



# Key takeaways of co-digestion capacity analysis

CBA Symposium | November 13, 2020

SLIDES BASED ON 9.9.2020 CAROLLO/CASA/CWEA PRESENTATION

1



**Chris Hyun**  
Specialist



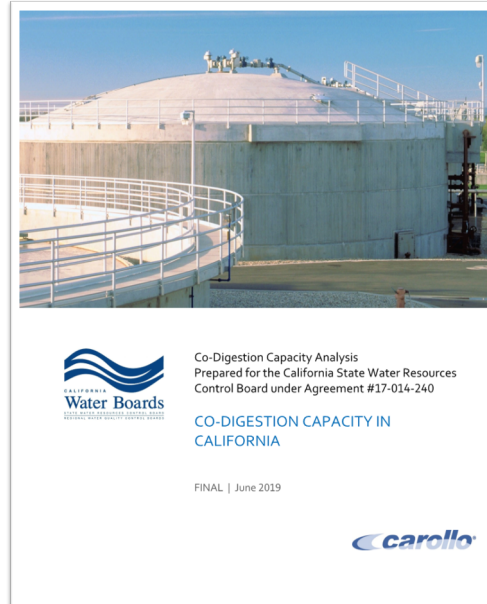
**Charlotte Ely**  
Supervisor

**Climate & Conservation Team**  
**STATE WATER RESOURCES CONTROL BOARD**

2

## // Today's Presentation

- Motivation of the report
- The punchline
- Key takeaways of each chapter
- How the State Water Boards are facilitating co-digestion projects



3

3

## // Thank you to the Carollo project team, participating California facilities, SWRCB, and CASA

- Project Team
  - Elizabeth Charbonnet
  - Sarah Deslauriers
  - Rashmi Gupta
  - Chelsea Ransom
  - Rob Williams
- State Water Resources Control Board
  - Jelena Hartman
  - Charlotte Ely
  - Max Gomberg
- Facilities who participated in survey and case studies
- Technical reviewers and advisors - Greg Kester
- Funding: US EPA

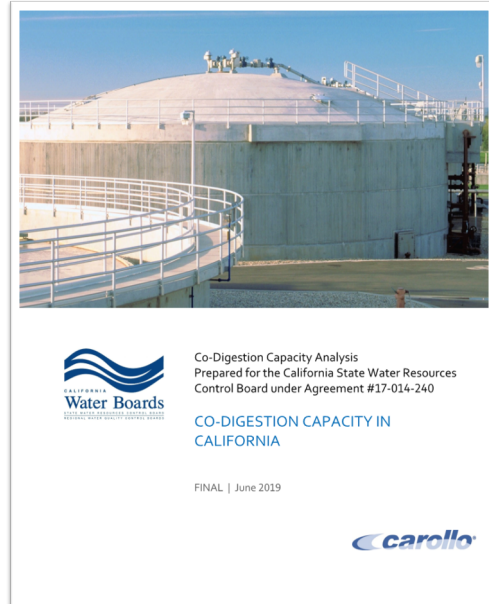


4

4

## // Today's Presentation

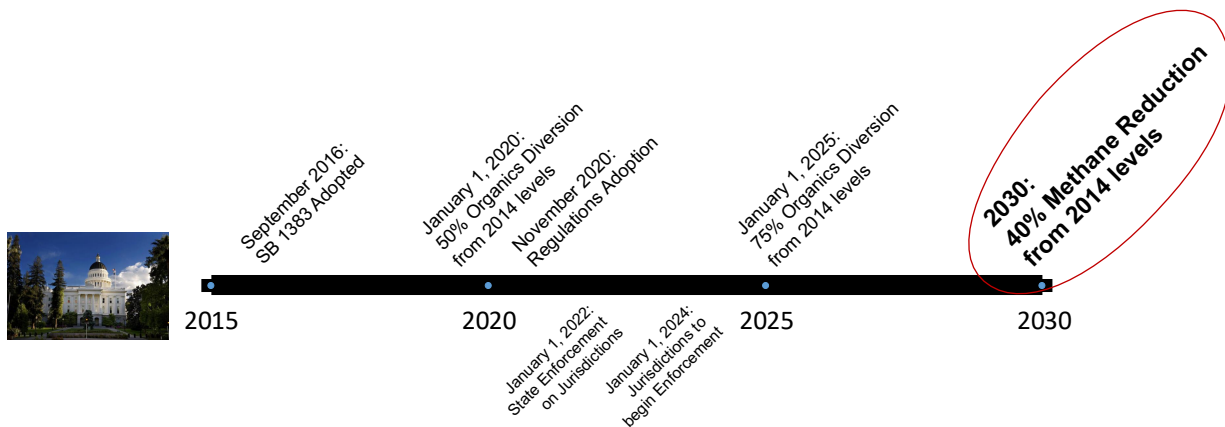
- **Motivation of the report**
- The punchline
- Key takeaways of each chapter
- How the State Water Boards are facilitating co-digestion projects



