on CT
5. Barriers to Development of CT
6. CT Facilities in the Region
7. Updates on Tetra Tech Team CT Project Tasks
8. Q&A

Introductions

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Description of Conversion Technologies

Biological, Thermal and Chemical Processes

Conversion Technologies for Municipal Solid Waste (MSW)

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- Several classes of technologies have been developed to convert MSW to beneficial end-products. They follow source reduction, reuse, recycling and composting in integrated waste management hierarchy.
- They include biological, thermal and chemical processes.
- The most developed worldwide include biological processes, like Anaerobic Digestion, and thermal processes, such as Waste to Energy (primarily Mass Burn incineration).

What are Thermal Conversion Technologies?

- Technologies that convert waste into energy or other products using high heat.
- Thermal technologies are a particularly viable option for the drier fraction of Material Recovery Facility (MRF) residual, comprised primarily of film plastics and paper.
- Types of CTs include Mass Burn, Gasification, and Pyrolysis.
- Thermal conversion technologies such as Gasification and Pyrolysis are still in development for use on a commercial scale due to the homogenous feedstock needed to optimize market potential.

What are Thermal Conversion Technologies?

- Heat is required to convert the waste to energy.
- Waste is the feedstock/fuel for the conversion process.
- Volume of residual materials after conversion process is less than 10% of original volume.
- Can recover metals and other inert materials following conversion process.
- Mass burn is considered the most commercially viable thermal conversion technology for processing municipal solid waste.

What is Anaerobic Digestion?

- Natural process when micro-organisms break down organic matter in the absence of oxygen.
- Occurs in a contained space much like a landfill cell or digester.
- End products include renewable natural gas (RNG), compost, and fertilizer/soil amendment.

What is Anaerobic Digestion?

- A more complicated version of in-vessel composting with energy benefits.
- Digesters are heated to provide optimal conditions for methane producing microorganisms to thrive.
- Higher processing cost compared to composting.

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History of County Support for Conversion Technology Development

Previous County Support of CT Development

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2007

Identification and Evaluation of Technology Supplier Qualifications and Database Management

TO

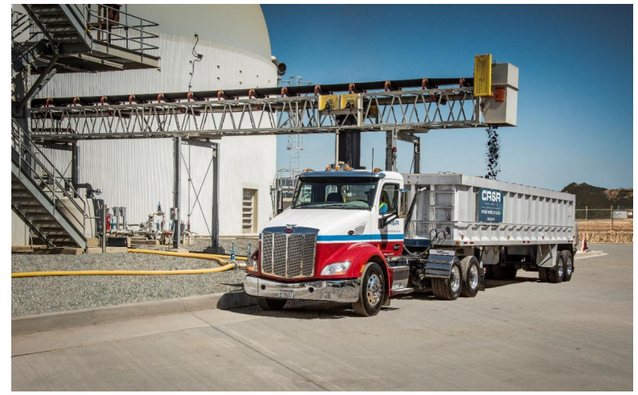
Funding and End Product Market Research

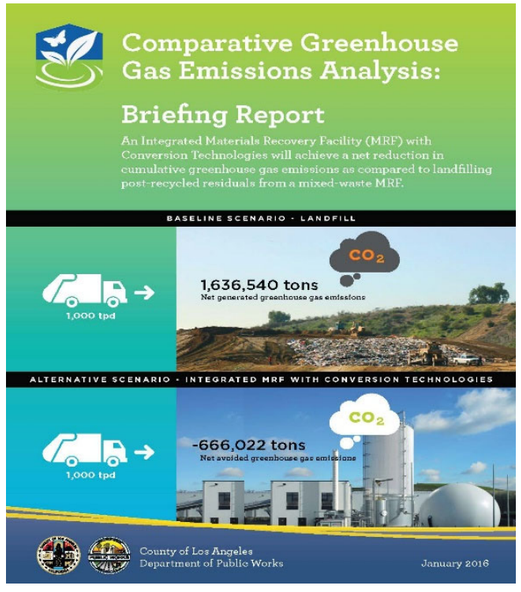
2020

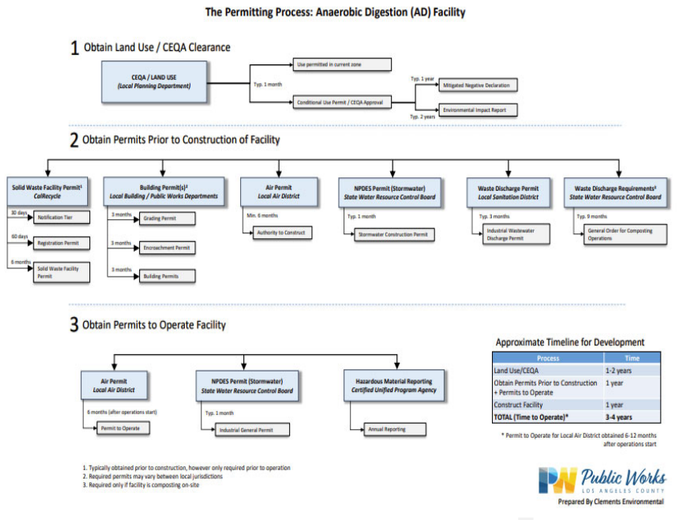
Preparation of Fact Sheets And Feasibility Studies

Notable Tasks

- Arrangement and coordination of CT facility tours in Japan and other destinations.
- Facilitation of a conversion technology conference.
- Preparation of CT permitting flow charts.
- Preparation of White Paper on Comparative Greenhouse Gas Emission Analysis (Alternative Scenarios for Treatment and/or Disposal of 1,000 Tons per Day of Post-Recycled Residuals from a Mixed-Waste Materials Recovery Facility)
- Advocacy support for development of the CR&R Perris AD Facility







