



CENTRAL MARIN SANITATION AGENCY'S ORGANIC WASTE AND POWER DELIVERY PROGRAMs



CALIFORNIA BIORESOURCES ALLIANCE SYMPOSIUM

NOVEMBER 9, 2022

PRESENTATION OUTLINE



- ▶ About CMSA and its Organic Waste Program
- ▶ Food to Energy Program with Marin Sanitary Service
- ▶ Organic Waste Program Benefits and Metrics
- ▶ Renewable Power Generation and Delivery
- ▶ What's Next



About CMSA and its Organic Waste Program

Central Marin Sanitation Agency - CMSA

- ▶ Regional Wastewater Agency in San Rafael, Marin County
- ▶ Serves about 110,000 people and San Quentin State Prison
- ▶ Joint Powers Agency (JPA) with four satellite collection agencies
- ▶ Wide range of influent flows: 8 MGD (ADWF) to 129 MGD (PWWF)
- ▶ Contract services:
 - ▶ Collection system O&M for two agencies
 - ▶ Pump station O&M for SQ prison
 - ▶ Source control for seven local agencies



Organic Waste to Energy



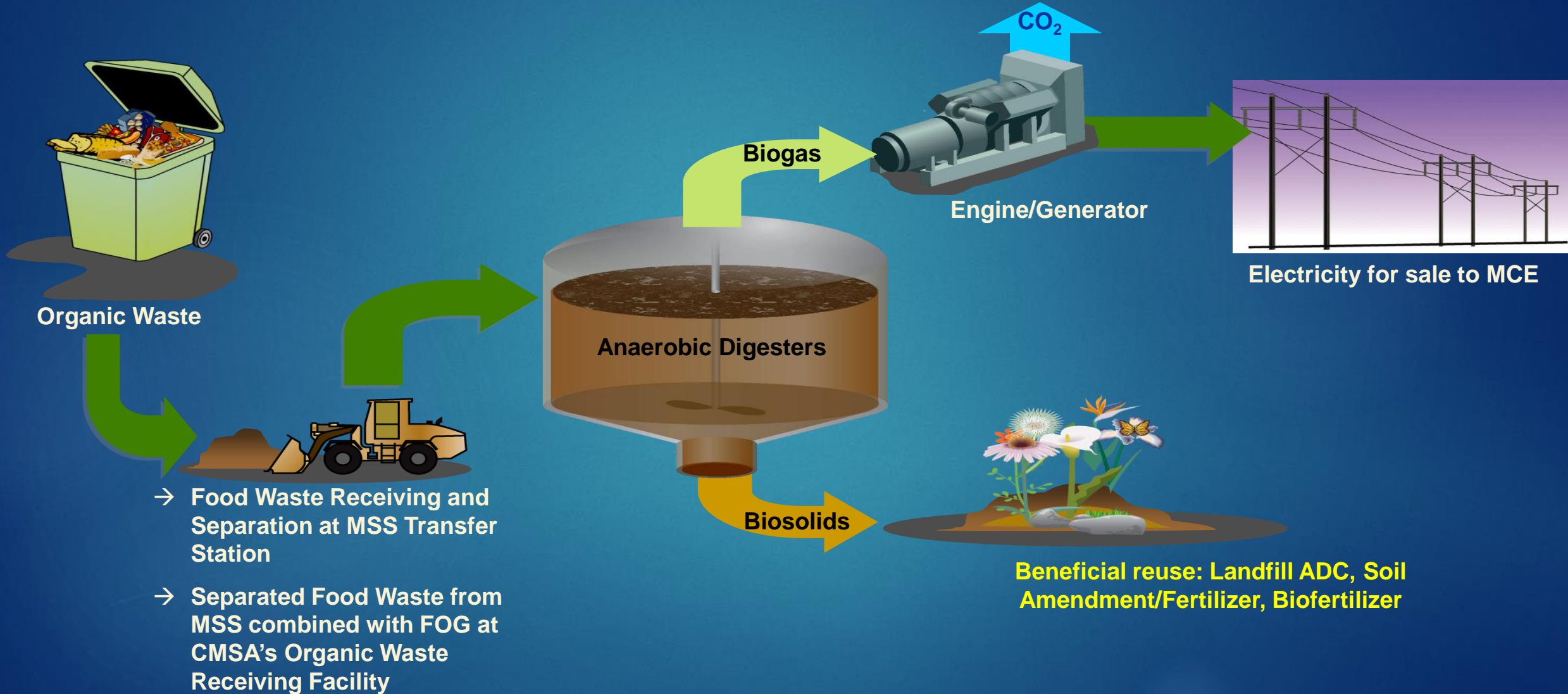
Organic Waste - food and grease

Process:
Anaerobic digestion



Biogas (methane)

