

Wastewater perspective on co-digestion opportunities and challenges



John Hake
Senior Civil Engineer, Resource Recovery Program

1 Resource Recovery (R2) Program

2 Food waste potential

3 Food waste experience at EBMUD

4 Impact of SB1383

5 Challenges and next steps

R2 = Trucked Waste



2001 **Septage**

First truckload received July 31, 2001



Today

All three R2 stations receive trucked waste:

- 24/7, 365 days per year
- 100-150 trucks per day
- Mostly liquid, limited solids acceptance

2004 **Solid-Liquid**



2014 **FOG/HSW**



FOG: Fats, Oils, and Grease

HSW: High-Strength Waste

Renewable Energy



SD-1 produces renewable electricity from up to 3 million cubic feet of biogas per day

Avoided cost (onsite)

\$2.5 Million/year savings

Surplus sales (export)

\$0.7 Million/year revenue

1985

Engines

3x2.2 MW



2013

Turbine

4.5 MW

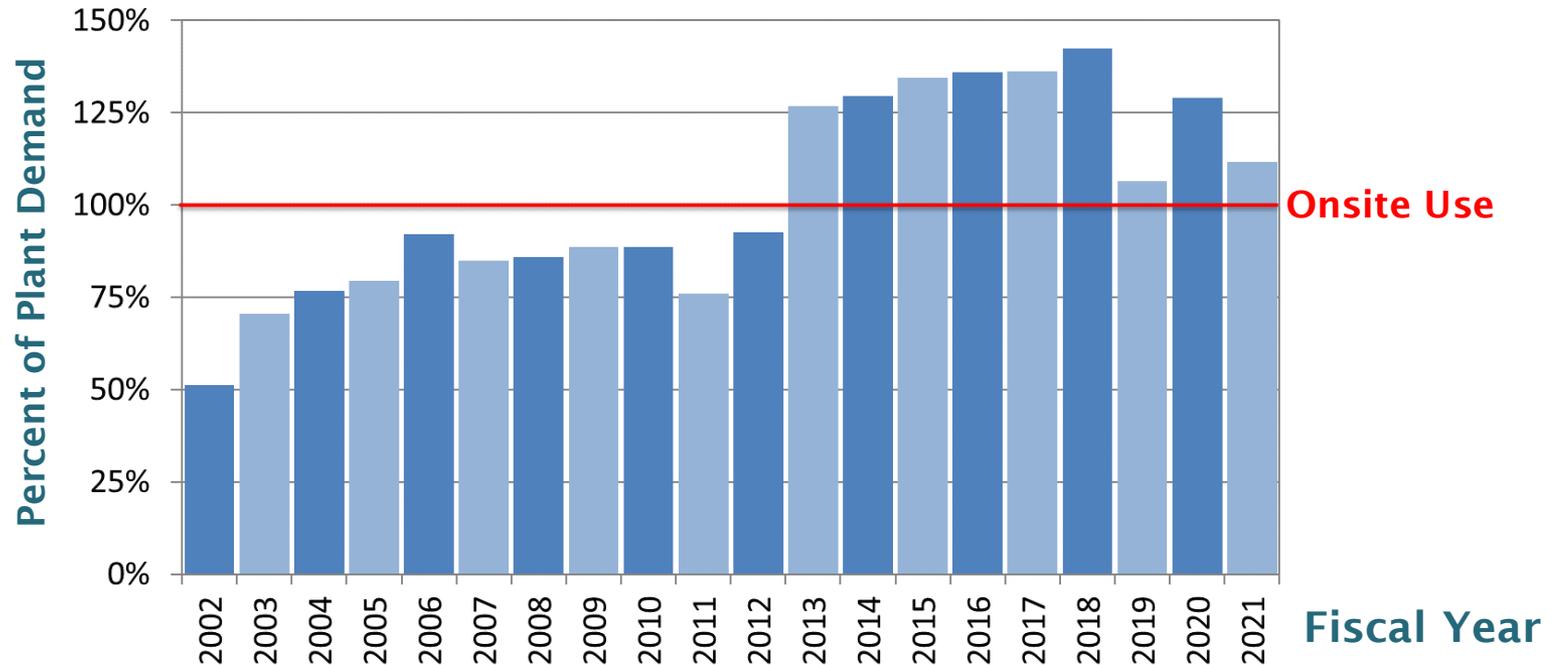


Energy Produced



Over 20 years, the R2 Program has:

