



Central Marin Sanitation Agency

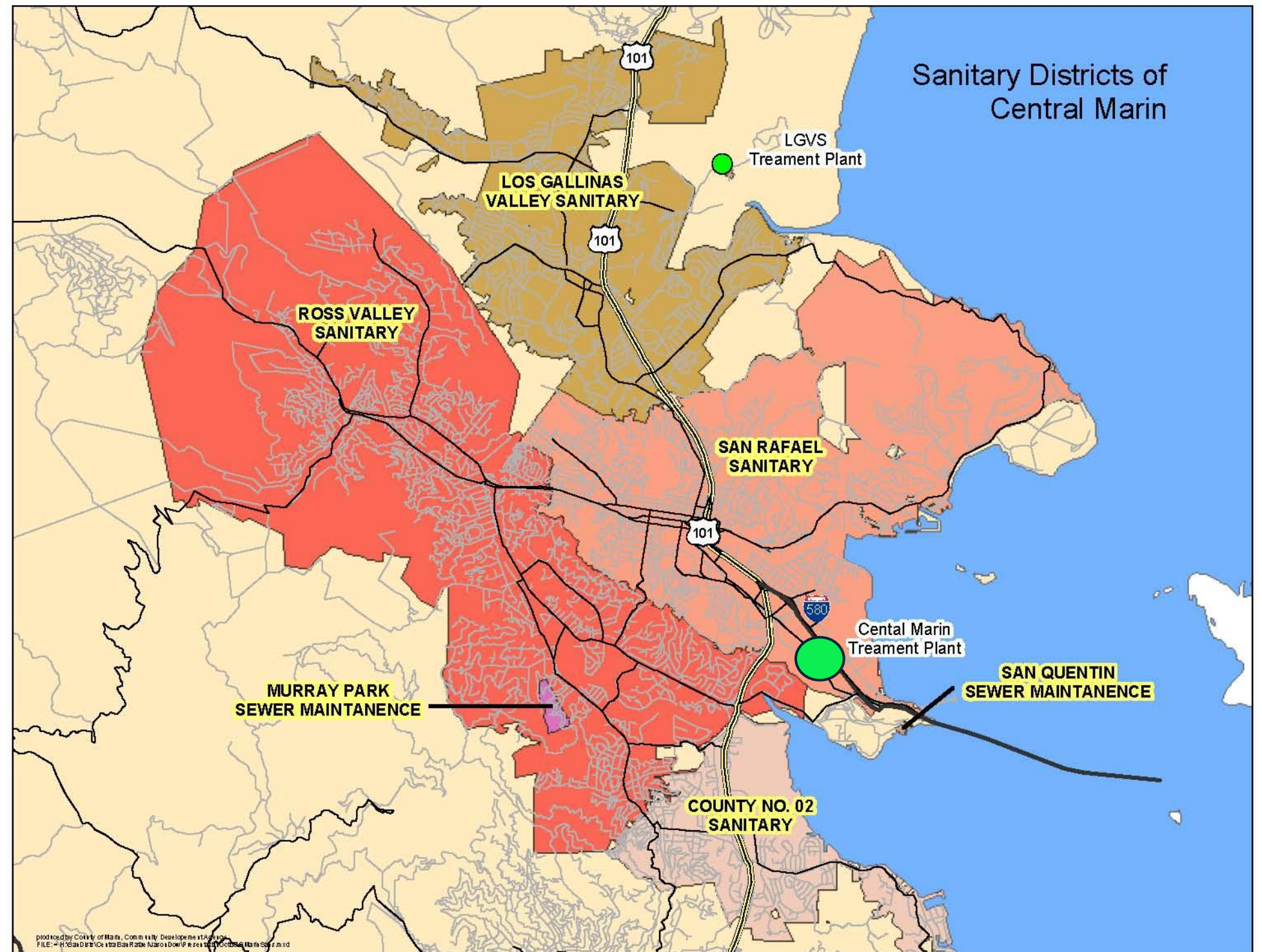
Achieving Energy Positive Wastewater Treatment while Tackling SB1383 Climate Goals: 15 Year Journey