Organic Waste to Energy



First FOG Load – November 2013



First Food Waste Load – January 2014



Food To Energy Program

Public-Private Partnership



Marin Sanitary Service
CONSERVATION – OUR EARTH, OUR MISSION, OUR JOB



Central Marin Sanitation Agency

Marin Sanitary Program Details

Focus on Contamination Removal

► Customer Enrollment

- Pre-consumer commercial food waste is collected and then transported to the MSS transfer station for processing to remove contamination and then delivered to CMSA
- 218 commercial food waste producers participate
 - Expansion planned to assist local jurisdiction comply with SB 1383.
- Program outreach
 - Kitchen staff training
 - Frequent monitoring
 - Retraining as-needed

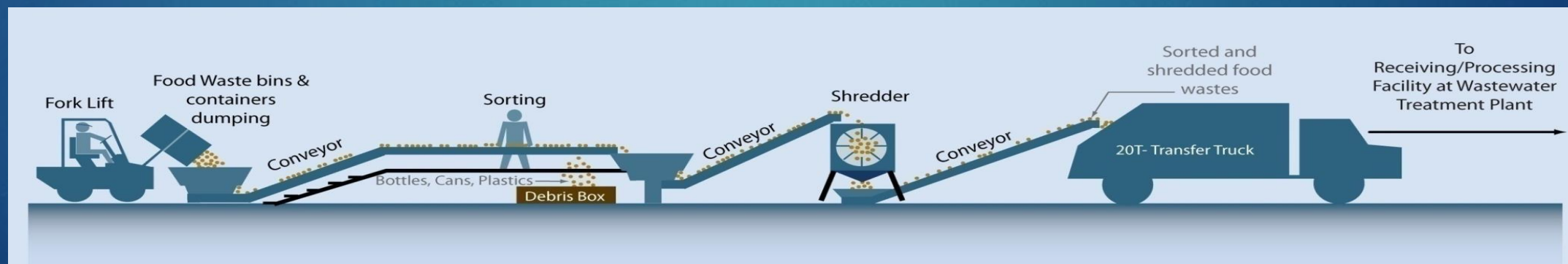


Food Waste Collection



Marin Sanitary Equipment

2013 As Built



2008 Design Concept



CLEAN FEEDSTOCK

CMSA Organic Waste Facility



Digestion and Biogas Cleaning



Anaerobic digesters with membrane covers



Biogas H₂S Removal

Biogas cleaning & Cogeneration



Biogas - moisture and siloxane removal



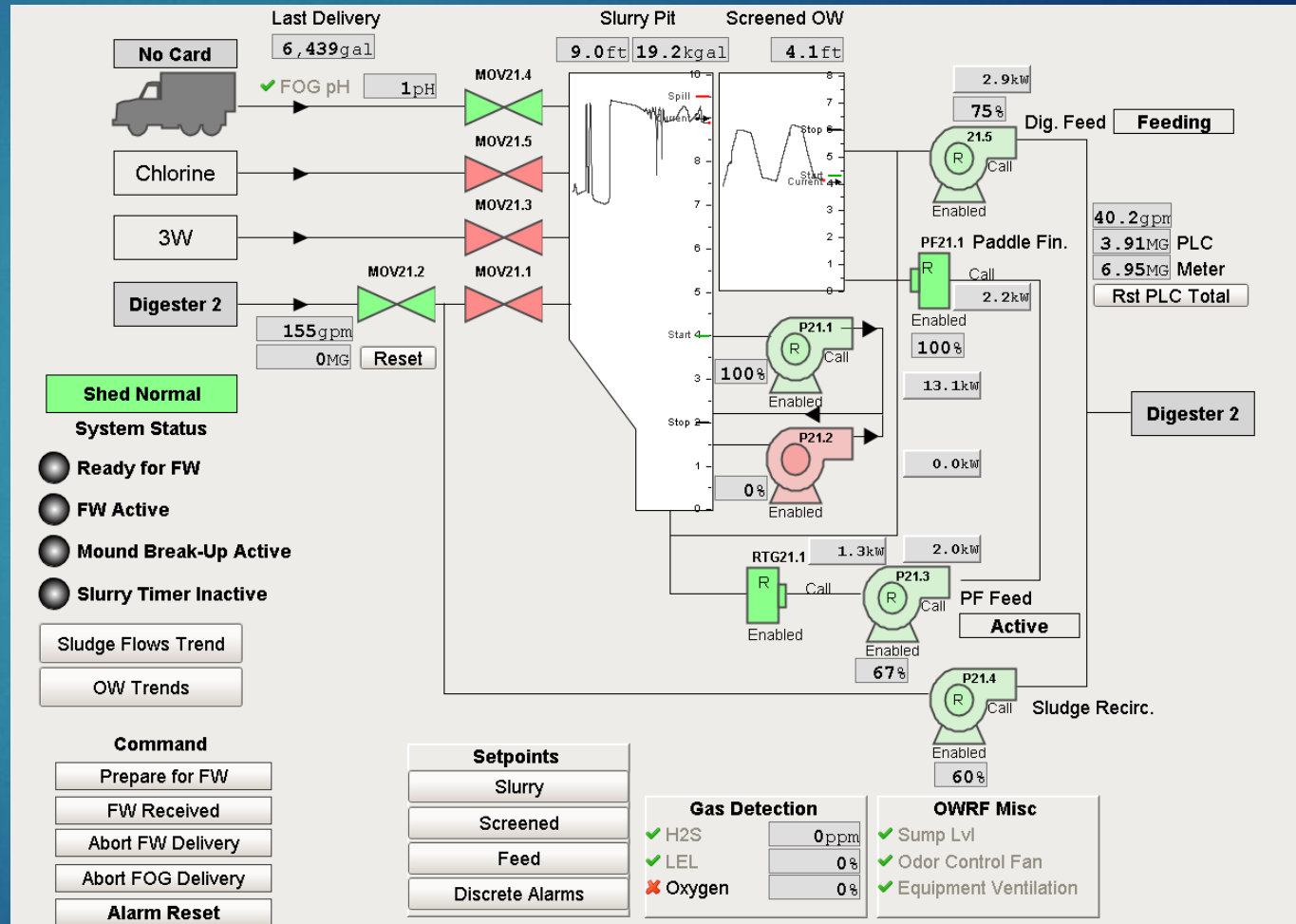
New 995kW Cogen System (Jenbacher)



Back-up 750 kW Cogen System (Waukesha)

Facility Operations

- Receive organic loads between 6:00 am and 12:00 pm
- Mix material for several hours
- Final screenings removal