Background on Conversion Technologies

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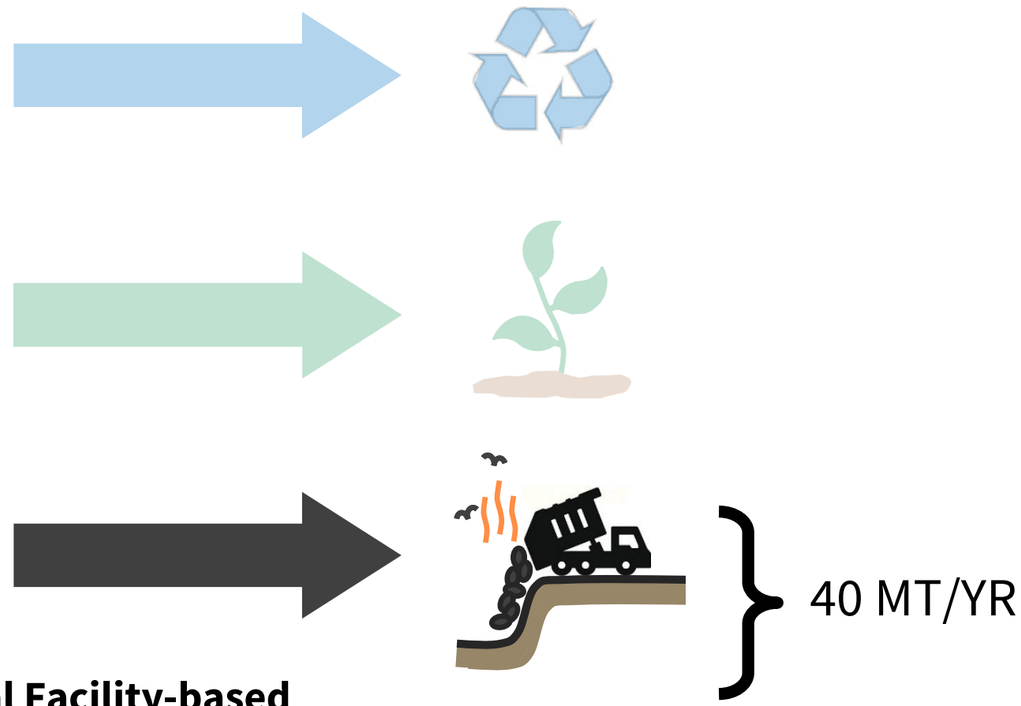
Composting

Anaerobic Digestion

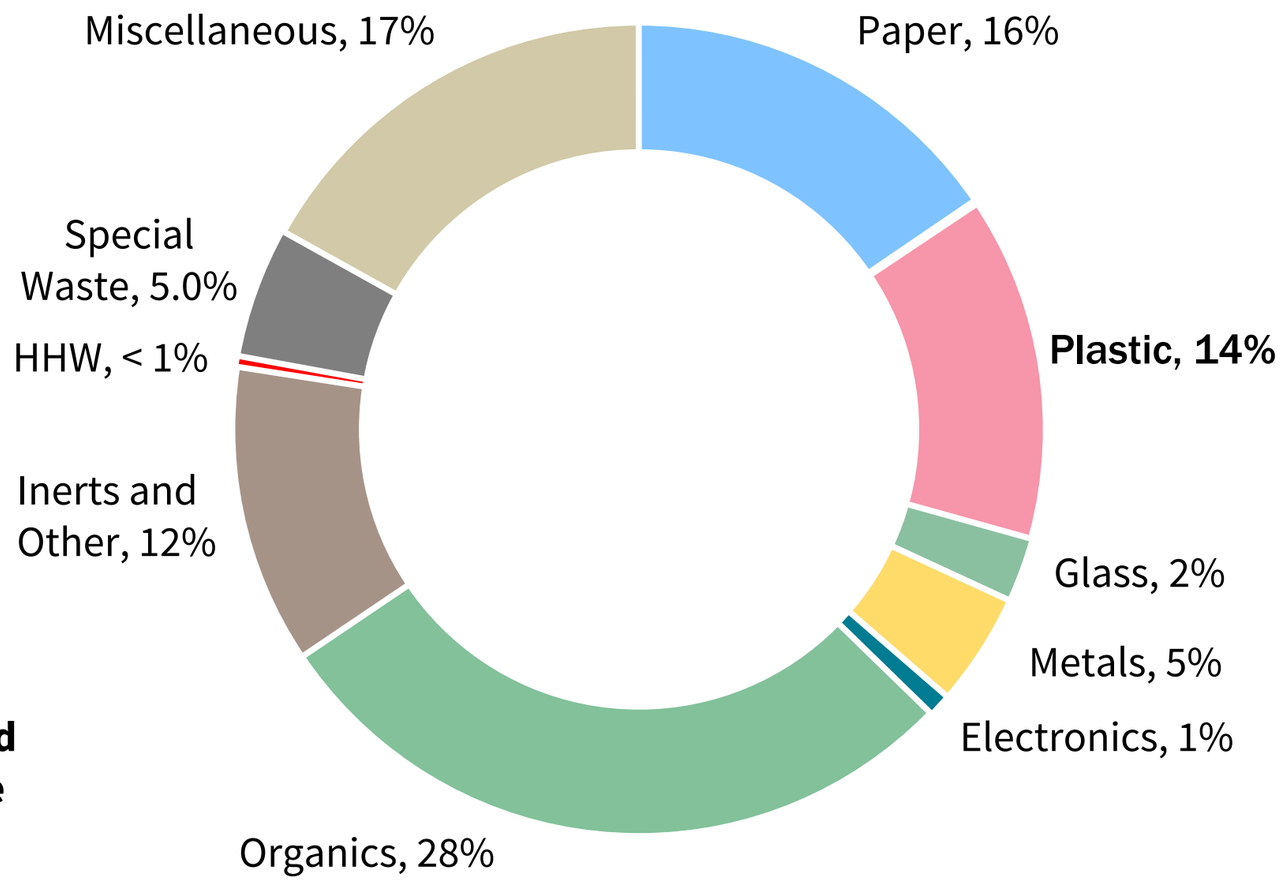
With other recycling and repurposing programs = approximately 45% of total waste stream is diverted for valuable purposes

Background on Conversion Technologies



Re: 2021 Disposal Facility-based Characterization of Solid Waste in California, June 2024