Sept 2025 BACWA O&M Committee

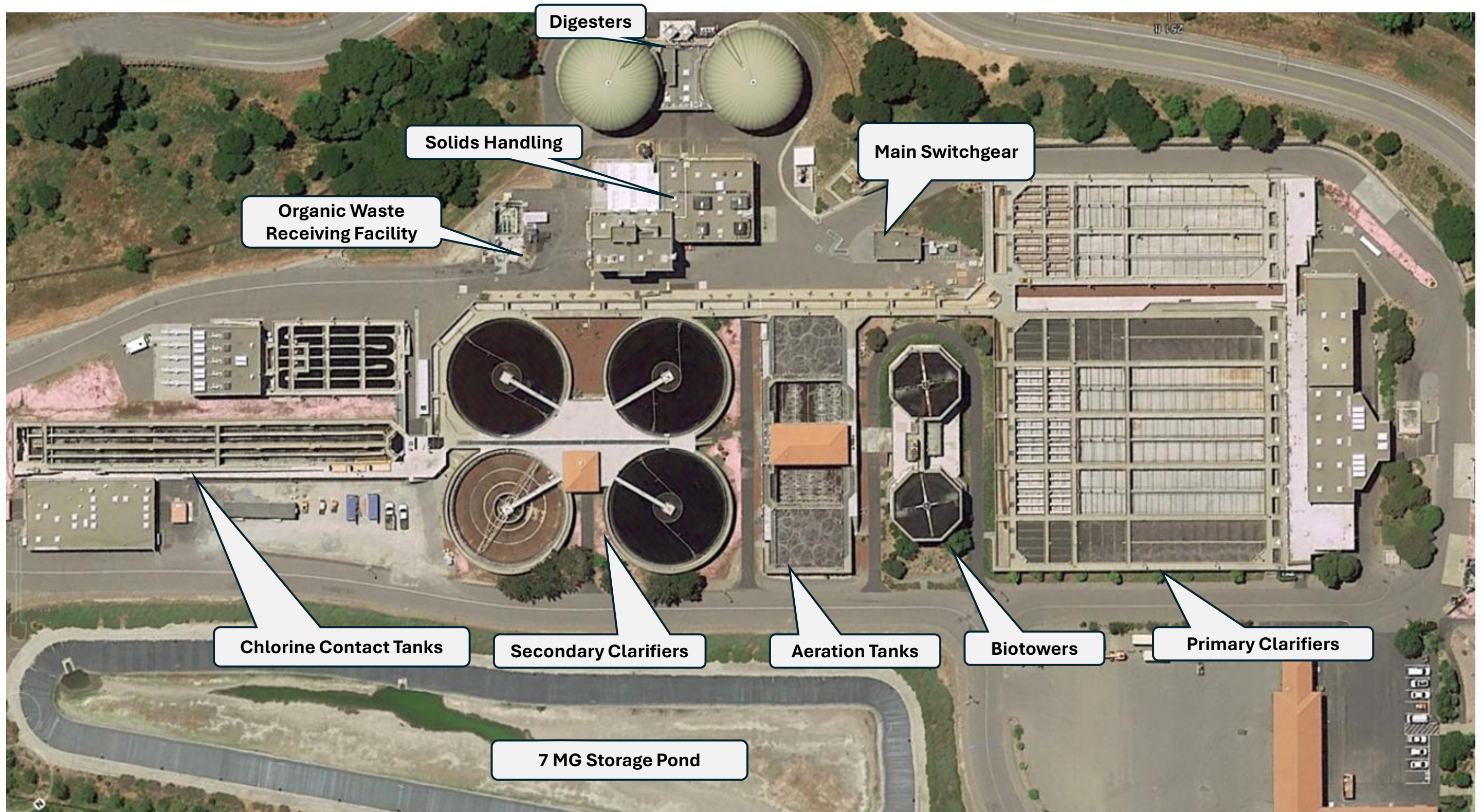




- Regional Wastewater Agency
- Ross Valley SD, San Rafael SD, Sanitary District No. 2, and San Quentin Prison & Village.
- Service Area: 105,000 people
- Activated Sludge Plant, Secondary Treatment
- Dry Weather Rated Flow:
10 MGD
- Wet Weather Rated Flow
30 MGD
- Peak: 150 MGD