- Generated 400,000 MWh of renewable electricity
- Reduced greenhouse gas emissions by 100,000 metric tons of carbon dioxide equivalent



Food Waste Potential

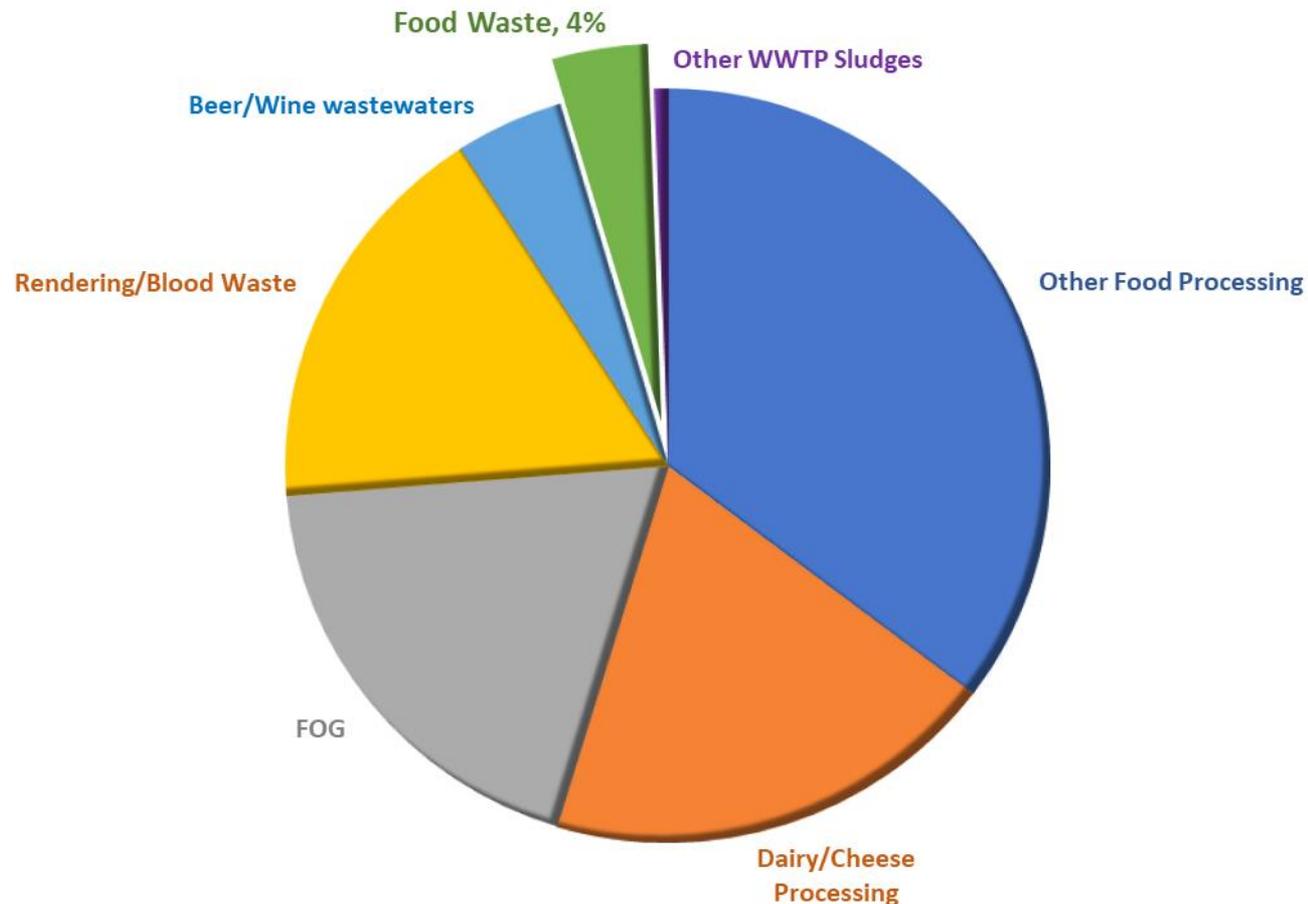


Food Waste Potential High Strength Waste Portfolio



FY 2021 High Strength Wastes

(by kg COD)



Food Waste Potential

Why Food Waste for our program?



- High energy content
- Locally available over long-term - sustainable
- Growth Potential -SB1383 mandates landfill diversion
- Lower in nitrogen than some other categories
- Solid food waste reduces trucking costs (vs liquids)



EBMUD Food Waste Experience



Food Waste Challenges

Types of Contamination

Metal:



Severe Problem
Breaks Equipment
Breaks Pumps

Can be removed offsite

Light Contamination (plastic):



Clogs Equipment
Doesn't Settle Out

Can be removed offsite

Heavy Contamination (grit):



Settles out, expensive to remove from tanks
Increases equipment wear and tear

Can be removed onsite

EBMUD Experience

Initial model - challenging



1. Source separated organics (SSO) on transfer station tip floor



2. Food waste after grinding

3. Off-loading at EBMUD



4. Contaminant removal at EBMUD

EBMUD Experience

Offsite contamination removal



EBMUD Experience Private Operators



- Waste generators include supermarkets and cafeterias
- Private contractor prepares a clean liquid food waste slurry – no special handling required on our end
- As Senate Bill 1383 takes effect in 2022 more of this activity is expected

EBMUD Experience

Lessons Learned



- Offsite contamination removal desired
- Liquids can be handled easily, but greater hauling costs
- WWTP may be able to cost effectively remove grit, EBMUD planning grit removal pilot
- EBMUD still actively exploring and is interested in a variety of approaches