- Slowly feed material to digesters over 12 hours



SCADA Overview Screen of the OWRF



Metrics, Benefits, & Cost Information

2019 Operational Metrics – Feed & Digester Info*

Digester Health

	Alkalinity mg/L	VA mg/l	VA/ALK	pH	HRT days	VSR %
Min	4,964	37.1	0.0074	7.22	33.7	56.1
Max	5,345	98.2	0.0196	7.42	60.6	71.8
Ave	5,094	57.5	0.0113	7.31	44.3	66.2

Organics Delivered

Organics	Amount	Loads
Food Waste	2,447 tons	348
FOG	3.36 million gallons	672

Digester Feed

Material	TS - lbs	VS - lbs	%VS
Primary Sludge	3.67 million	3.07 million	36%
TWAS	3.35 million	2.80 million	34%
Organic Slurry	2.68 million	2.48 million	30% (55% max)**

Biogas Use

	Biogas	Cogeneration
Max month	316K ft3/day	22.6 hours/day
Ave month	277K ft3/day	17.8 hours/day

- 2020/21 metrics lower than normal due to COVID impacts and digester cover replacements

** Based on 2020/21 pilot study results

Program Benefits

- ▶ A local renewable energy project
- ▶ Reduces landfilling of food waste; reject material is composted by MSS
 - ▶ Compliance with SB 1383 – organic waste diversion from landfills
- ▶ Increases CMSA's energy self sufficiency to align with State renewable energy generation goals
- ▶ Utilization of existing unused asset capacity – cogeneration system and digesters
- ▶ CMSA has delivered energy to local utility grid (MCE) since May 2019
- ▶ Reduces greenhouse gas emissions in region