Existing Treatment Plant



Highlights



Jan 2025

Power Made from Biogas
525,244 kWh

Power Used
454,753 kWh

Energy Neutrality

116%

2024

Power Made from Biogas
5,397,594 kWh

Power Used
5,251,653 kWh

Energy Neutrality

103%

Tons of Food Waste

16,000+

Diverted from Landfills since program
inception

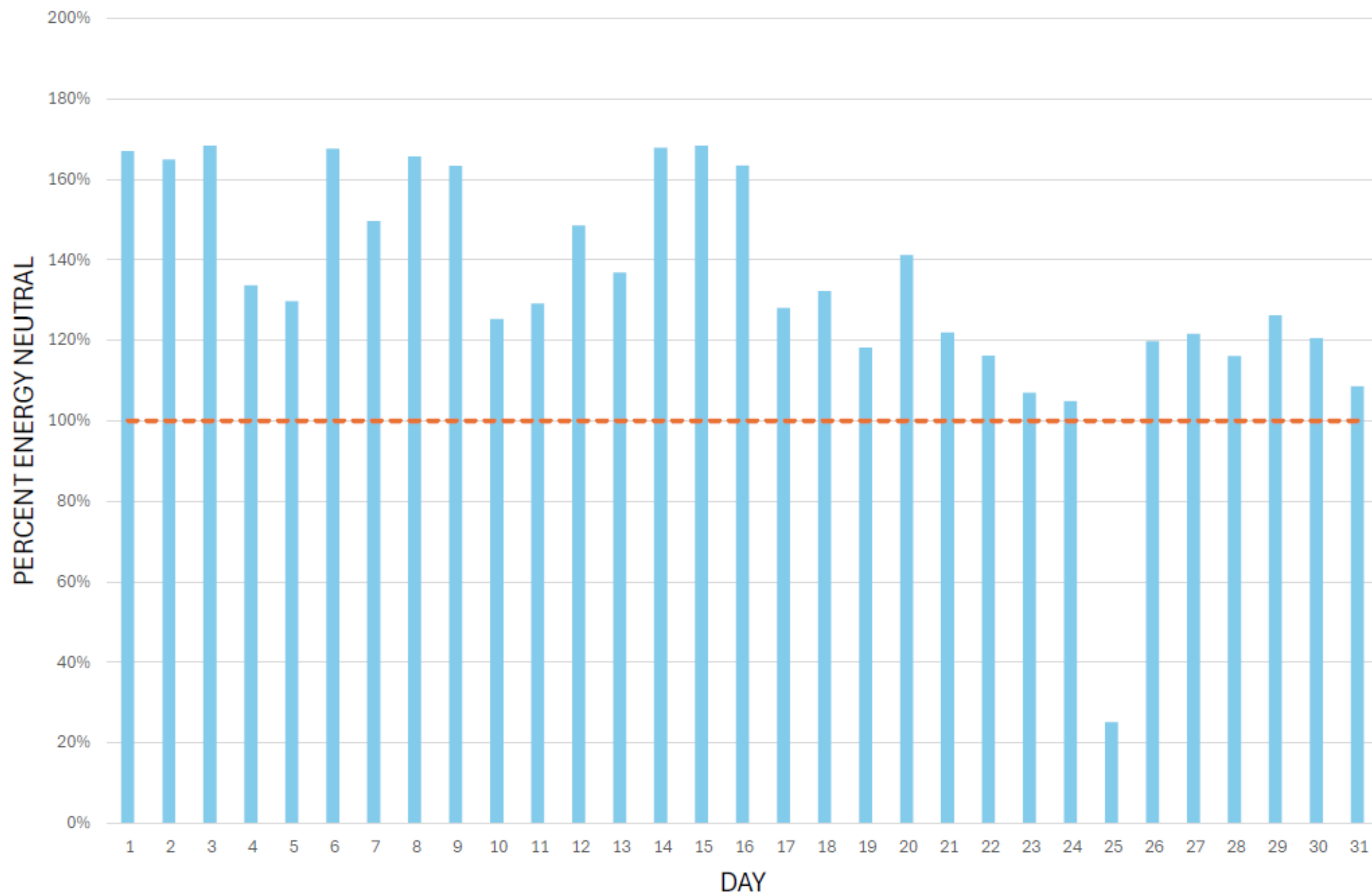
Gallons of FOG

25 million+

Delivered since program inception

AUGUST 2025 CMSA RENEWABLE POWER SUMMARY

134% ENERGY NEUTRAL



Program Benefits

Annual electricity and natural gas savings
>\$1.5 million

Tipping fees and MCE revenues 2024
\$268,911

CalRecycle Grant Funding
\$2.5 million

Renewable electricity production 2024
5,397,594 kWh/hr

Cogeneration system uptime 2024
98%



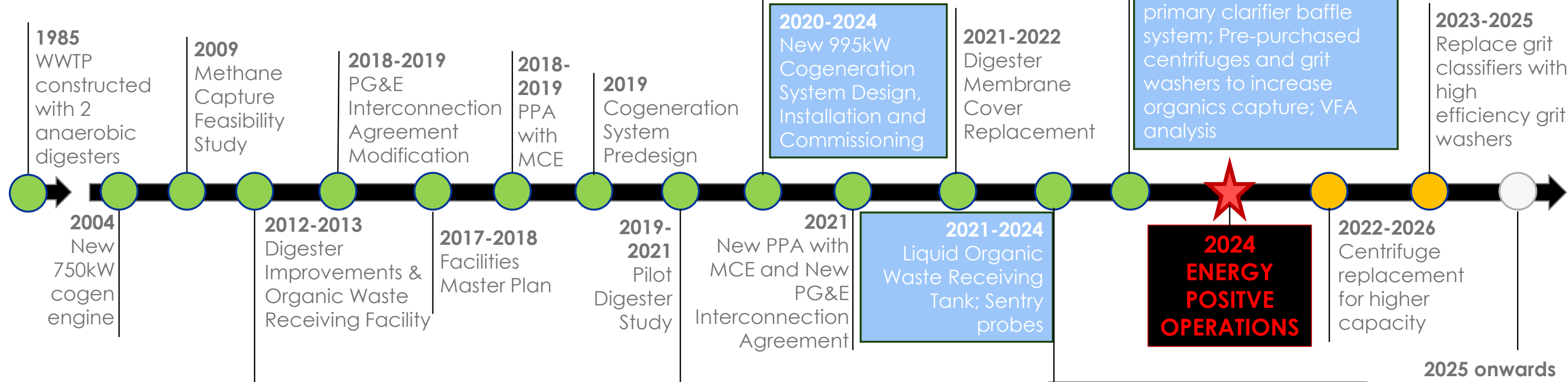
Timeline of Becoming Energy Positive

Completed

In Progress

Planned

2024 Completed Projects



Cogeneration System Installation Project (2019-2024)

Unique Project Elements

- **First project in Bay Area** with stringent **Air Quality** emissions limits
- **First wastewater cogeneration project in PG&E territory** permitted for use as a backup power system
- **Increased resiliency & cost savings** during power outages
- **\$1.7 million IRS Tax Credit**

New 995kW
cogeneration
engine

Liquid Organic Waste Receiving & Biogas Treatment Upgrades Project (2021-2024)