5

5

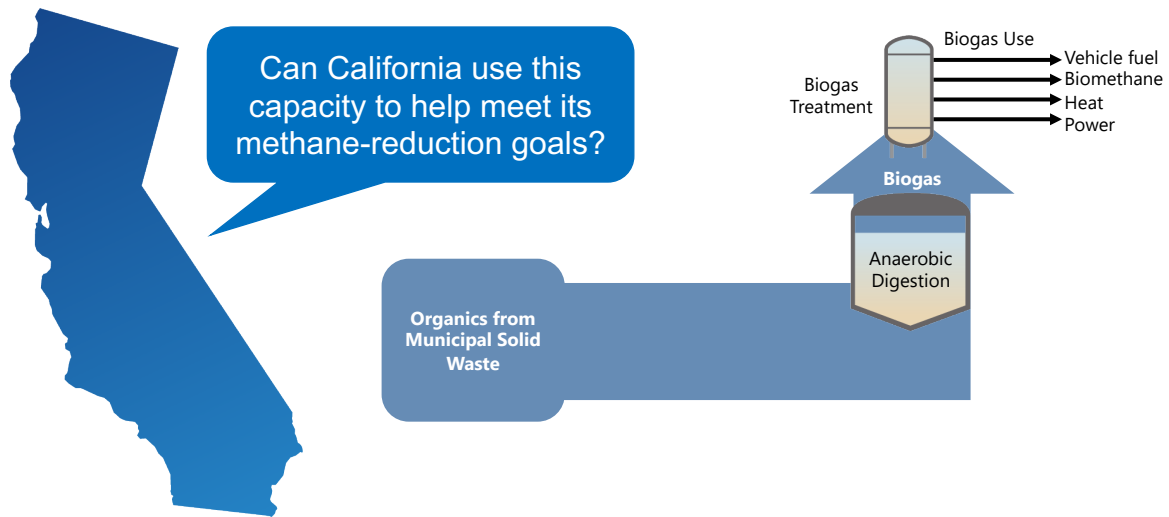
## // California's Senate Bill 1383 — Methane Reduction



6

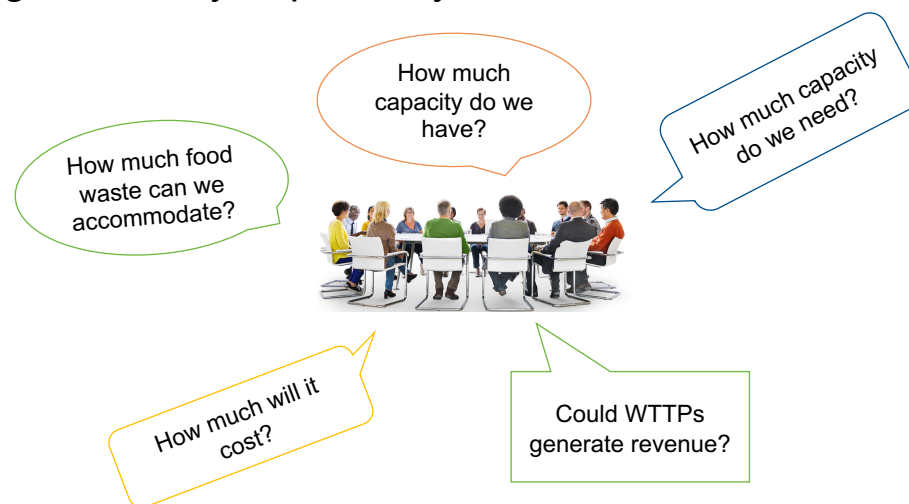
6

// Lots of talk in the last few years about excess digester capacity and producing renewable energy at WWTPs



