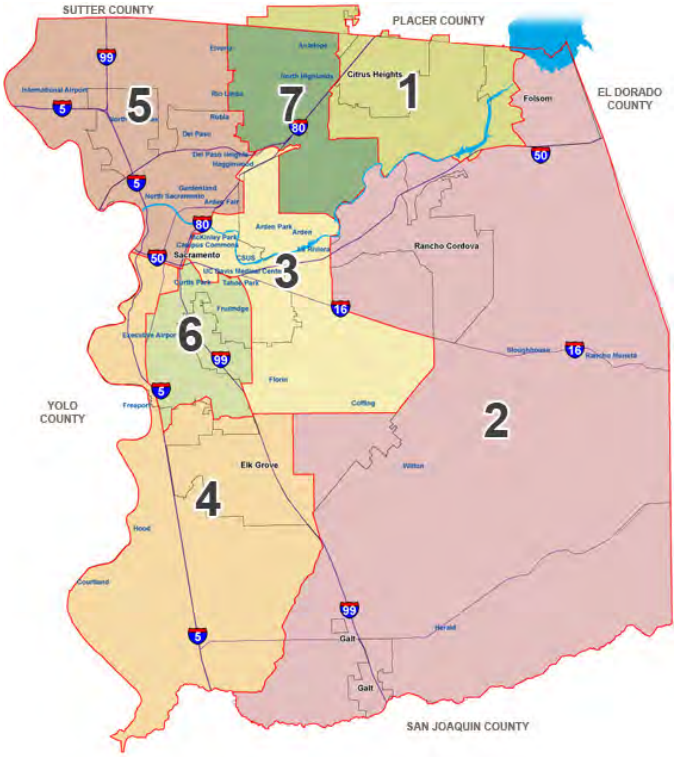
TASK 3 INTERIM REPORT: STRATEGIC IMPLEMENTATION PLAN FOR FOOD WASTE COLLECTION PROGRAMS



Prepared for:
Sacramento Municipal Utility District
Sacramento, California

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Executive Summary

SMUD along with other community-based stakeholders are currently formulating strategies to divert organic wastes for electricity generation and co-production of other value-added products. SMUD also facilitates a sustainable and low carbon future, enhances customer choice and supports distributed and large-scale renewable energy resources. In response to rapid changes in the energy landscape, SMUD's Energy Research & Development (ER&D) Department continues to take a proactive stance in ER&D advancements by supporting the core values of competitive energy costs, high reliability, environmental responsibility, leadership, commitment to safety and ensuring high level of customer satisfaction. The main objective of this task is to develop a five-year strategic and sustainable implementation plan (to be referred to as the Strategic Implementation Plan or SIP) for the establishment of food waste/organic waste collection program for all sectors in Sacramento County.

Policy Drivers, Mandates and Local Enforcement Actions

Recently, a series of legislative actions have been enacted to develop the organics markets in California. These policy drivers and enforcement mechanisms create quantitative and qualitative goals the uniformly move the markets to a position that incentivizes improved organics resource recovery practices. However, the actual implementation of these policy drivers has significant flexibility to allow for customized regional solutions. Critical policies reviewed included: SB 1383 (Lara, 2016), AB 1594 (Williams, 2015), AB 1826 (Chesbro, 2015), SB 350 (De León, 2015), SB X1-2 (Simitian), SB 107 (Simitian), SB 1078 (Sher), AB 32 (Nunez, 2006), Executive Order B-30-15, AB 249, SB 1016, and AB 341. Within the SMUD territory, the Sacramento Regional Solid Waste Authority (SWA) has the authority and leadership to engage in local implementation of statewide legislation. This report evaluates the approach taken by the SWA to implement statewide legislation at the local level.