Background on Conversion Technologies



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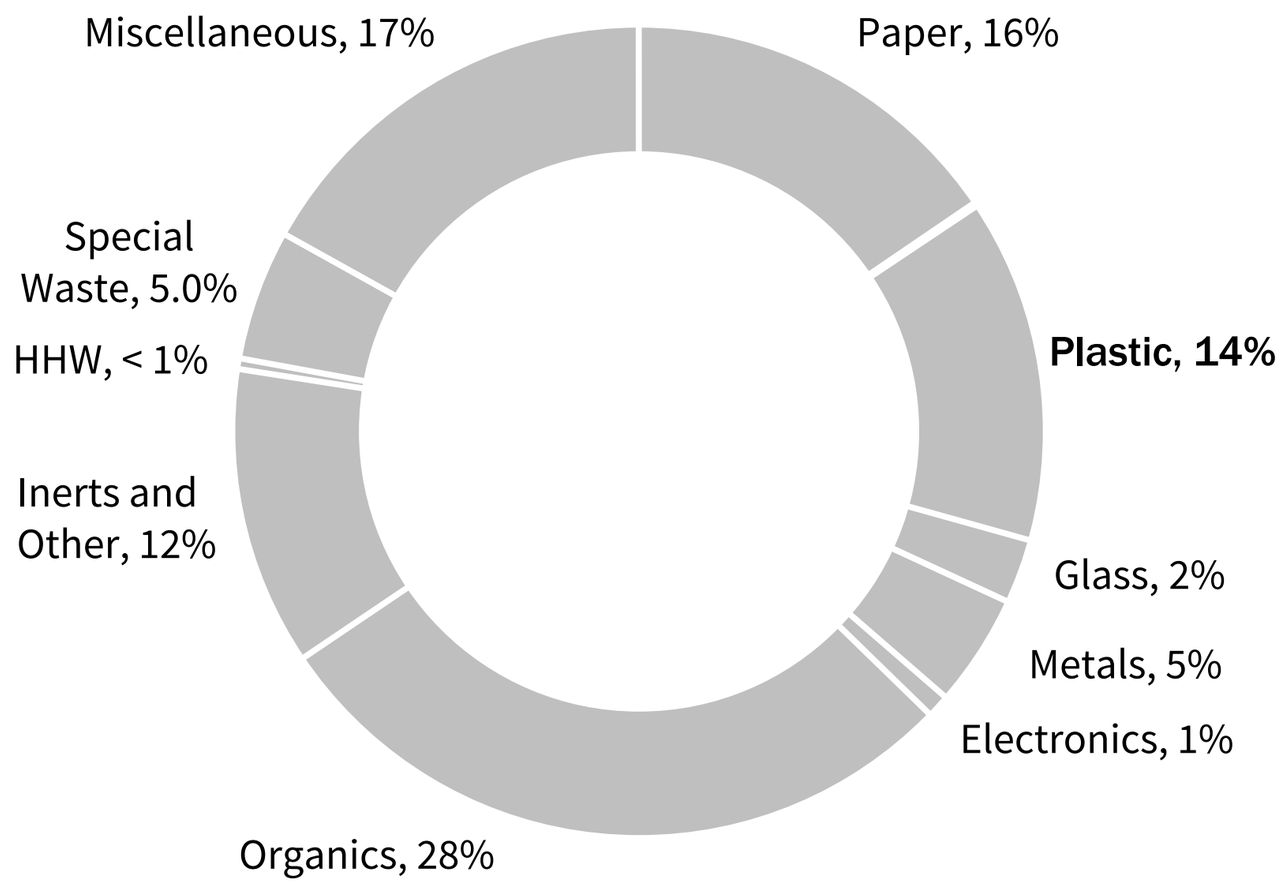