7


// State agencies had many of the same questions about co-digestion as you probably do



8

8






## Co-Digestion Capacity in California

*Six-Chapter Report with Appendices*

- *Finalized June 2019*
- *Multi-agency review at State level*
- *Published August 2020*


Find the report at:  
[www.waterboards.ca.gov/water\\_issues/programs/climate](http://www.waterboards.ca.gov/water_issues/programs/climate)



Co-Digestion Capacity Analysis  
 Prepared for the California State Water Resources  
 Control Board under Agreement #17-014-240


**CO-DIGESTION CAPACITY IN CALIFORNIA**

FINAL | June 2019




9

9



## The Punchline


- **≥ 50% of food waste in California could be recovered**
- **Maximizing co-digestion is a net positive investment**
- **Could reduce GHGs to up to 60% of the state's 2030 landfill reduction goal**



Co-Digestion Capacity Analysis  
 Prepared for the California State Water Resources  
 Control Board under Agreement #17-014-240

**CO-DIGESTION CAPACITY IN CALIFORNIA**

FINAL | June 2019

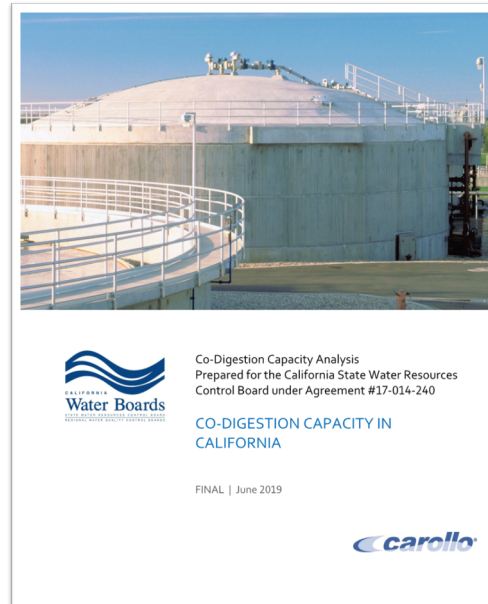


10

10

## // Today's Presentation

- Motivation of the report
- The punchline
- **Key takeaways of each chapter**
- How the State Water Boards are facilitating co-digestion projects



11

11

## // Today's Presentation

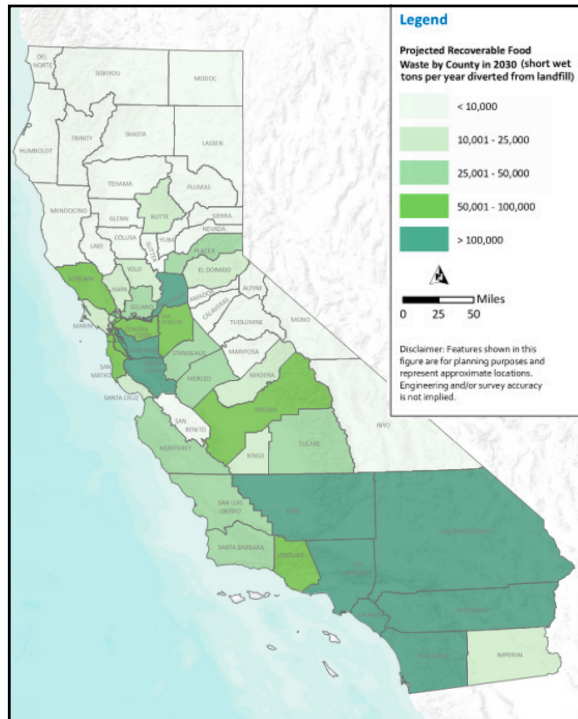
### **Key takeaways of each chapter**

1. Projected food waste
2. Existing co-digestion capacity
3. Investments
4. GHG reduction
5. Small to medium WWTPs
6. Large WWTPs