Stakeholder / Focus Group Meetings

Four stakeholder groups were convened during the development of this Strategic Implementation Plan The first stakeholder meeting, conducted on February 23, 2017, was scheduled to build a foundational understanding of the region, particularly around existing local programs and the implementation of AB 1826. The second and third stakeholder meetings, conducted on May 31, 2017 and June 21, 2017, were scheduled to evaluate, validate, and modify (as needed) the market barriers and opportunities identified as a result of the first stakeholder meeting and to ensure that the framework for determining next steps was consistent with stakeholder-identified needs. The second stakeholder meeting was conducted with the generators only, no waste haulers to facilitate and open discussion between generators. The third stakeholder meeting was conducted with waste haulers, no generators, to facilitate open discussion without discussing details in front of clients. The fourth stakeholder meeting, conducted on August 16, 2017, was scheduled to evaluate, validate, and modify (as needed) the Strategic Implementation Plan recommendations and path forward. These stakeholder meetings provided the basis and backbone for the recommendations presented in this SIP.

Resource Availability

CalRecycle waste characterization data was utilized to determine the amount of food/organic waste available within the SMUD service territory. The gross volume was identified to

understand the scope of the resource. It should be noted that residential source separated organics are not reported in the CalRecycle database. Since this material is already collected, it will not impact the final economic potential results. However, based on the findings of the workshops, there is significant potential for this collected organics stream to be processed locally instead of outside the region. The technical volume is the fraction of the gross potential that is available when accounting for limitations of recovery technology using standard management practices. The methodology used to identify technical potential was consistent with the California Biomass Collaborative study methodology. Finally, economic potential was identified by evaluating the total amount of technically-available resource and removing the fraction that is already collected in a manner that is currently used for bioenergy or composting. This methodology was appropriate for this study, which is focused on the recovery of additional bioenergy resources. The energy potential of this resource was also calculated and shown in the table below.

Material Type	Gross Availability	Technical Availability	Economic Potential
Other Miscellaneous Paper - Compostable	1,581 BDT/yr *0.3 MW DG* *0.3 MW RNG*	1,100 BDT/yr *0.2 MW DG* *0.2 MW RNG*	976 BDT/yr *0.2 MW DG* *0.2 MW RNG*
Remainder / Composite Paper - Compostable	23,693 BDT/yr *3.8 MW DG* *5.0 MW RNG*	15,921 BDT/yr *2.5 MW DG* *3.4 MW RNG*	15,781 BDT/yr *2.5 MW DG* *3.3 MW RNG*
Food	70,107 BDT/yr *11.1 MW DG* *14.8 MW RNG*	49,822 BDT/yr *7.9 MW DG* *10.5 MW RNG*	41,185 BDT/yr *6.5 MW DG* *8.7 MW RNG*
Leaves and Grass	24,859 BDT/yr *2.1 MW DG* *2.7 MW RNG*	22,059 BDT/yr *1.8 MW DG* *2.4 MW RNG*	5,686 BDT/yr *0.5 MW DG* *0.6 MW RNG*
Prunings and Trimmings	14,349 BDT/yr *1.2 MW DG* *1.6 MW RNG*	11,285 BDT/yr *0.9 MW DG* *1.2 MW RNG*	6,222 BDT/yr *0.5 MW DG* *0.7 MW RNG*
Branches and Stumps	3,092 BDT/yr *0.3 MW DG* *0.3 MW RNG*	2,147 BDT/yr *0.2 MW DG* *0.2 MW RNG*	1,918 BDT/yr *0.2 MW DG* *0.2 MW RNG*
Manures	95 BDT/yr *0.0 MW DG* *0.0 MW RNG*	64 BDT/yr *0.0 MW DG* *0.0 MW RNG*	64 BDT/yr *0.0 MW DG* *0.0 MW RNG*
Total	**137,777 BDT/yr** ***18.7 MW DG*** ***24.7 MW RNG***	**102,397 BDT/yr** ***13.6 MW DG*** ***18.0 MW RNG***	**71,831 BDT/yr** ***10.4 MW DG*** ***13.7MW RNG***

Barriers/Challenges and Opportunities

Regional Barriers/Challenges - Costs

Cost is the number one challenge facing the industry when collecting new organic resources. The costs of organic waste collection service are driven by a combination of transportation costs and tip fees for the processing of materials. For each commercial customer, haulers balance these costs to provide a competitive price. Transportation costs are driven by the geographic location and density of disposal facilities and the ability for these facilities to accept specific organic waste types.