Impact of SB1383



SB 1383
Reducing Short-Lived
Climate Pollutants in
California



Impact of SB1383

Positive Impact on Projects



Offsite Cleanup



New Technology



Private Partners creating liquids

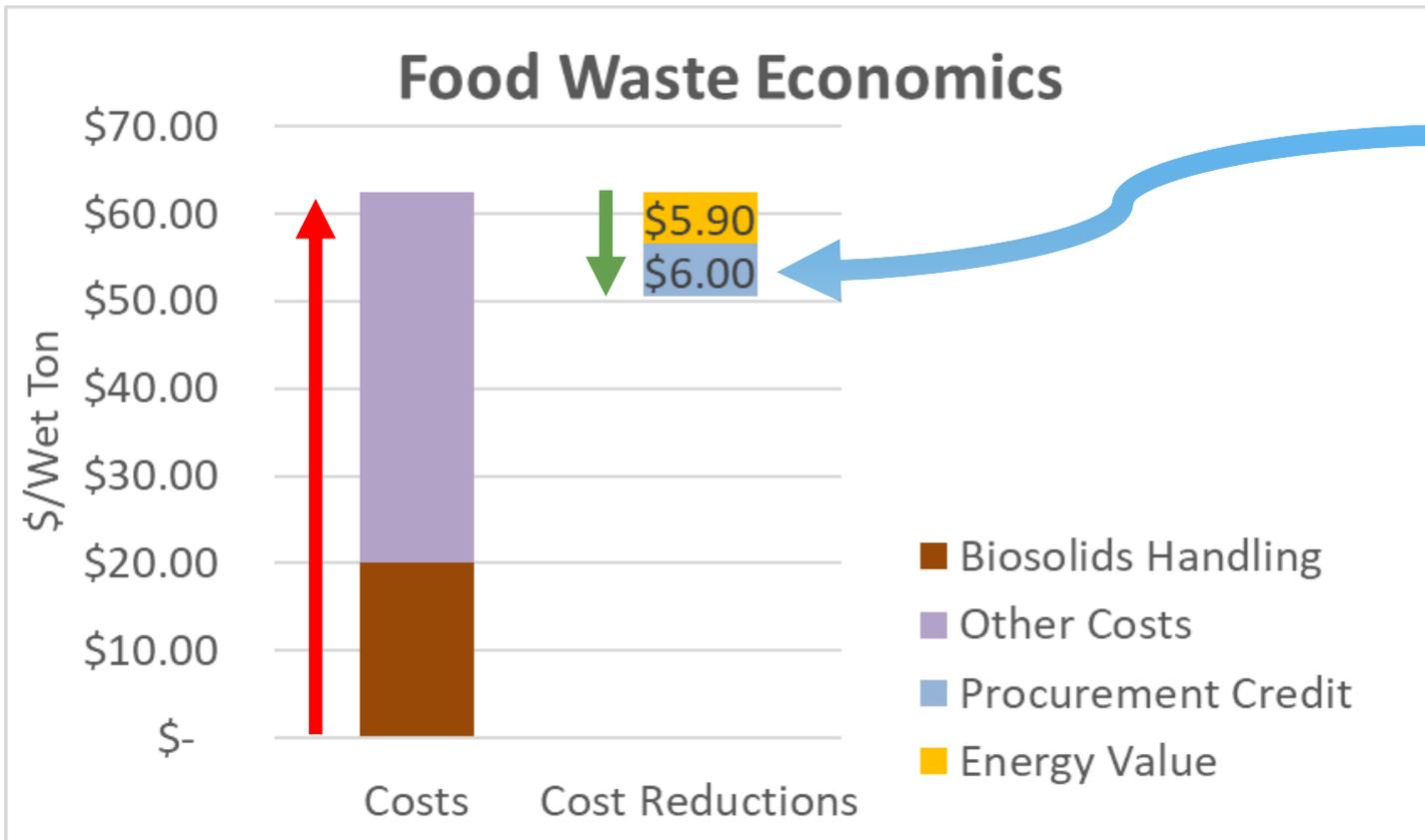


KEY TAKEAWAY

- 1 SB1383 is driving real projects and creating more interest in food waste.

Impact of SB1383

The procurement Credit



1 Ton of Procurement Credit (\$6 est.)

KEY TAKEAWAYS

- 1 The procurement credit is helpful but not game changing, and the scope is fairly limited (must come from a transfer station).

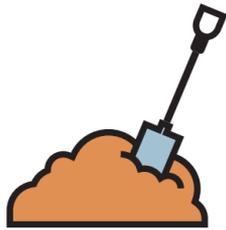
Biosolids Management: Changing Economics