Power Delivery

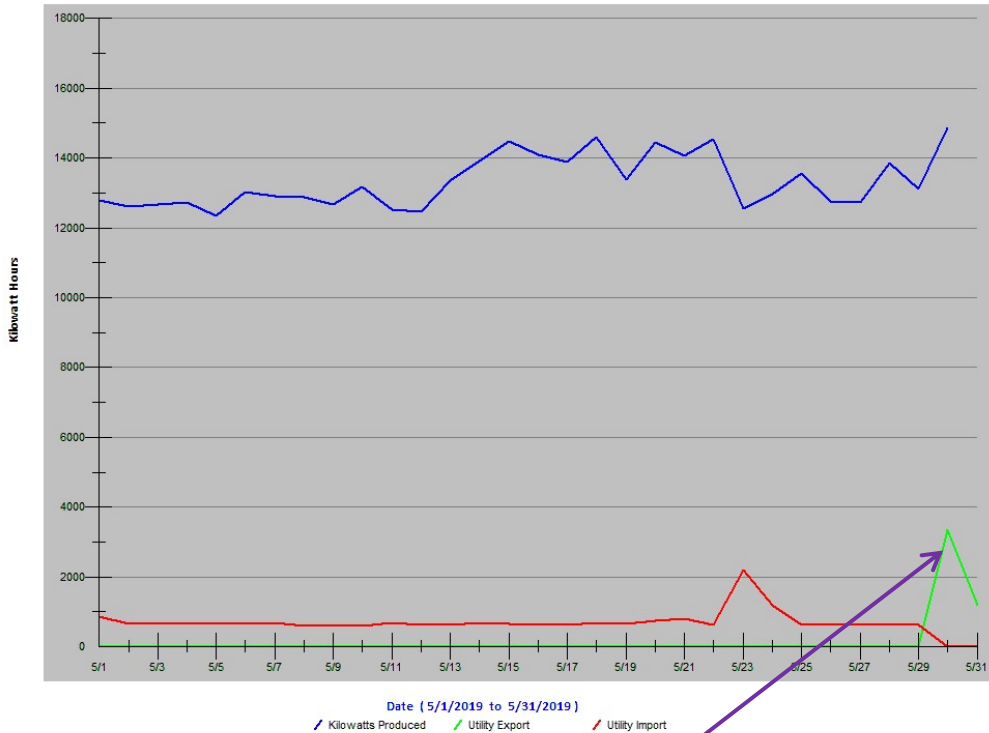
Power Delivery - Interconnection

- ▶ Need approval from local electrical utility – PG&E
- ▶ Utility performs electrical system evaluations
- ▶ CMSA needed to:
 - ▶ Design, install, and test protective devices
 - ▶ Pay for utility review of design work
 - ▶ Install a revenue meter
- ▶ First Permission to Operate received in March 2019 for 750 kW generator
- ▶ Second Permission to Operate received in September 2022 for 995kW cogen.