- **Transportation Challenges**: With the implementation of AB 1826, organics routes can be collected and directly transferred to organics processing facilities. Currently the majority of this material goes to 11 facilities across Northern California, as far away as Santa Clara County. In stakeholder meetings conducted as part of this project, local area haulers identified the importance of a "north-of-the-river" and "south-of-the-river" solution for green and food waste (that river being the American River which bisects the SMUD territory on an east-west trajectory).

- **Infrastructure Availability**: Stakeholders identified challenges associated with the ability of existing facilities to handle the types feedstock and variety of contamination in the organics that are being collected. Specifically, for food waste, the SATS biodigester as historically experienced periodic shutdown due to feedstock contamination. The uncertainty of the system's availability makes it challenging for the local haulers to manage food waste collection in a cost-effective manner if there is not a reliable outlet for food waste. For green waste, there are no facilities in Sacramento County that accept green waste.

- **Tipping Fee**: In the Sacramento area, tip fees are low compared to the rest of California. At approximately $30 per ton at Keifer Landfill, the Sacramento area has one of the lowest in the state. The tip fee represents the value that can be received by a bioenergy project utilizing the same waste. In the Bay Area, where tip fees can exceed $90 per ton, the value of converting that waste to bioenergy is three approximately times higher than it is in the Sacramento area.

- **Multiple Points of Communication**: The Sacramento area is one of the few remaining competitive waste management systems without a single franchised waste hauler. The dynamics of this market have keep the cost of waste collection services low; however, this system can also stifle innovation. With multiple waste service providers, there is no unifying leader across the region. At this point in time, the County's SWA is the stakeholder that most closely resembles a single-point leader; however, since its role is also one of regulation, the SWA struggles to be a strong advocate in the community. Inefficient information exchange and communication creates costs for generators trying to adapt practices. While it is hard to quantify, there is a clear value associated with dissemination of best practices to avoid repeating costly mistakes across generators.

Regional Opportunities – Potential for Cost Reduction

SMUD is in a unique position in the region because it interacts with nearly all food/organic waste generators and can provide a business structure to support the back-end conversion of this material into energy. The waste service providers—principally Atlas Disposal, Republic Services, and Waste Management—do not have this level of customer interface and the regulating agencies—principally Solid Waste Authority and CalRecycle—do not have direct customer engagement on a broad-scale or regular basis. SMUD has a long history of promoting sustainable best practices, deploying emerging alternative energy technologies, and implementing policies to benefit the community it serves. Specific opportunities identified through stakeholder workshops include:

- **Develop Dry Fermentation**: The feedback from the workshops clearly identified a need in the local area to manage green waste. A dry fermentation facility, capable of handling a large fraction of the volume of green waste available in the area should also be permitted to accept co-mingled food waste. This type of facility would facilitate the diversion of organic waste from the residential sector and would provide an outlet for commercially-collected food waste if the existing local infrastructure is not available.
- **Promote and Improve Existing Facilities**: When evaluating opportunities for regional infrastructure improvement, it is important that strategies are developed in a way to support and leverage the existing regional assets. The ability for existing facilities to tolerate contamination in the waste stream was frequently acknowledge in the stakeholder workshops. Efforts to improve the pre-processing capabilities of the existing local infrastructure would help improve the availability of these facilities and reduce the costs to waste haulers associated with finding alternative outlets.
- **Conversion of Composting to Anaerobic Digestion**: While there are no composting facilities in the SMUD service territory, there are facilities within the greater Sacramento region. These facilities are un-tapped resources for energy. Converting these facilities to dry fermentation to capture the energy value of the existing resources could streamline and accelerate SMUD's ability to generate more local renewable energy from biomass resources. These facilities may also be appropriate to permit with co-mingled food waste to help facilitate the adoption of local policies that improve food waste collection.
- **Information Exchange**: The stakeholder meetings conducted throughout this process demonstrated a clear need for peer-to-peer information exchange. There are many early-adopters and sustainability leaders within the community that have years of experience with food waste diversion. However, there is no organized way for business colleagues to learn from these efforts. SMUD serves a central role in the Sacramento community as one of the only organizations that routinely interacts with almost every business and resident in the area. SMUD has the marketing reach and knowledge of local area businesses across industry sectors to be a leader in the promotion and facilitation of peer-to-peer education.
- **Promotion & Visibility**: While sustainability is a long-term goal shared by most businesses, the realities of running a business can make sustainable decisions challenging, particularly for early-adopters who incur additional costs ahead of a market-wide shift in prices. Promotion and recognition may incentivize generators to make the switch if such promotion and recognition results in additional business or an enhanced reputation/recognition from generators' customers. SMUD's extensive reach into the community, through billboards, flyers, emails marketing, and billing inserts, among other avenues, could be used to promote and recognize early adopters in the community.