12

12



## Chapter 1 Food Waste Disposal

*Food waste comprises*

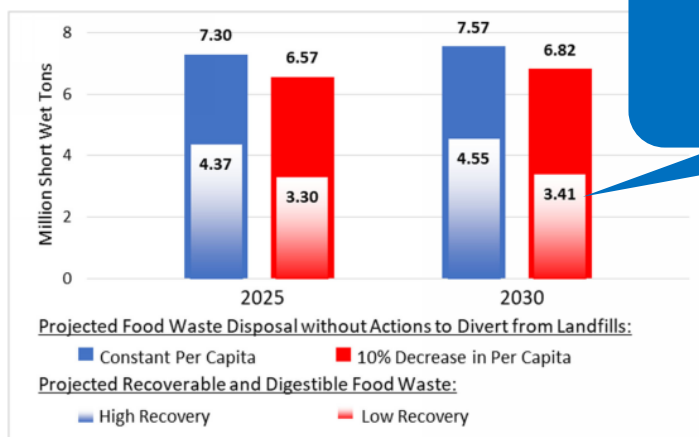
- 18% of municipal solid waste
- 30% total organics disposal

*Diversion can play a major role in meeting state's SB 1383 goals*

13

13

// State's population and waste data used to determine projected recoverable and digestible food waste

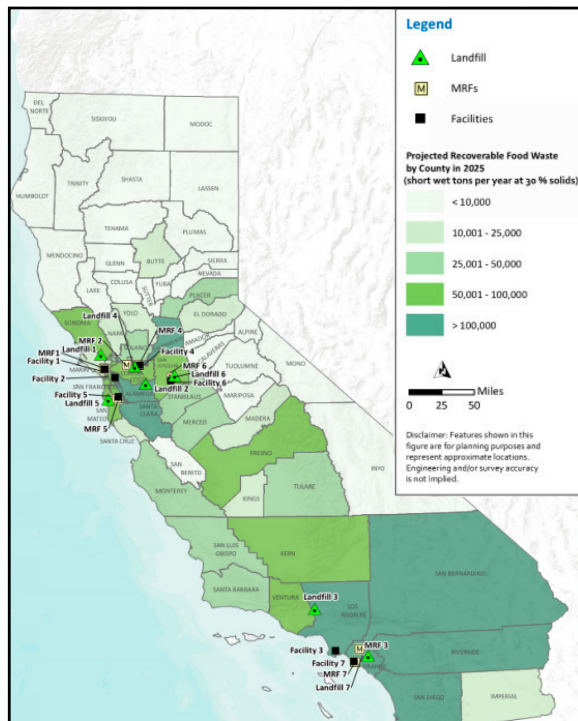


CONSERVATIVE 2030 ESTIMATE

**3.4 MILLION**  
WET TONS PER CAPITA

14

14



## Chapter 2 Existing Co-Digestion Capacity

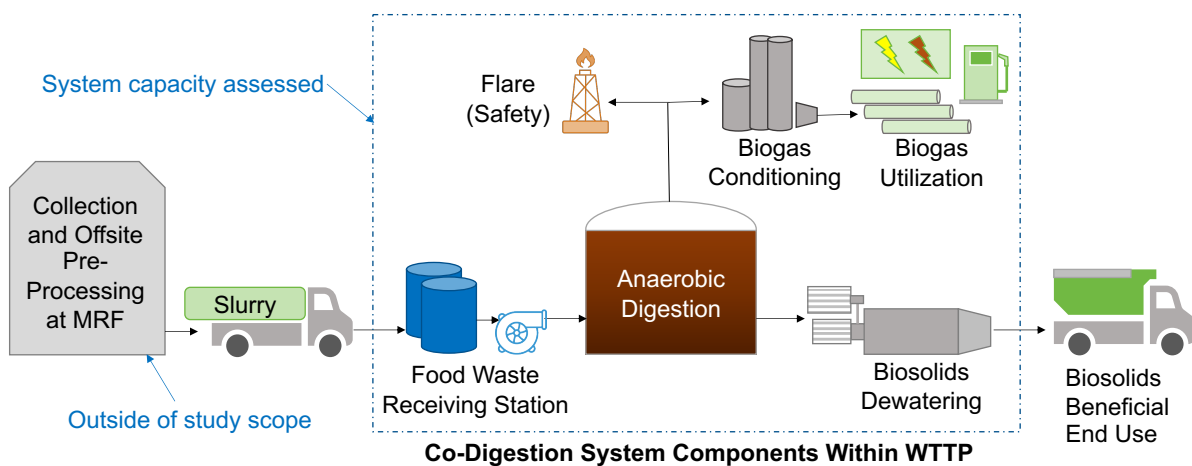
*Seven WTTTs have or will soon have all required system components*