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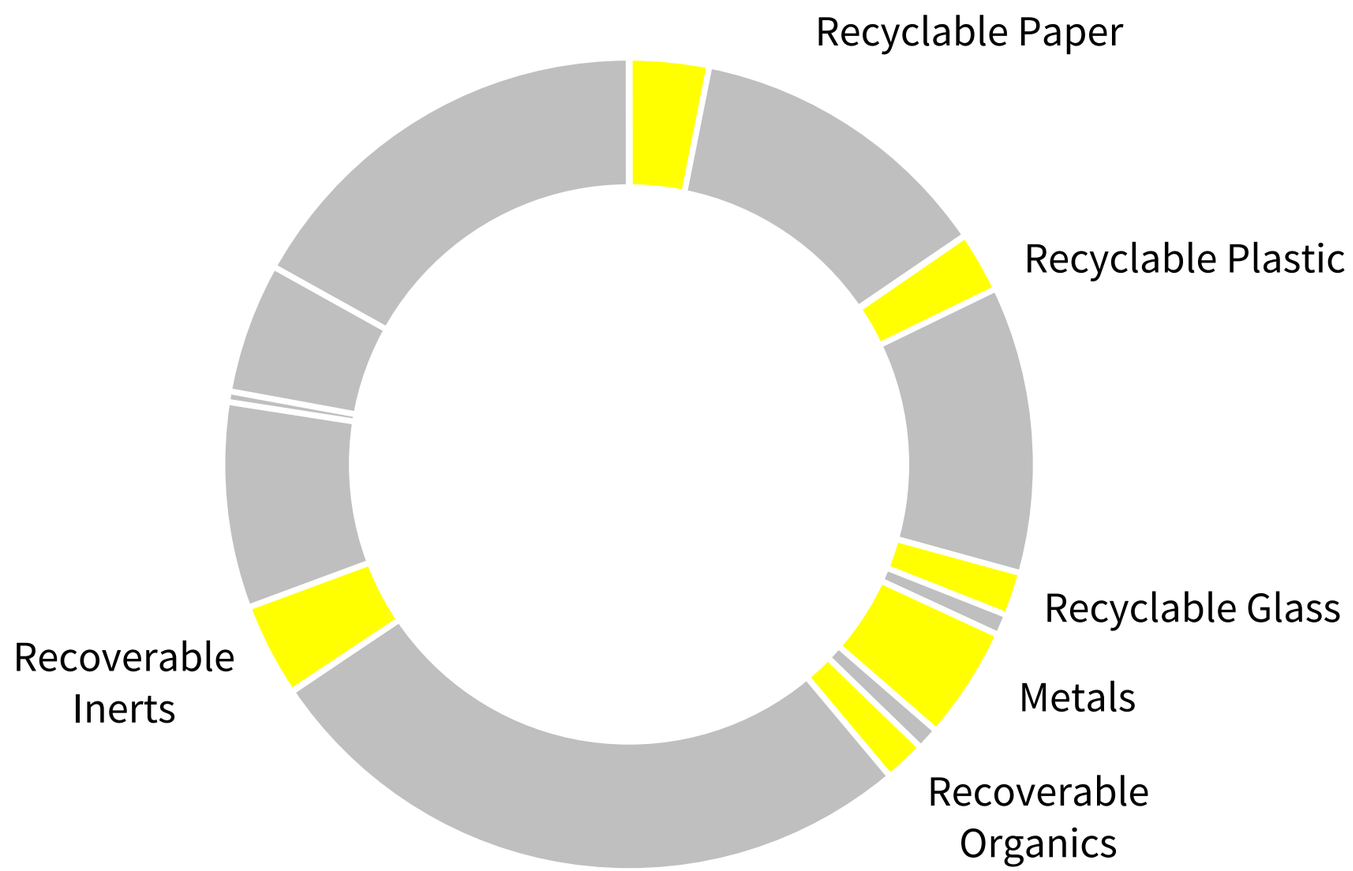
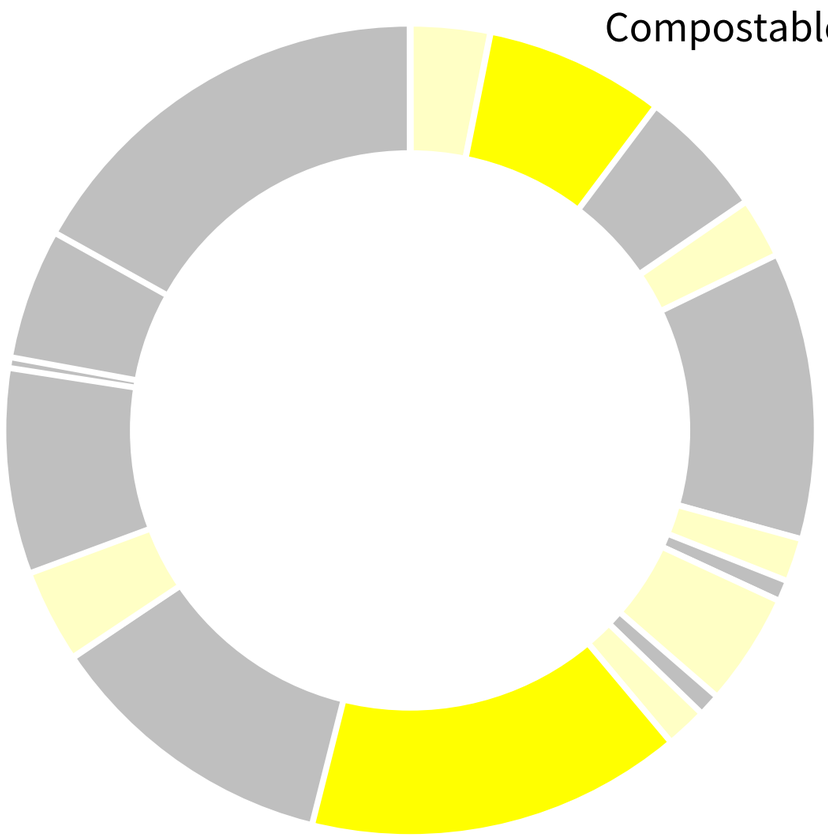
Background on Conversion Technologies