Recommendations and Next Steps

The SIP identifies a series of detailed tasks, milestones, and success metrics for each of the five parallel pathways identified as marketplace opportunities. If all five pathways area successfully implements, SMUD will be well-positioned as the region's leader in the organic waste management space and will be able to facilitate projects that will support SMUD's long-term procurement and sustainability goals.

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1 Introduction

In October 2014 Governor Brown signed AB 1826 Chesbro (Chapter 727, Statutes of 2014), requiring businesses to recycle their organic wastes on and after April 1, 2016, depending on the amount of waste they generate per week. This law also requires that on and after January 1, 2016, local jurisdictions across the state implement an organic waste recycling program to divert organic waste generated by businesses, including multifamily residential dwellings that consist of five or more units (note, however, that multifamily dwellings are not required to have a food waste diversion program). Organic waste (also referred to as organics throughout this resource) means food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed in with food waste. This law phases in the mandatory recycling of commercial organics over time, while also offering an exemption process for rural counties. In particular, the minimum threshold of organic waste generation by businesses decreases over time, which means an increasingly greater proportion of the commercial sector, will be required to comply.

For this reason, SMUD along with other community-based stakeholders are currently formulating strategies to divert organic wastes for electricity generation and co-production of other value-added products. SMUD also facilitates a sustainable and low carbon future, enhances customer choice and supports distributed and large-scale renewable energy resources. In response to rapid changes in the energy landscape, SMUD's Energy Research & Development (ER&D) Department continues to take a proactive stance in ER&D advancements by supporting the core values of competitive energy costs, high reliability, environmental responsibility, leadership, commitment to safety and ensuring high level of customer satisfaction.

1.1 Objective and Scope

The main objective of this task is to develop a five-year strategic and sustainable implementation plan (to be referred to as the Strategic Implementation Plan or SIP) for the establishment of food waste/organic waste collection program for all sectors in Sacramento County.

The scope of this task includes:

- Collaboration with Valley Vision and other key stakeholders in formulating and establishing the SIP
- Listing key stakeholders for cohesive collaboration for the formulation of the establishment of food waste/organic waste collection program
- Conducting stakeholders and focus group meetings that will help establish the food waste collection program in Sacramento County
    - Identifying and prioritizing issues, barriers and potential solutions
    - Identifying gaps (RD&D, deployment and commercialization)
    - Identifying outreach methods and activities to be implemented
    - Identifying and evaluating compliance strategies and implementation plan for some policy drivers (e.g., AB 1826, AB 32, AB 341, SB 1383)

- Refining resources and market potentials for electricity production (MWs, pipeline quality biogas/biomethane)
- Preparing tactical implementation plan for five years with specific milestones, schedule and control mechanisms
- Identifying ongoing and other potential enforcements for all sectors
- Preparing recommendations and next steps
- Preparing a report and power point slides

1.2 Approach

The SIP was developed through a three-pronged approach:

1. **Evaluation of Relevant Policies and Mandates**: The legislative and regulatory environment has shifted dramatically over the last few years with transformative legislation intended to move the industry forward by limiting the options for management of organics.
2. **Stakeholder Meetings**: TSS gathered a diverse group of stakeholders for four workshops to better understand the specific regional challenges and barriers faced by stakeholders across the supply chain.
3. **Resource Availability Assessment**: To understand the magnitude and realistic potential of food waste and organics in the SMUD service territory to provide additional renewable energy.