Power Delivery – Power Sale Agreement

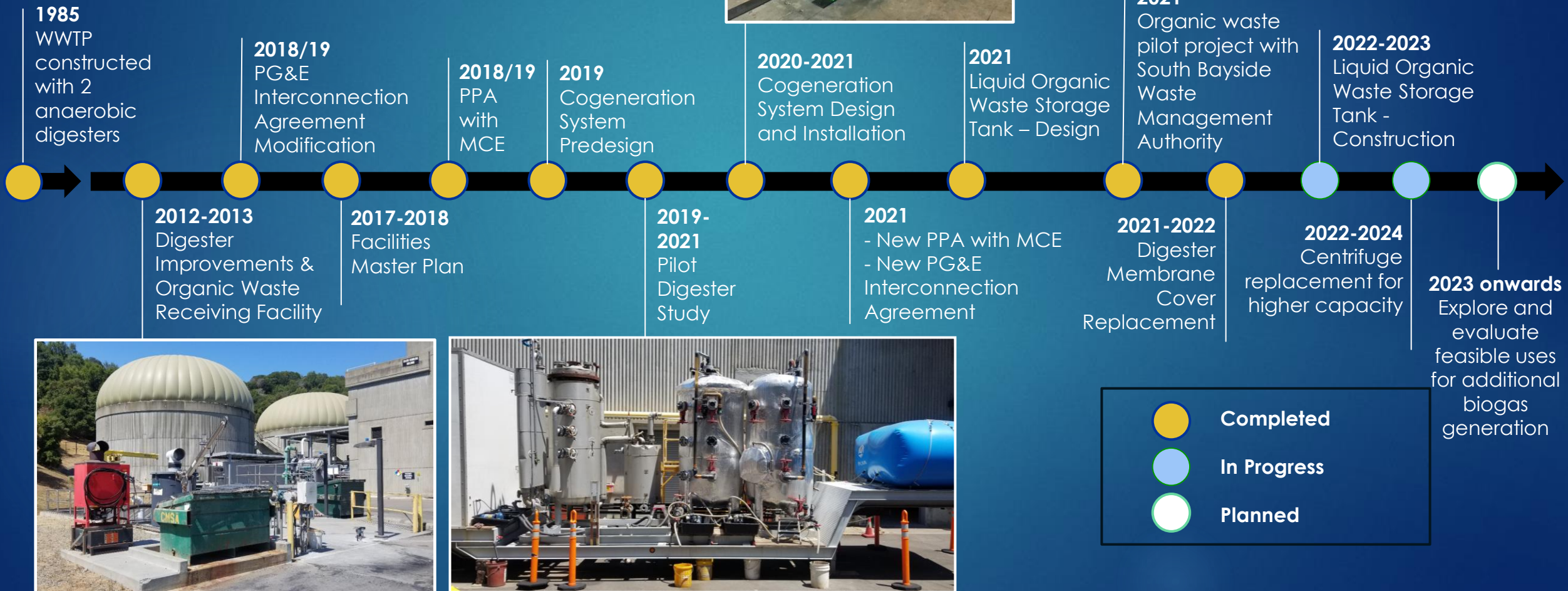
Graph #8: kW/hr Purchased vs. kW/hr Produced vs. kW/hr Exported



Power Exported

- ▶ Two electrical utilities serve CMSA – PG&E and MCE
- ▶ Identified and evaluated several Feed-in-Tariffs from both utilities
- ▶ Selected Small Generator Power Purchase Agreement (PPA) with MCE
 - ▶ Minimal administration, no power scheduling, buy what we deliver – no delivery commitments
- ▶ Attained the Commercial Operations Date (COD) on 4/26/19
- ▶ First delivered power on May 29, 2019
- ▶ Second PPA for the new 995kW executed – COD was on 9/26/22
- ▶ Power sale price is \$0.0869/kWh

CMSA Renewable Power Delivery Program



Digester Cover Replacements



Figure 1: Scaffolding was installed around the 80-ft diameter digester (37.5-ft tall) in July to provide access for the contractor (GrayWolf) to remove and install the cover.



Figure 2: GrayWolf removed the membrane cover in August. A crane was used to remove the cover, and a lift was used to lower the contractor in to remove the cable hub and level sensor.



Figure 3: After the cover was removed, Operations began draining the digester.



Figure 4: Staff contracted Wastewater Solids Management in September to clean and remove the sludge, grit and debris that was accumulated inside the digester. A belt filter press was onsite to dewater the solids.



Figure 5: Wastewater Solids Management pressure washed the inside of Digester 2 and staff inspected it.



Figure 6: GrayWolf was back onsite in October to install the new membrane cover (inner membrane shown).

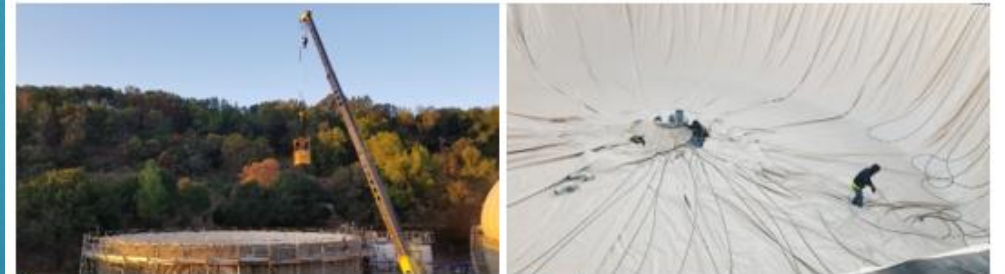


Figure 7: Installation of the outer membrane, cables and level sensor.



Figure 8: Inflating the outer membrane (left) and completed installation (right).



Questions?