Recyclable –
approximately 12-15%



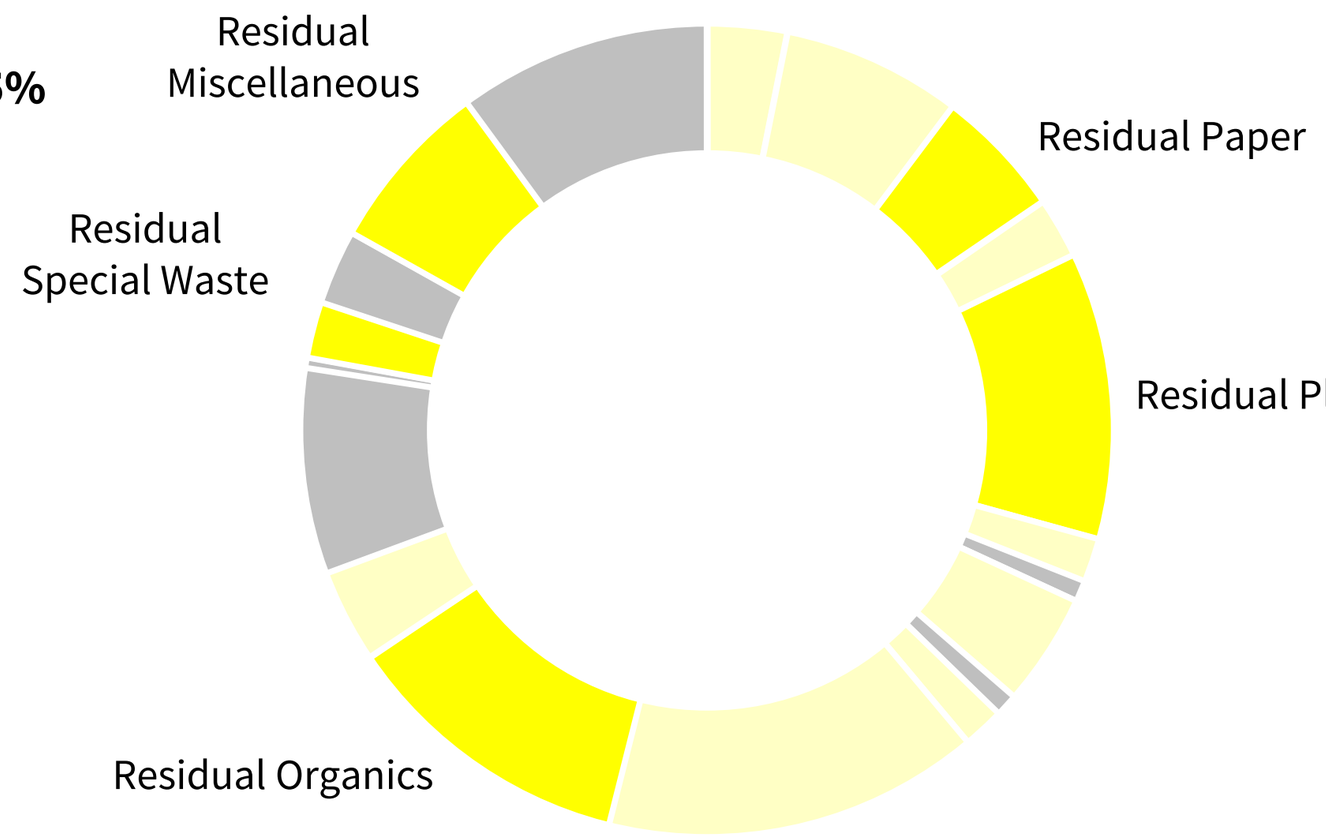
Background on Conversion Technologies

Compostable –
approximately 25-30%



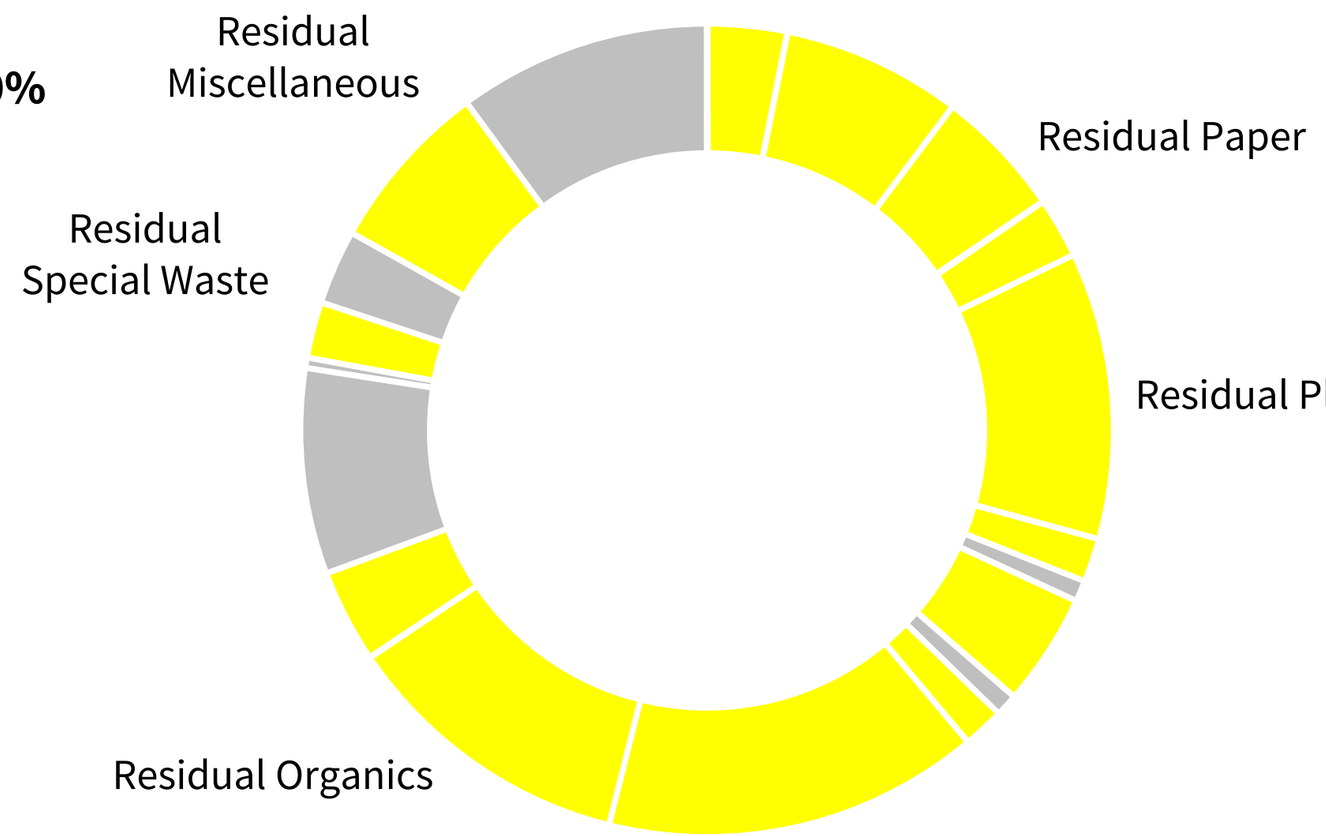
Background on Conversion Technologies

Combustible – approximately 20-25%



Background on Conversion Technologies

Total – approximately 65-70%



Benefits of Conversion Technologies

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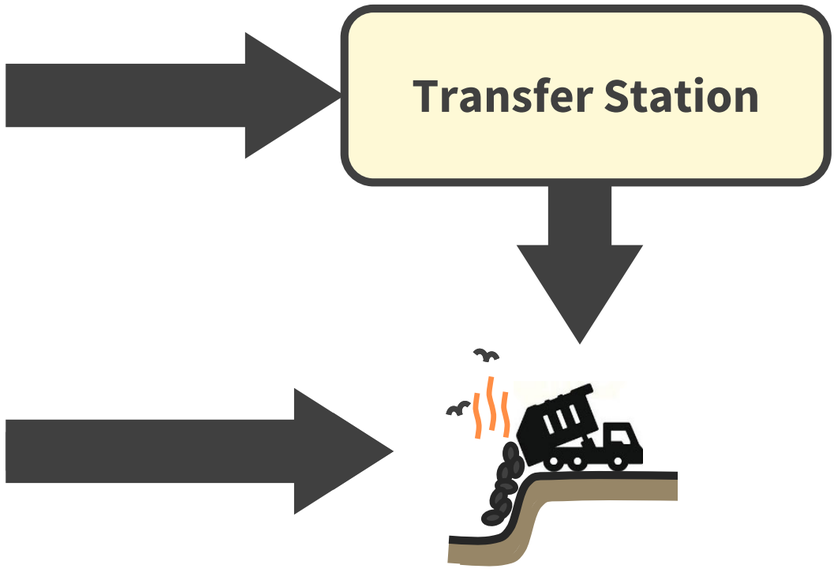