New 15,000-gallon tank

New pressure washer

New mixing pump

New organics screening system

Total Project Cost: \$3 million
Project funding: CalRecycle \$2.5 million

CalRecycle 

Biogas Treatment Upgrades

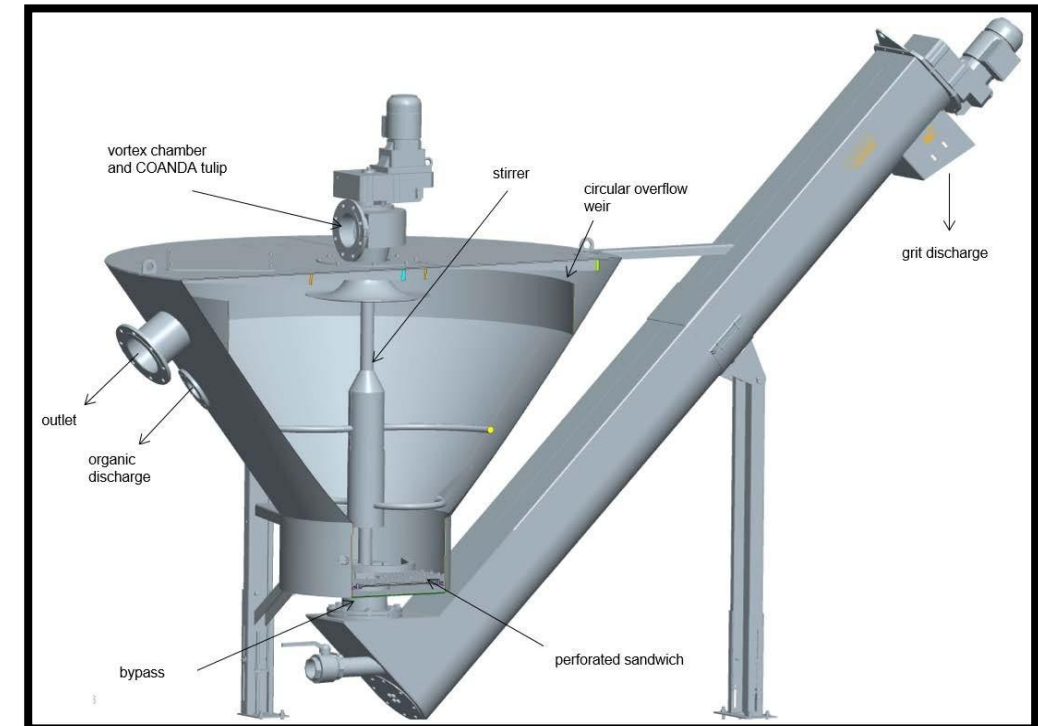
New Heat Exchanger

Increased system redundancy and reliability

New Chillers

Higher Organics Capture → More Biogas

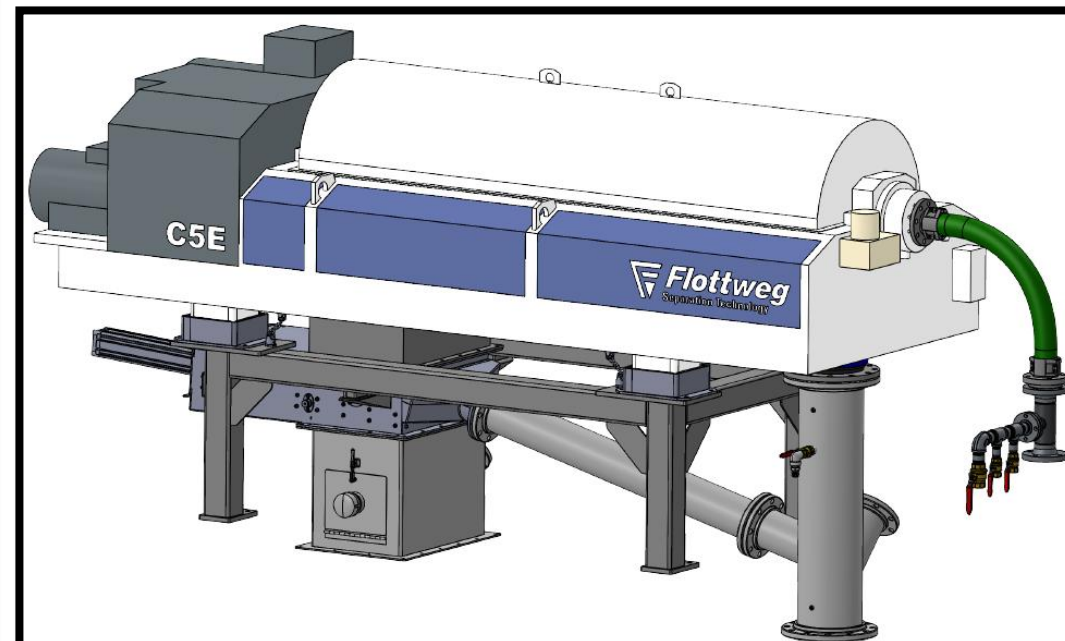
- New high efficiency centrifuges
- New high efficiency grit washers
- New flow optimization baffles in primary clarifier
- Innovative real-time biological sensors to monitor digester health and support increased organic loading



Grit Washers Recover Organics



Flow Optimization Baffles Increase Organics Capture



High Efficiency Centrifuges Save Power and Allow CMSA to accept more Food Waste



Sentry probes installed at digester recirculation pumps

Food Waste Agreements

- Augmented public-private partnerships
- Continued partnership with Marin Sanitary Service with updated agreement (2022 – present) and increased food de-packaging waste quantities
- Developed new food waste agreements with:
 - Republic Services (2022 – present)
 - Sustainable Organic Solutions LLC (2024)



Food waste delivery from Marin Sanitary Service



REPUBLIC
SERVICES



Tested food waste delivery from Republic Services using widened floor hatch in May 2024



FOG delivery from SRC (left), and food slurry delivery in September 2024

Challenges Overcome



Overheated Emissions Treatment System



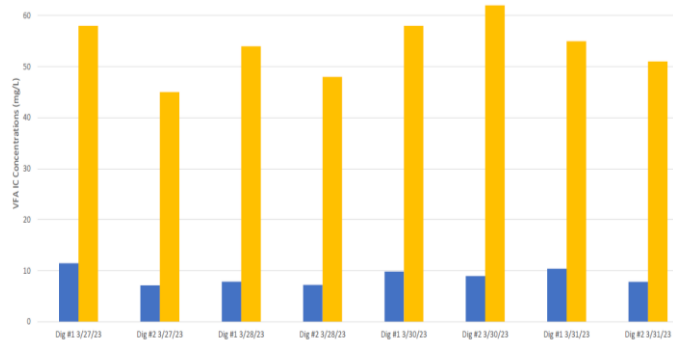
Increased Engine Emissions Testing Complexity



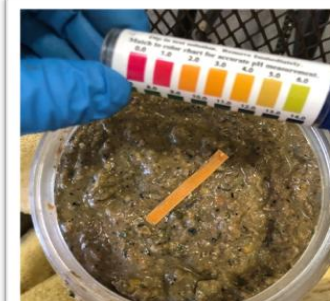
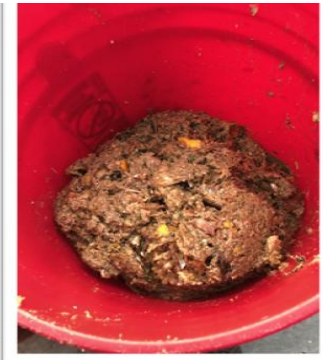
Digester Membrane Replacement