- Limited to **3.4%** of 2030 projection of 3.4 million wet tons of recoverable food waste
- Capacity could be expanded to handle 8 times that, **25%** of the 2030 food waste projection

15

15

// Key processes required at WTTT to accept food waste slurry, co-digest, and beneficially use byproducts

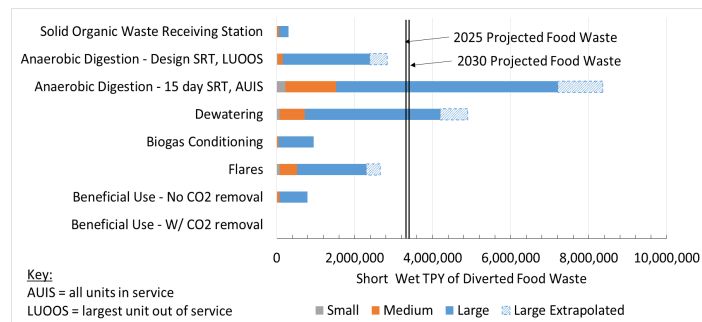


16

16

## // Statewide existing capacity for key processes

- Sufficient **digestion capacity** for most of 2030 projection
- Significant limitations in **receiving stations** and **biogas** systems



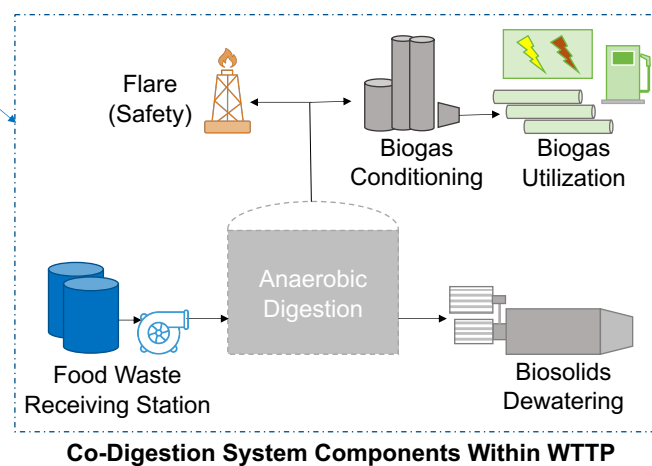
➤ See Appendix 2C for details

17

17








## // Increased capacity is needed for key processes that limit co-digestion in WWTPs

System capacity assessed



18

18

## Chapter 3

### Investments for Co-Digestion

Revenue projected to cover 15-year capital and O&M costs

- Renewable energy incentives currently favor CNG/RNG and positive economic outcomes more likely for higher-capacity facilities
- Other considerations: individual facilities, jobs, noise, odor, regulations

19

## // Developed capital and O&M costs for Scenarios 1 and 2, and an illustrative facility

- Capital: Increase capacity in key processes other than digestion
  - Unit costs: biogas, dewatering
  - Discrete cost: receiving stations, pipeline interconnection
- O&M: Incremental increase beyond indigenous solids treatment
  - Labor
  - Maintenance
  - Energy
  - Dewatering polymer and biosolids hauling/end use

Case	Wet Tons Diverted Food Waste/Year
<b>Scenario 1</b>	
Conservative (70%)	2,400,000
<b>Scenario 2</b>	
2030 Projection (100%)	3,400,000
<b>Illustrative Facility (1.3%)</b>	45,000

CHAPTER 3. INVESTMENTS TO MANAGE CO-DIGESTION | CO-DIGESTION CAPACITY ANALYSIS | DATA

Appendix 3A  
SUMMARY OF ASSUMPTIONS USED IN COST ANALYSIS

Medium Solid Organic	\$1,050,000	2%	Wastewater quantity transferred to below grade concrete storage tanks, feed and mixing pumps, rock trap grinder, paddle blender, crane, pump pumps, and odor control system. Capital costs for existing solid organic waste receiving stations (ARCS, OWSA, Westside, and Delta District) ranged from \$1 to \$4 million.
Large Solid Organic Waste Receiving Station	\$8,340,000	2%	
Dewatering Station			