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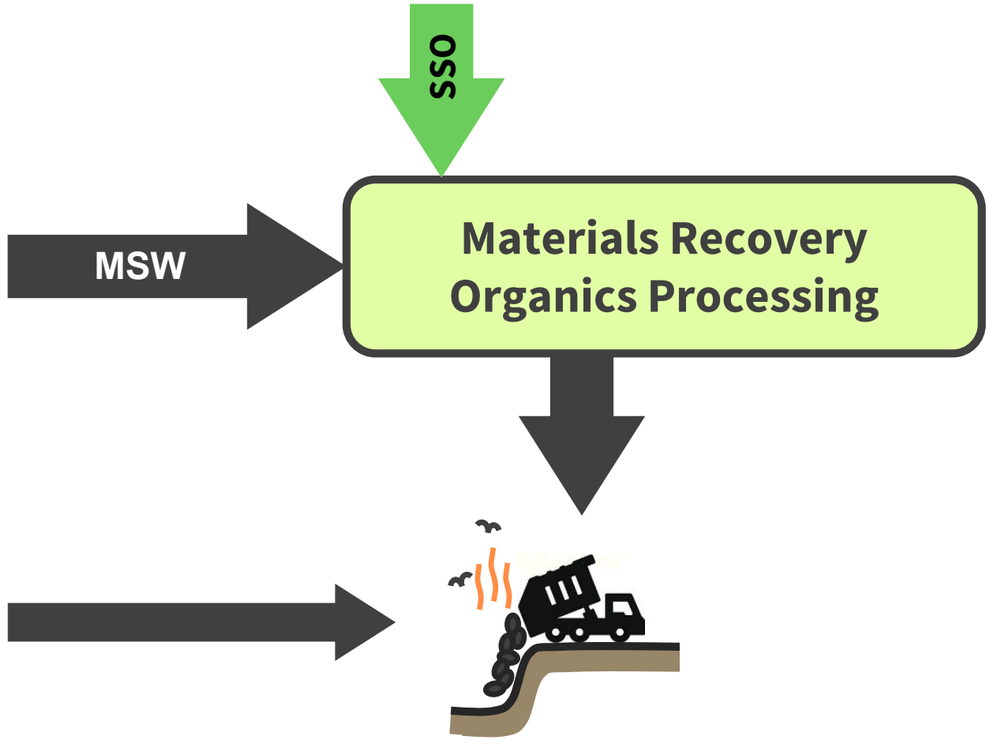

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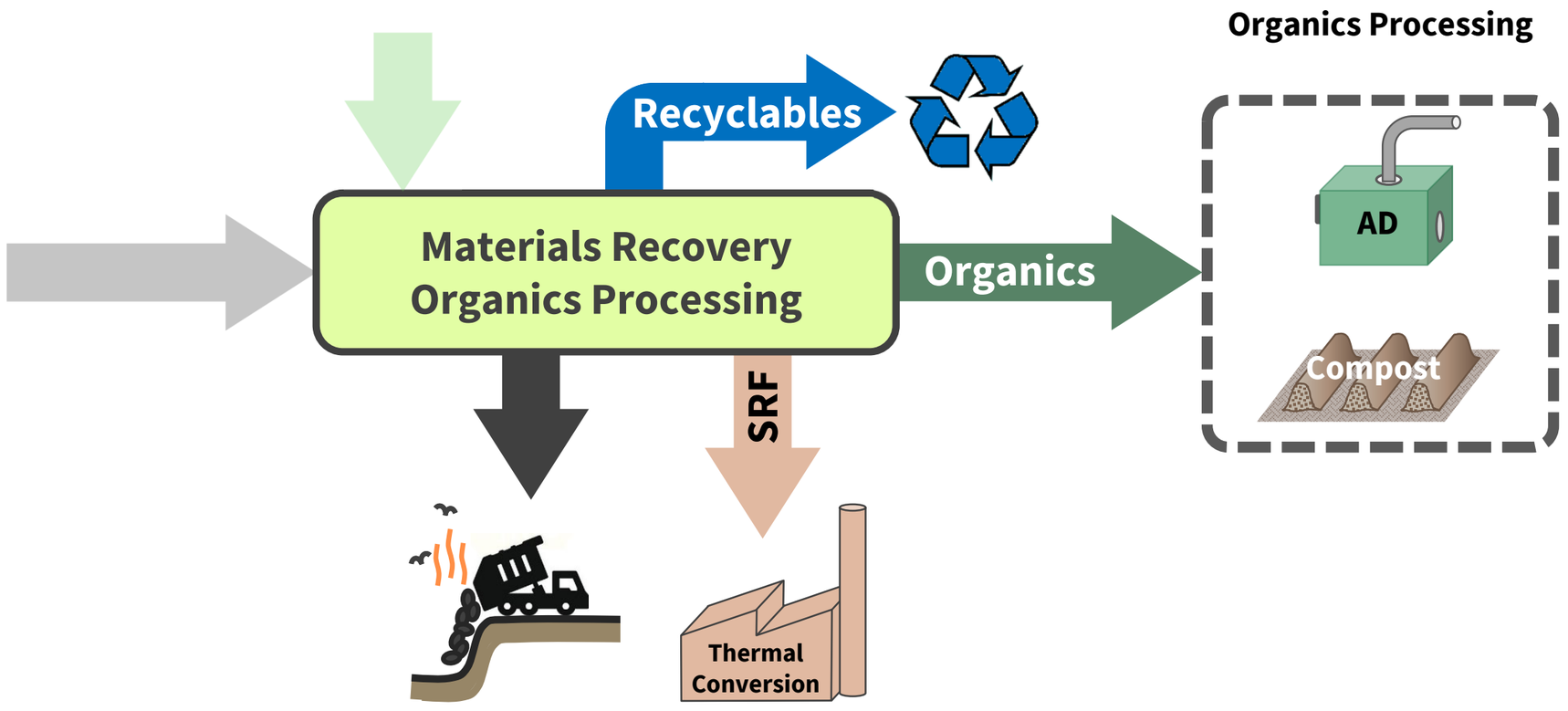