Industry Innovations

- Pilot Study
- SENTRY™ real-time probe
- VFA methods study
- Organic loading rates



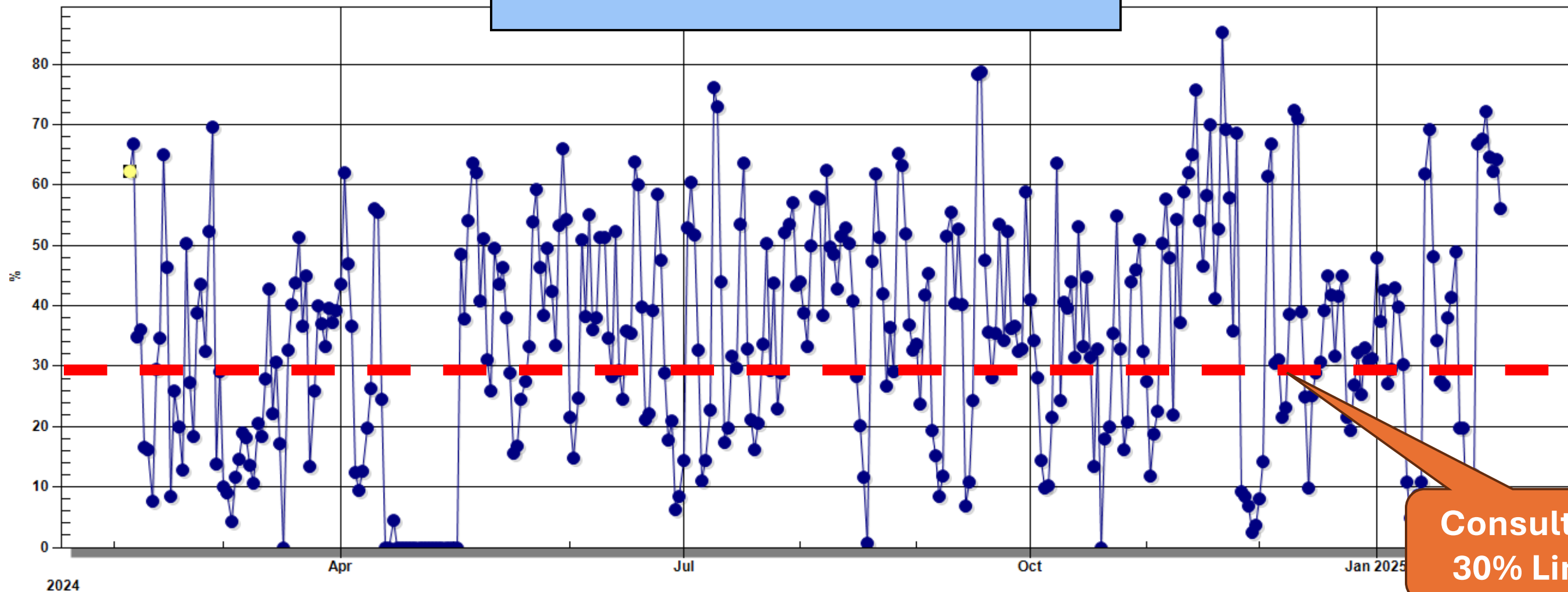
Differences in Acetic Acid concentrations between IC method (blue) and the traditional distilled method (yellow)



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1/29/2025 8:48, 8.145

Full Scale Organic Loading Rate



Consultant
30% Limit

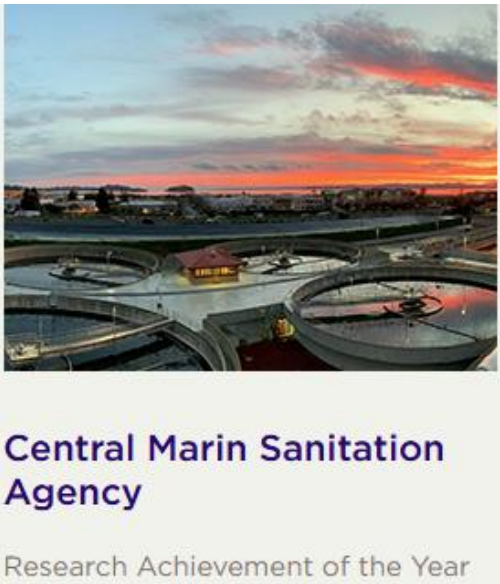
Awards and Knowledge Sharing



Publications



Awards



Presentations



CWEA, CASA, WEFTEC, HWEA, CA Bioenergy



Tours



CENTRAL MARIN SANITATION AGENCY



Business Plan

Fiscal Year 2024 – 2025

Board Approved 7/9/2024

Alignment with Agency Goals

MISSION

MISSION

WHAT THE AGENCY DOES

Central Marin Sanitation Agency protects the environment and public health and is integral to the community by providing wastewater, environmental, and resource recovery services.

VISION

VISION

WHERE THE AGENCY WANTS TO BE IN THE FUTURE

Central Marin Sanitation Agency will be a forward-thinking organization by providing innovative and effective wastewater services, capturing and utilizing renewable resources, and implementing sustainable solutions for an enhanced quality of life.