SB1383 impact on End Uses of Biosolids



Farms

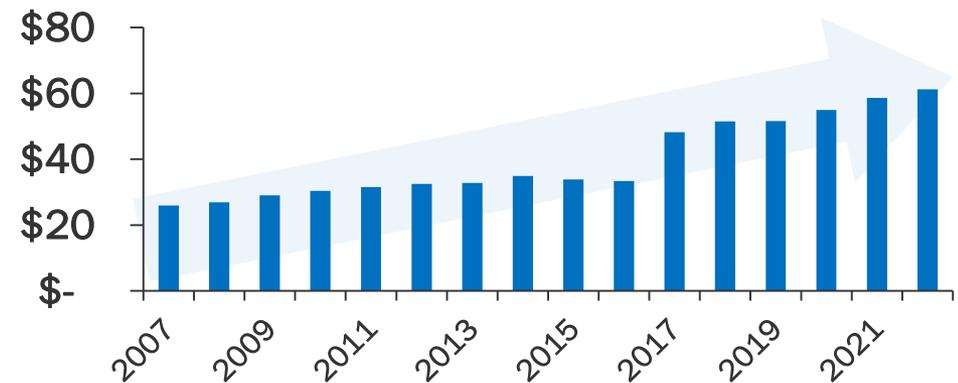


Compost



Landfill

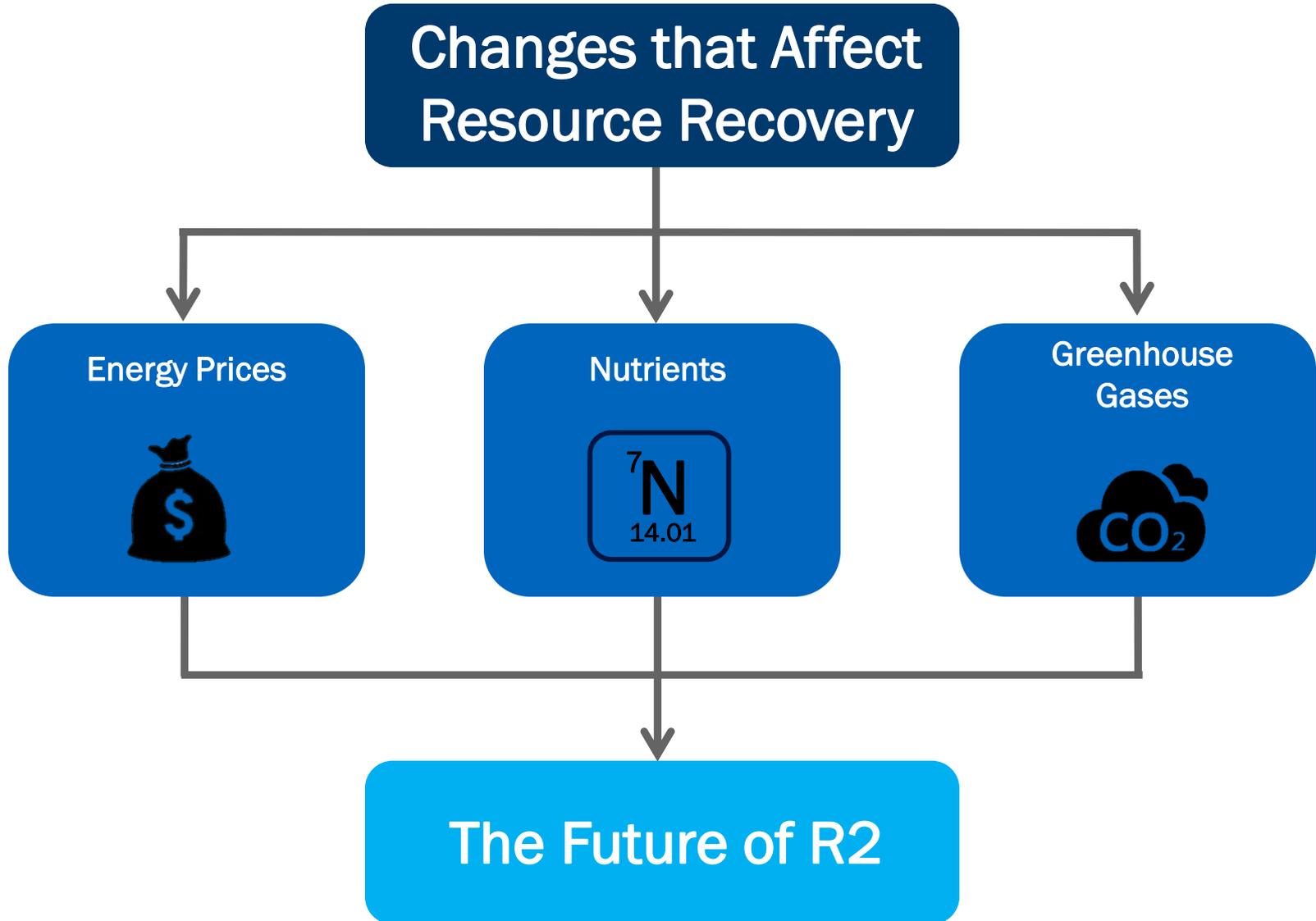
Average Cost per Wet Ton



KEY TAKEAWAY

- 1 However, Senate Bill 1383 limits end uses for biosolids, a major cost for treating food waste. Handling costs have already begun increasing and will continue to rise.

Co-Digestion Challenges



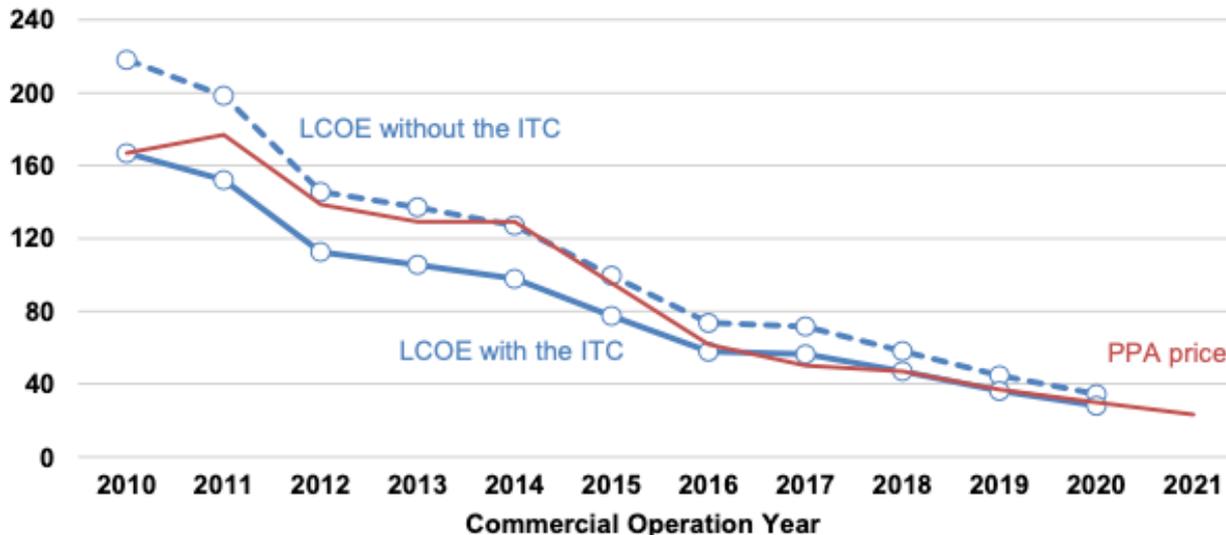
Co-digestion Challenges

Energy Value



- Displacing power bought is generally most valuable (avoiding retail price)
- Selling power wholesale after you exceed plant demand lower value
 - Some options like BioMAT, but EBMUD too big

Generation-Weighted Average LCOE and Levelized PPA Price (2020 \$/MWh)



Source: Lawrence Berkeley National Laboratory
Utility-Scale Solar, 2021 Edition *Mark Bolinger, Joachim Seel, Cody Warner, and Dana Robson*

Co-Digestion Challenges

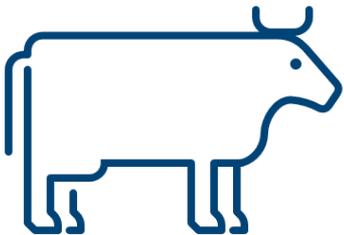
Why not RNG?