To convert the cost to dewater digester to 276 TS into 80 pounds TS digester per day we assumed large facilities operate 24 hours per week, medium facilities operate 80 hours

➤ See Appendix 3A for details

20

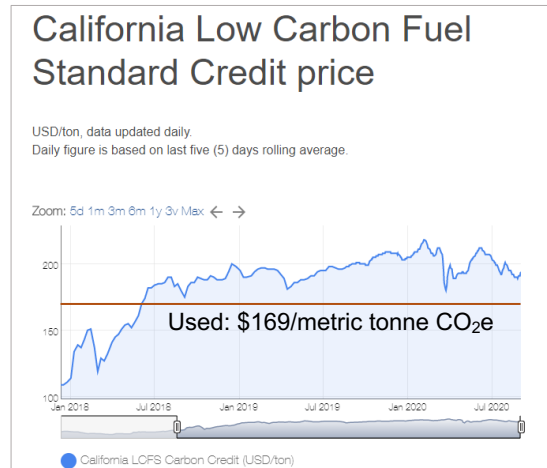
20



## // Revenue estimates included for tipping fees and biogas utilization

- Tipping fees
- Biogas utilization
  - Electricity: power and gas offset
  - Renewable natural gas
    - vehicle fuel offset
    - pipeline injection sale
  - Renewable energy credits
    - RIN: advanced biofuel (D5)
    - LCFS: low carbon fuel standard
    - SGIP: self-generation incentive program

**Note: these values can change and impact economics**



Source: NESTE 2020

21

21

## // Summary of estimated costs illustrate potential WTPP investments required and annual O&M, revenue

Case	Wet Tons Diverted Food Waste/Year	Coverage	Estimated Capital Cost, \$M	Estimated O&M Cost, \$M/Year	Estimated Revenue, \$M/Year	Biogas Use
Scenario 1	2,400,000	Statewide	<b>968</b>	<b>97.6</b>	<b>278</b>	Split
Scenario 2	3,400,000	Statewide	<b>1436</b>	<b>138</b>	<b>393</b>	Split
Illustrative Facility	45,000	For Facility	<b>22.4</b>	<b>1.8</b>	<b>7.3</b>	CNG Vehicle Fuel

**Notes:**

1. Costs do not include collection of food waste, pre-processing at MRF, or fleet conversion.
2. Capital costs represent planning level estimates, corresponding to AACE Class 5.

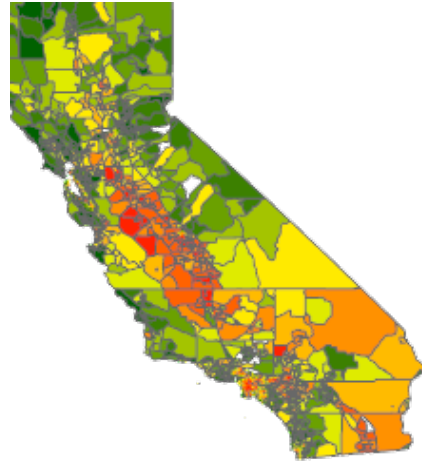
22

22



## // Considered community impacts near WTPs

- Statewide **job creation** at WTPs may be limited
  - Additional jobs possible for offsite needs
- Truck **trips and noise** near WTPs would increase
  - Truck trips and noise near and to/from landfills would decrease
- **Odor** containment and control required