VALUES

VALUES

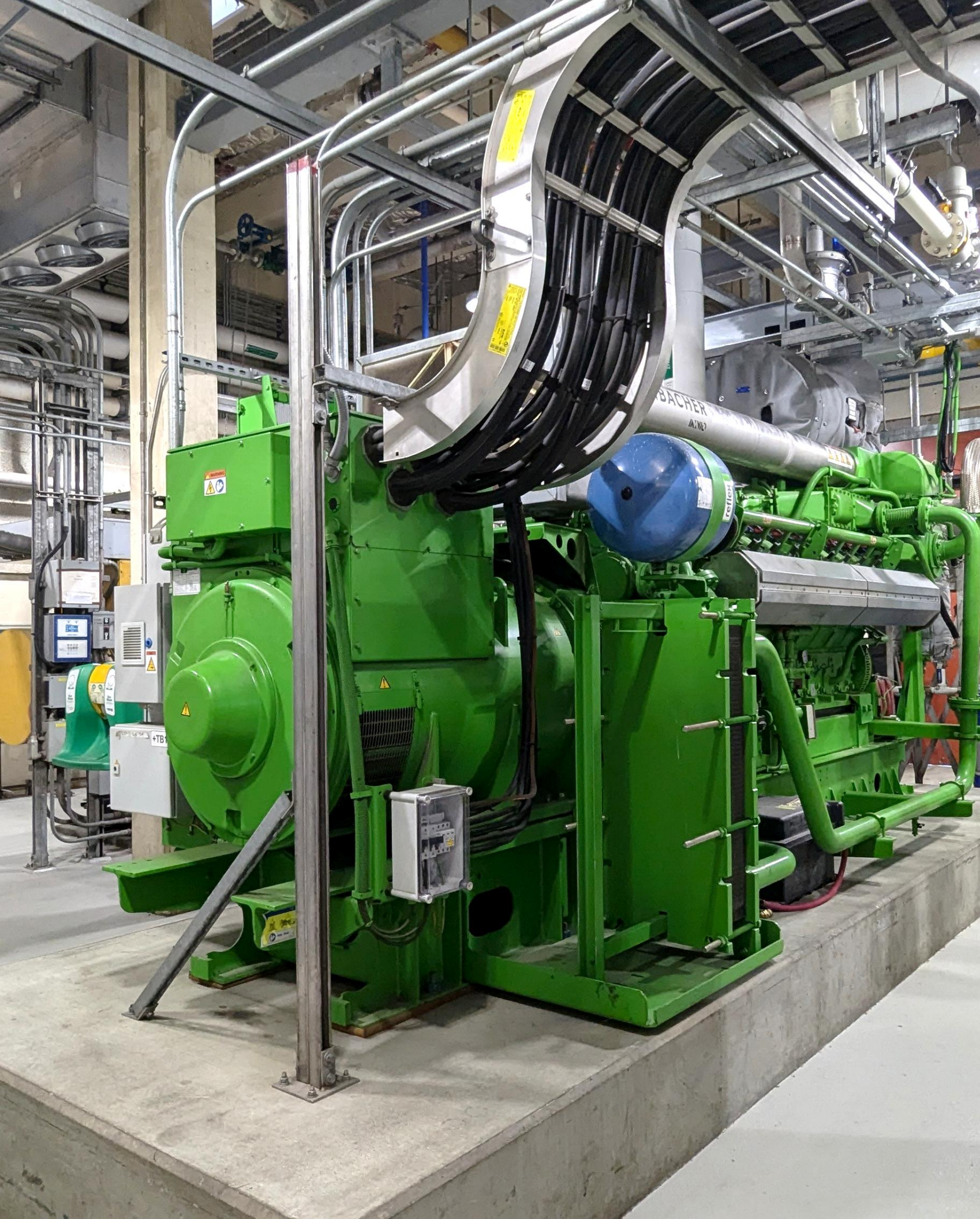
KEY STATEMENTS THAT DESCRIBE THE IDEALS OF THE AGENCY

CMSA values...

- Continuous regulatory compliance to protect the environment.
- Sound financial practices.
- Effective asset management.
- A safe and healthy workplace.
- Creating job satisfaction within a diverse workforce.
- Engaging public outreach and educational programs.
- Leadership, partnerships, teamwork, and collaboration.

Next Steps





C
M
S
A

Phase 1 – Use All Existing Engine Capacity

Bring in more organics

Increase biogas production consistency

Current

Energy Neutrality

<120%



Potential*

Energy Neutrality

~150%

Phase 2 – Use All Digester Capacity

Questions to be answered:

Parallel cogeneration?

Renewable natural gas (RNG) production?

Additional receiving facilities?

Potential*

Energy Neutrality

~250%

* Based on today's facility power demand, which would increase under nutrient removal.