An RNG project is technically feasible (gas main with capacity adjacent to MWWTP site)



EBMUD concerned about regulatory challenges due to CalARP and OSHA PSM



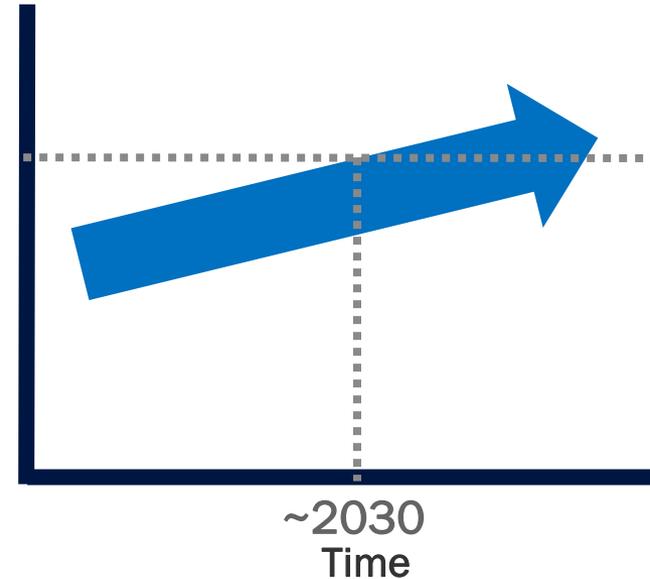
EBMUD concerned about competing in the LCFS market with all the dairy projects coming online

Co-digestion Challenges

Potential Nutrient Load Cap



Nitrogen
In EBMUD Wastewater Discharged
to San Francisco Bay



KEY TAKEAWAYS

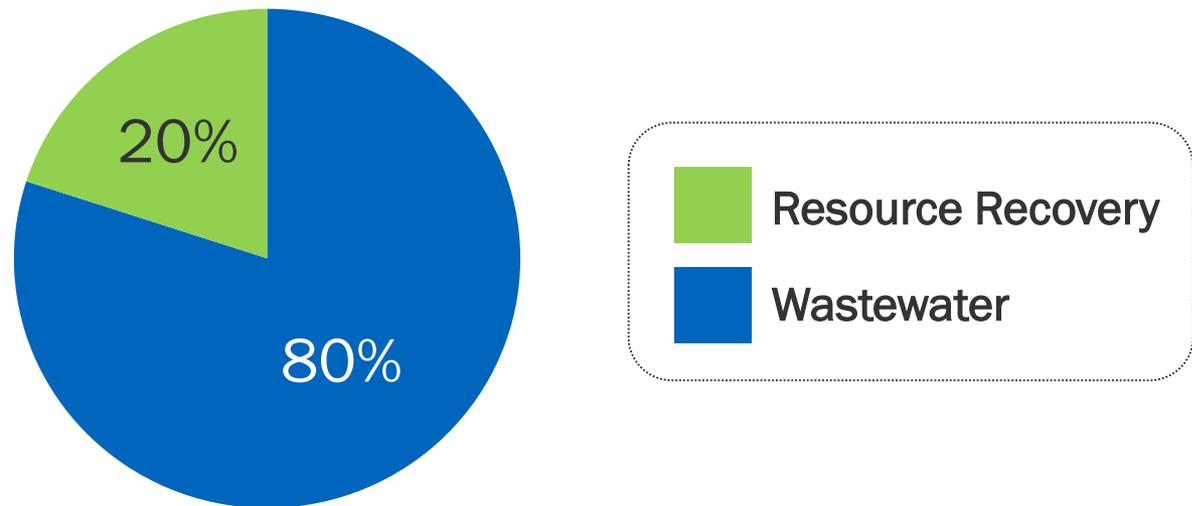
- 1** A load cap will likely be issued in the next Watershed Permit (2030).