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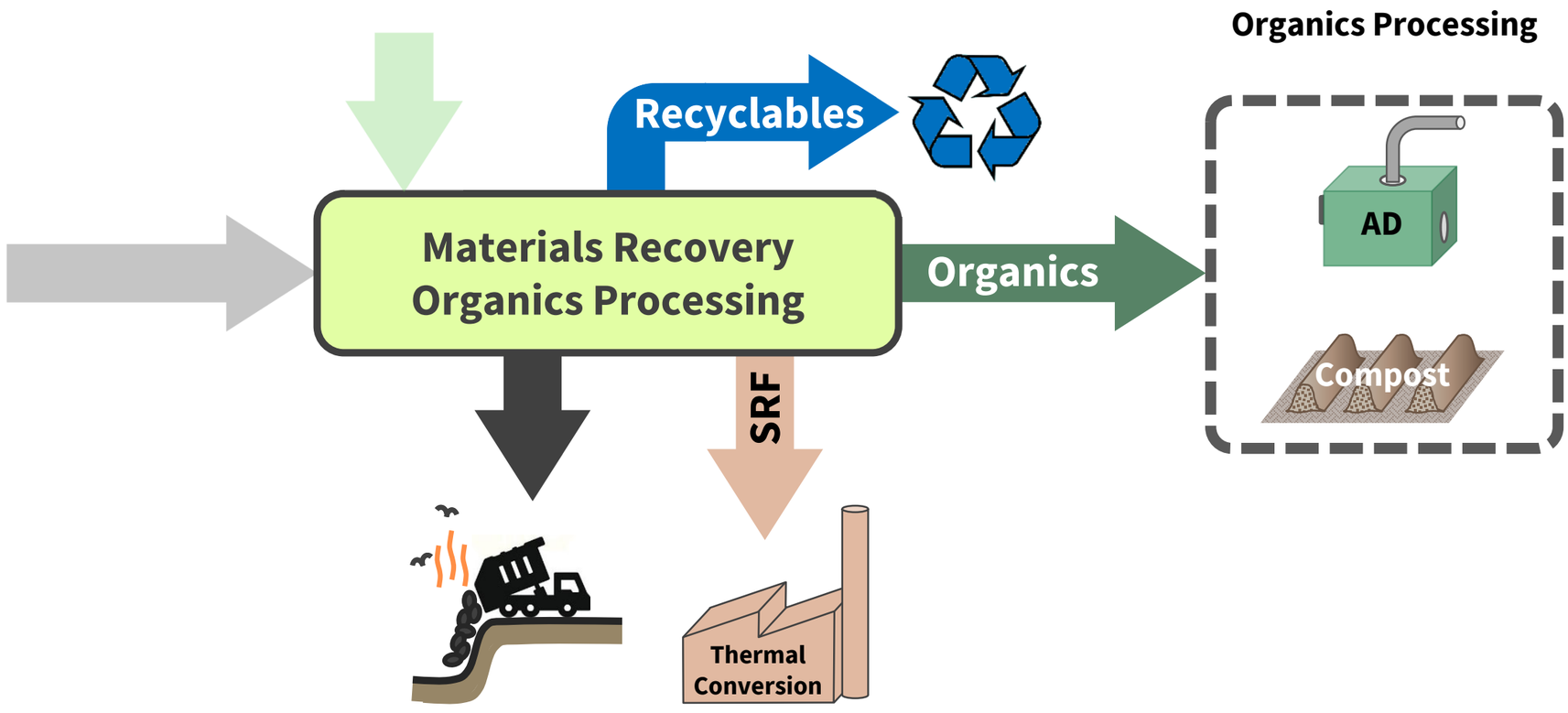

Potential Benefits of Anaerobic Digestion

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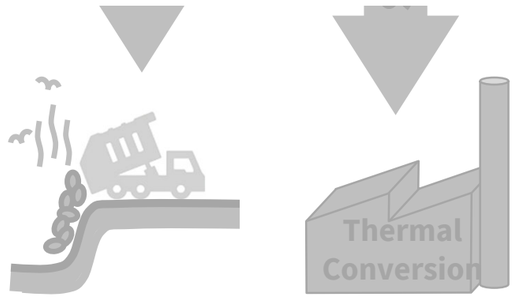
- 25 MT/YR Landfill Diversion (Approx. 75% Overall)
- Reduces Greenhouse Gas Emissions ($MTCO_2e$)
- 9.0M mmBTU of Renewable Natural Gas
- 250k MwH Renewable Electricity
- 1.8 MT/YR of Compost
- 300M Gal/YR Liquid Fertilizer
- 800k T/YR of ADC
- 5 MT/YR Recyclables

Biogas is considered green energy and yields higher commodity prices

Barriers to Development of Conversion Technologies

Barriers to Development of Conversion Technologies

If this is so great, why aren't we doing it?



Barriers for Conversion Technologies

1. Financial
   A. Landfilling - $60/T
   B. Composting - $75/T
   C. AD and WTE - $125/T
2. Siting
   A. Potential for significant transportation costs (to locate away from neighbors)
   B. NIMBYism
3. Permitting
   A. 5-10 yr process (Siting, Permitting, Design, and Construction)
   B. Thermal conversion technologies not considered diversion in California and end-products not considered renewable.
   C. Potential for substantial cost increase

Conversion Technology Facilities in the Region

AD Technology Facilities in the Region

- Anaerobic digesters accepting green and/or food waste
- Food waste pre-processing systems
- POTW accepting food waste

AD Technology Facilities in California

- Privately-owned Anaerobic Digesters accepting green and/or food waste
- POTW's accepting green and/or food waste for co-digestion

CTs (Waste-to-Energy) Facilities in California

- Active Thermal Conversion Facility (located in Stanislaus County)
- Pilot Gasification Facility (Sierra Energy)
- Mass Burn Incinerators (Closed)

Tetra Tech Team Projects on CTs Conducted for LA County

Timeline of Tetra Tech Project Tasks for CT Development

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2020

- Calabasas AD Facility RFP Support

2021

- Progress of AD Technology in the EU vs. US and CA White Paper

2023

- Calabasas AD Facility Organics Grant Application

2024

- Long Term Disposal Options Study for the Antelope Valley
- Closed Landfill Site Evaluations
- AD Technology and Industry White Paper
- Countywide Siting Evaluation
- SB 1383 RNG Procurement Presentation

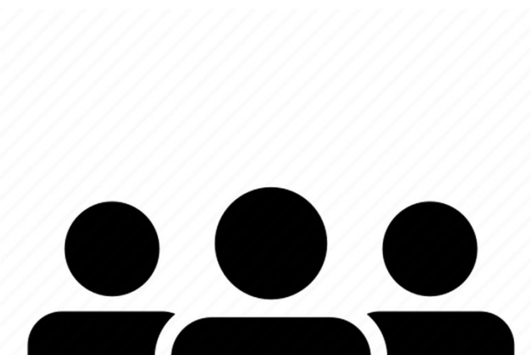
2025

- Phase II – Countywide Siting Evaluation

Calabasas AD Facility

Calabasas AD Facility RFP and Procurement Support

- Assisted Public Works with the development of a RFP for companies interested in developing an AD facility
  - Exclusive Negotiating Agreement
  - Ground Lease and Base Agreement
  - Design, Build, Finance, Own, and Operate