2024 Total

Energy Neutrality

103%

2025 YTD

Energy Neutrality

112%

2026 Goal

Energy Neutrality

150%

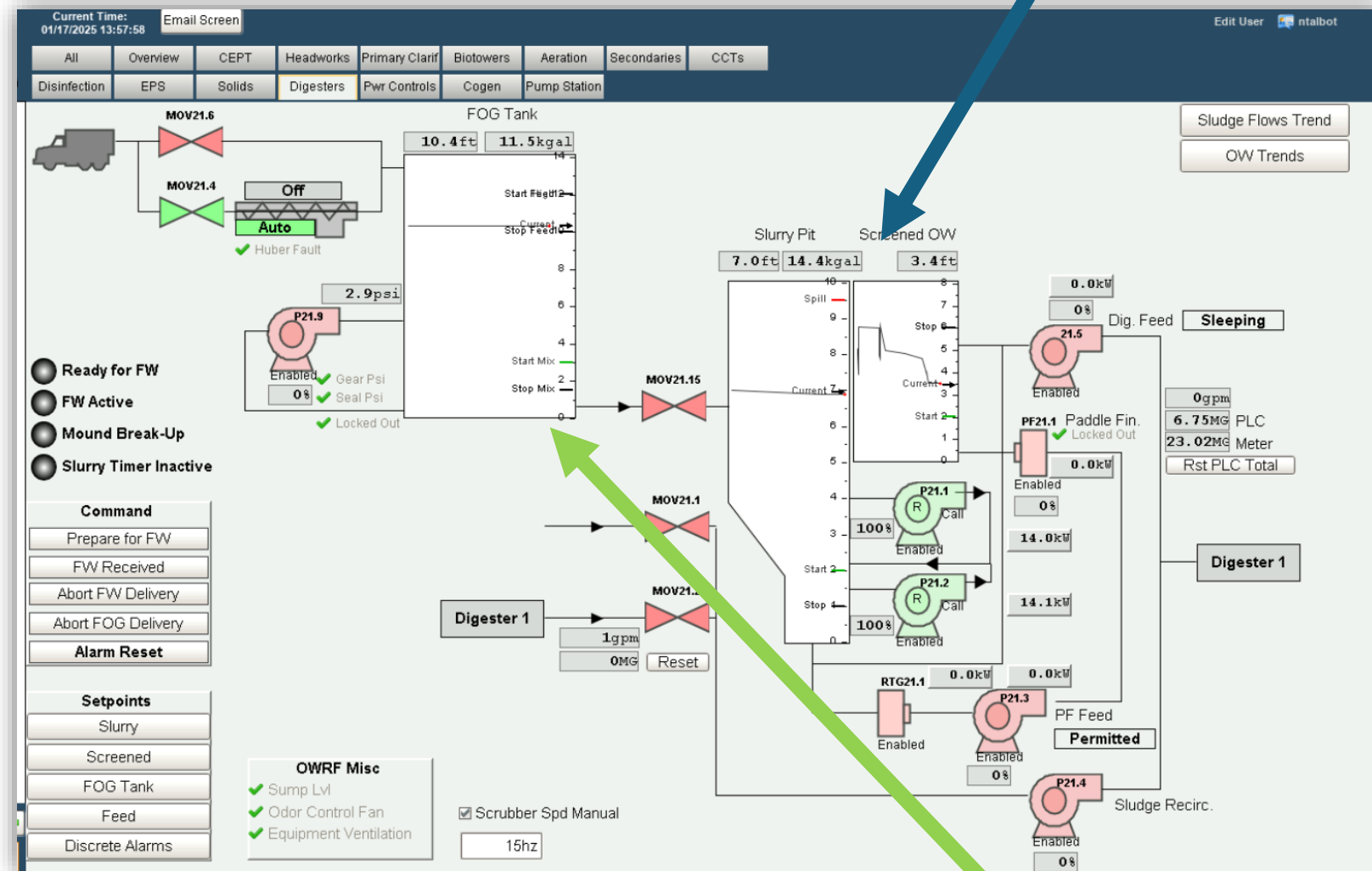
Evaluating Nutrient-Energy Nexus



Optimizing Feedstock Receiving



Below Ground Tank

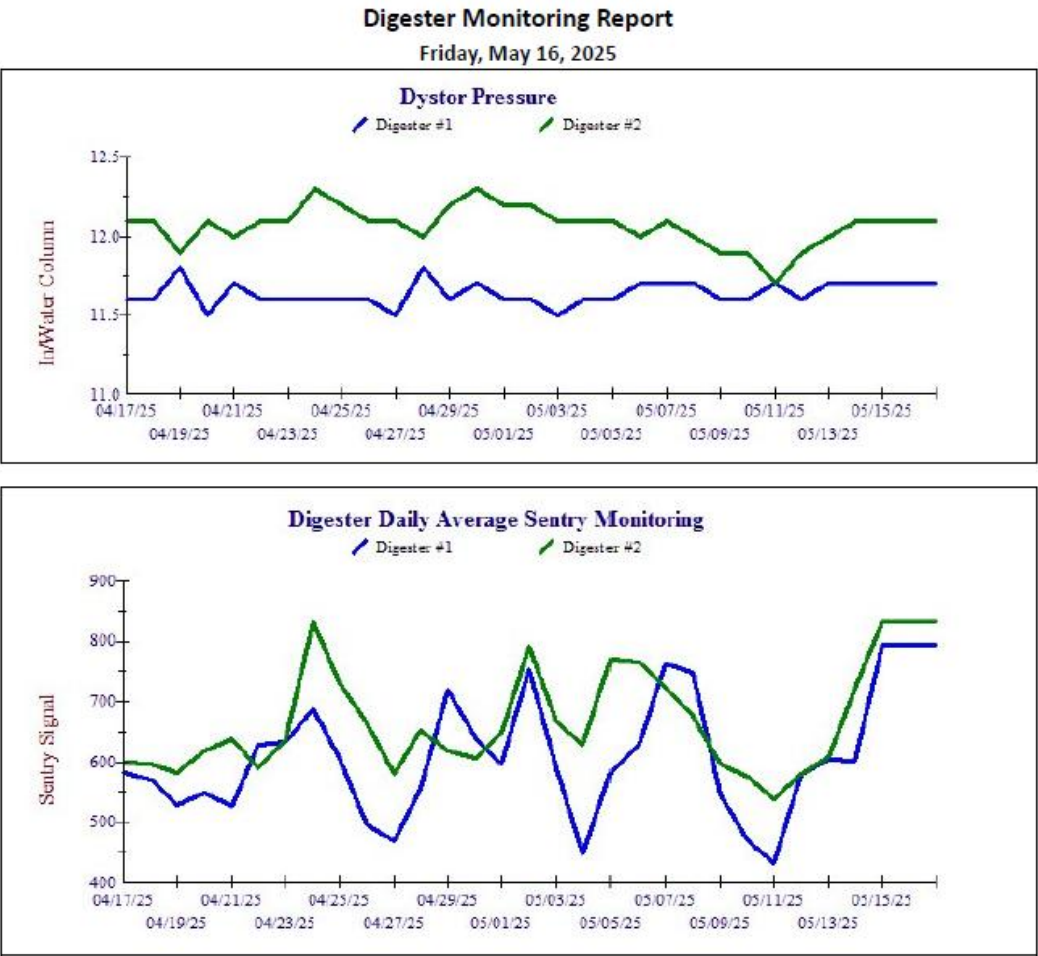
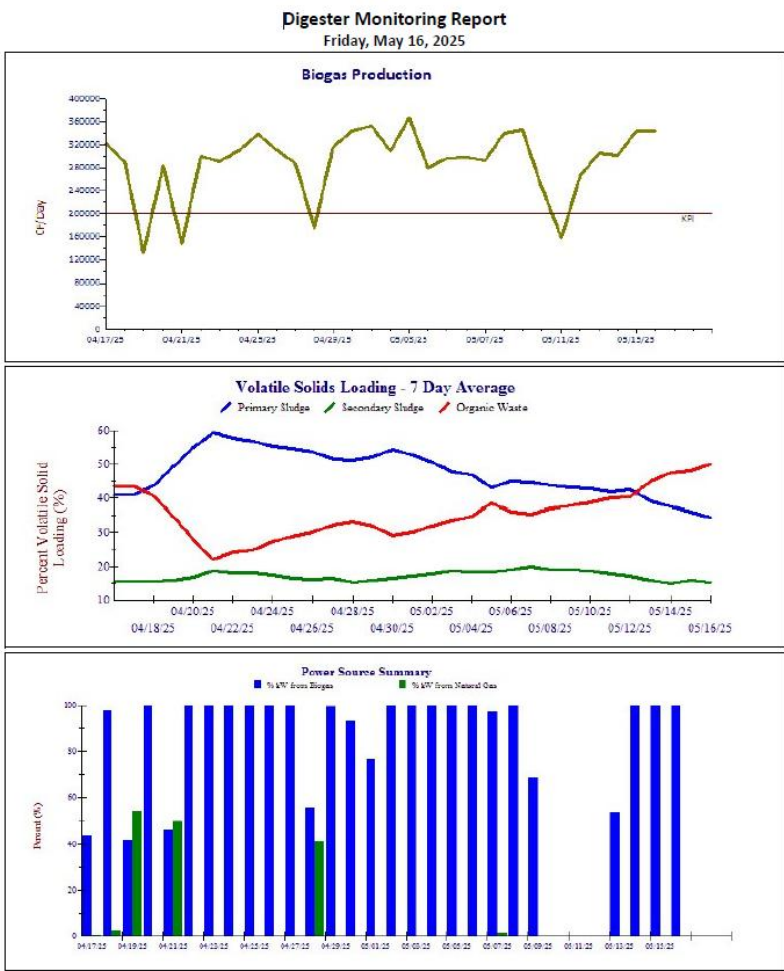