Co-Digestion Challenges

R2 Nutrient Loadings



Nitrogen in EBMUD
Treated Wastewater

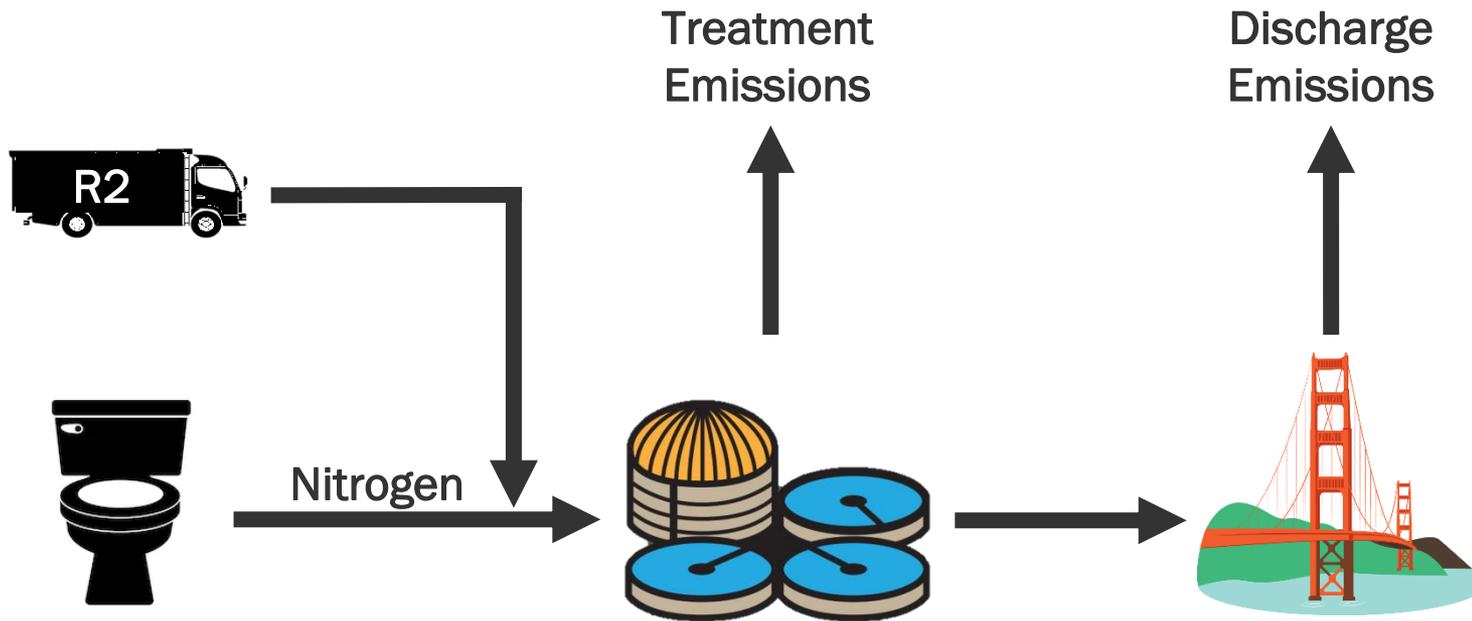


KEY TAKEAWAYS

- 1** About 20% of the Nitrogen in the MWWTP effluent comes from R2.
- 2** The load cap may force R2 to shift towards organics that are lower in nitrogen.

Co-Digestion Challenges

GHG Emissions



KEY TAKEAWAY

- 1 Some R2 wastes contain nitrogen, which increases treatment and discharge emissions. May make it challenging to meet internal GHG reduction goals.

Next Steps



Continue to explore and expand food waste partnerships



Maximize value of biogas



Align R2 growth strategy with other priorities—especially Nutrients—and changing energy markets



Questions?

Contact info:

John Hake

East Bay Municipal Utility District

John.hake@ebmud.com

www.ebmud.com