CalRecycle Organics Grant Program Application (2023) Cycle 7

- Assisted Public Works with the compilation of a grant application
- Funding for permitting, design, and construction

White Papers Developed on Anaerobic Digestion

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Progress of AD Technology in the EU vs. US and CA White Paper (2021)

- Presents brief history and status of AD in the European Union (EU)
- Compares EU policies and practices which led to the development of AD facilities to those in the US with a focus on CA
- Concludes that policy and economic considerations are the primary discrepancies between the EU and the US

AD Technology and Industry White Paper (2024)

- Presents broad perspective on AD technologies and the AD industry in CA for Public Works' consideration in the planning of potential AD projects in LA County.
- Provides evaluation of considerations for local government agencies in partnering with private entities to develop AD facilities.

Alternative Disposal Options Evaluations

Long-Term Disposal Options Study for the Antelope Valley

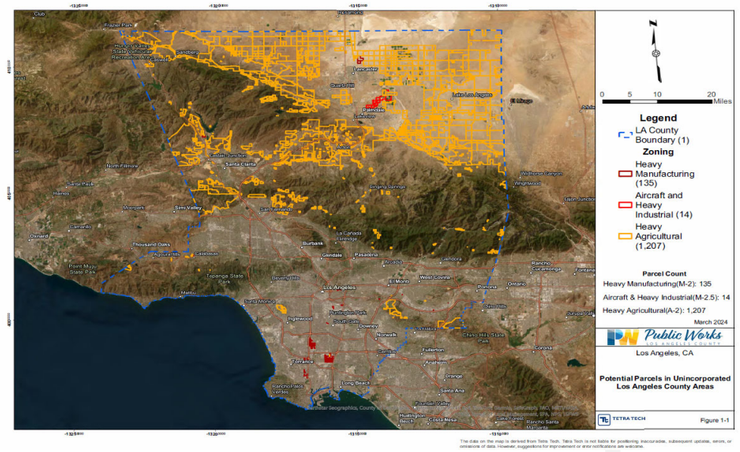
- Included evaluation of conversion technologies
- Submitted to the County February 2024, pending County Review

Countywide Siting/Feasibility Analysis for CT Facility

- Identified potential parcels by developing a set of siting criteria and utilizing GIS technology.
- Final results concluded 138 stand-alone parcels (98 Unincorporated total parcels and 40 Incorporated City parcels)
- Submitted Final to the County September 2024
- Conducting Phase II Detailed Site Evaluation

Closed Landfill Evaluation

- In-progress
- Evaluated 13 County owned solid waste facility sites
- Three found potentially suitable pending further analysis



SB 1383 RNG Procurement

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Anaerobic Digestion (AD) Facilities and Publicly Owned Treatment Works (POTWs) in CA

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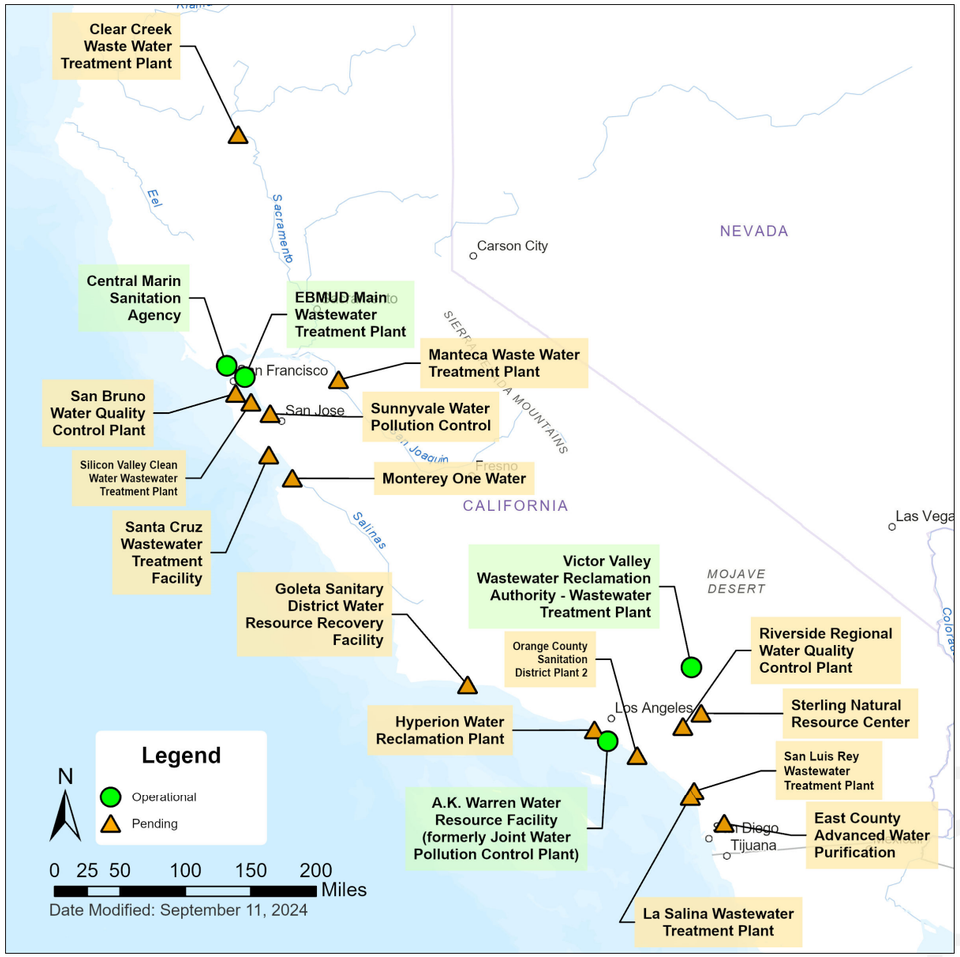

SB 1383 RNG Procurement

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Item #5:
What is the best approach for jurisdictions that are interested in procuring the actual RNG-derived electricity as well both the RECs and the PCAs?

Questions

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