Above Ground Tank



Phase 1 – Maximize Existing Infrastructure

Operational Considerations



Friday, May 16, 2025

Volume				
Sludge Type	30-Day Average	7-Day Average	Last	Unit
Primary Sludge	26,366	25,045	16,827	gal
TWAS	8,964	8,474	10,393	gal
FOG	16,603	18,140	11,600	gal
Food	20.5	16.7	22.8	tons
Volatile Solids Loading				
Sludge Type	30-Day Average	7-Day Average	Last	Unit
Primary VS Loading	47.5	34.5	24.2	% VS by Weight
TWAS VS Loading	17.3	15.3	17.3	% VS by Weight
External Organic Loading	35.1	50.1	58.5	% VS by Weight
Hydrogen Sulfide				
Sludge Type	30-Day Average	7-Day Average	Last	Unit
Raw Biogas to Scrubbers	79.0	76	79.2	ppm
Scrubber #1 Exit	11.3	10	13.0	ppm
Scrubber #2 Exit	1.3	1	1.0	ppm
At Boiler Room to Engines	0.0	0.0	0.0	ppm
Digester Health				
Metric	30-Day Average	7-Day Average	Last	Unit
Acetic Acid	2.9	3.4	3.0	mg/L
Alkalinity	5,241	5,233	5,235	mg/L
pH	7.3	7.3	7.3	SU
Total Solids	2.0	2.1	2.1	%
Volatile Solids	72	72.2	73	%
Volatile Solids Reduction	75.2	71.6	74.7	%
VSLR	0.18	0.21	0.20	
Detention Time	40	42.7	39	days
Dig #1 Sentry Reading	588	603.5	783	
Dig #2 Sentry Reading	657	658.0	832	
Biogas Information				
Metric	30-Day Average	7-Day Average	Last	Unit
Biogas Production	287,914	294,121	344,340	cf/day
Total (BioG + NG)	16,647	16,143	18,824	Kwhrs/day
Biogas	15,272	11,140	18,824	Kwhrs/day
Natural Gas	3,228	1,426	259	Kwhrs/day
Utility Export	2,554	2,061	4,672	Kwhrs/day
Import	413	333	5	Kwhrs/day
Siloxanes				
Metric	Annual Average	Annual Maximum	Last	Unit
Pre Media	813.9	1,218.4	1,128.3	ppb
Mid Filter	454.1	871.2	871.2	ppb
Post Media	34.3	102.9	102.9	ppb
POCs				
Metric	Annual Average	Annual Maximum	Last	Unit
OWRF Scrubber	46.5	93.0	0.0	ppm
Jenbacher MMBTU				
Metric	30-Day Average	7-Day Average	Last	Unit
77,701 12 Month Rolling	66,200	65,249	67,004	MMBTU
Waukesha MMBTU				
Metric	30-Day Average	7-Day Average	Last	Unit
84,184 12 Month Rolling	10,467	8,818	11,532	MMBTU

KPI	
MIN	MAX
	100.0
	20
	8.0
	8.0
KPI	
MIN	MAX
2.0	12.0
4,300	7,000
6.8	7.3
1.7	2.8
65	75
55	90
15	
	750
	750
KPI	
MIN	MAX
	500
	0
	18
	77,000
	83,500

Daily Performance Tracking

Questions?