Source: CalEnviroScreen

23

23

## // Outlined regulatory considerations for water, air, and land that could affect feasibility



24

24

## // Identified potential funding sources for bioenergy and GHG-reducing projects

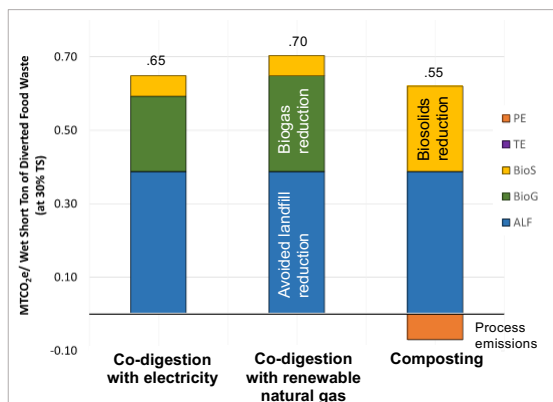


➤ See Appendix 3G for details

25

25

GHG Emissions Reduction Potential



## Chapter 4 GHG Emissions Reductions from Co-Digestion

*Potential to reach up to 60% of landfill emissions reduction goal by 2030*

- Slightly more GHG reduction than composting
- Goal: 4 million MT CO<sub>2</sub>e/year reduction from landfills by 2030
- Diversion of food waste for co-digestion could reduce 1.6 to 2.4 million MT CO<sub>2</sub>e/year

26

26

## // GHG emission reduction factors (ERFs) for co-digestion follow CARB's 2017 draft methodology for compost ERFs

- Emissions
  - Process emissions, *e.g. additional digester heating*
  - Transport emissions, *similar to composting and landfill transport*
- Emission Reductions
  - Biosolids-related reductions, *e.g. decreased soil erosion from biosolids application*
  - Biogas-related reductions, *e.g. electricity generated onsite from biogas*
  - Avoidance of landfill emissions

Emission Reduction Factor (MT CO<sub>2</sub>e) = Emissions Reductions - Emissions

27

27

## // GHG emissions reduction from co-digestion of food waste could go a long way towards meeting the state's goals

Case	Wet Tons Diverted Food Waste/Year	Net Emissions Reductions Potential (MT CO <sub>2</sub> e)	
		Electricity Production	RNG Vehicle Fuel Production
Scenario 1	2,400,000	1,564,000	1,696,000
Scenario 2	3,400,000	2,210,000	2,397,000

*Diversion of food waste for co-digestion could reduce up to 2.4 million MT CO<sub>2</sub>e, 60% of the state's goal to reduce landfill emissions by 4 million MT CO<sub>2</sub>e by 2030.*

28

28



## Chapter 5 & 6

### Small, medium & large WWTPs

- *Central Marin Sanitation Agency – 10 mgd*
- *Manteca Wastewater Quality Control Facility – 9.9 mgd*
- *Delta Diablo – 19.5 mgd*
- *Silicon Valley Clean Water – 29 mgd*
- *East Bay Municipal Utility District – 120 mgd*
- *Sanitation Districts of Los Angeles County – 400 mgd*

29

- **State laws and regulations** drive change
- **Supportive partnerships** with waste management firms and utility providers
- **Board/community support**
- **Robust planning/feasibility studies**
- Financing assistance through **loans/grants**
- Revenue/cost offsets through **tipping fees and biogas** utilization

## *Common Factors Facilitating Co-Digestion*

30

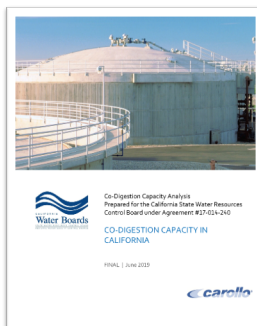
- **Regulatory hurdles** – effluent, air, solid waste
- **Insufficient planning/feasibility**
- **Inadequate funding** and uncertainty about revenue
- **Feedstock contamination**
- **Competition for organics diversion** through composting and impacts on tipping fees

## *Common Barriers Impeding Co-Digestion*

31

31

## // How State Water Boards are Facilitating Projects



**Every penny that  
a facility is not  
spending on energy  
is a penny for  
improvements on  
water quality.**

- Report
- Stakeholder engagement
- Interagency coordination



32

32

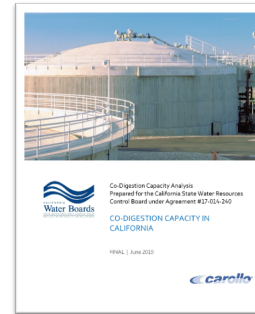


**Chris Hyun**  
Specialist

**Climate & Conservation Team**  
christopher.hyun@waterboards.ca.gov  
charlotte.ely@waterboards.ca.gov



**Charlotte Ely**  
Supervisor



Find the report at:  
[www.waterboards.ca.gov/water\\_issues/programs/climate](http://www.waterboards.ca.gov/water_issues/programs/climate)