The results of these preliminary assessments guided the findings and recommendations of the SIP.

1.3 Report Organization

The report is organized in a sequence to facilitate the understanding of the marketplace. The first sections, Policy Drivers and Mandates, Stakeholder/Focus Groups Meetings, and Resource Availability are intended to document that background research that was conducted for the SIP.

The follow section, Barrier/Challenges, and Opportunities, document that issues, challenges, and opportunities identified through the background evaluation of policy, mandates, stakeholder workshops, and resource availability.

Lastly, a plan forward is identified in the SIP to address the regional challenges and to realize the market opportunities.

2 Policy Drivers, Mandates, and Local Enforcement Efforts

Recently, a series of legislative actions have been enacted to develop the organics markets in California. These policy drivers and enforcement mechanisms create quantitative and qualitative goals the uniformly move the markets to a position that incentivizes improved organics resource recovery practices. However, the actual implementation of these policy drivers have significant flexibility to allow for customized regional solutions.

2.1 Policy Drivers

In chronological order starting with the most recent legislative mandates, important policy drivers that impact food waste/organic waste collection in the Sacramento region includes:

SB 1383 (Lara, 2016): SB 1383 creates goals for short-lived climate pollutant reductions in various industry sectors, including reduction goals for black carbon, fluorinated gases, and methane. Organic materials comprise two-thirds of the waste stream. This bill aims for a 75% reduction in the level of statewide disposal of organic waste from 2014 levels by 2025.

AB 1594 (Williams, 2015): AB 1594 eliminates the diversion credit for using organic material as landfill alternative daily cover (ADC). This diversion credit had incentivized the use of organics in the landfill. The removal of this diversion credit does not prohibit the use of organics as ADC; however, without the diversion credit, landfill operators are incentivized to find alternative uses for organic materials to achieve diversion requirements.

AB 1826 (Chesbro, 2015): AB 1826 requires commercial generators to subscribe to composting or anaerobic digestion service for their organic waste. AB 1826 presents a phased approach to mandating large organic waste generators to begin source-separated diversion. This practice reduces the cost of organics collection and processing for value-added utilization. The timeline prescribed by AB 1826 is:

- **January 1, 2016:** Local jurisdictions shall have an organic waste-recycling program in place. Jurisdictions shall conduct outreach and education to inform businesses how to recycle organic waste in the jurisdiction, as well as monitoring to identify those not recycling and to notify them of the law and how to comply.
- **April 1, 2016:** Businesses that generate 8 cubic yards of organic waste per week shall arrange for organic waste recycling services.
- **January 1, 2017:** Businesses that generate 4 cubic yards of organic waste per week shall arrange for organic waste recycling services.
- **August 1, 2017 and Ongoing:** Jurisdictions shall provide information about their organic waste recycling program implementation in the annual report submitted to CalRecycle. (See above for description of information to be provided.)
- **Fall 2018:** After receipt of the 2016 annual reports submitted on August 1, 2017, CalRecycle shall conduct its formal review of those jurisdictions that are on a two-year review cycle.
- **January 1, 2019:** Businesses that generate 4 cubic yards or more of commercial solid waste per week shall arrange for organic waste recycling services.

- **Fall 2020:** After receipt of the 2019 annual reports submitted on August 1, 2020, CalRecycle shall conduct its formal review of all jurisdictions.
- **Summer/Fall 2021:** If CalRecycle determines that the statewide disposal of organic waste in 2020 has not been reduced by 50 percent of the level of disposal during 2014, the organic recycling requirements on businesses will expand to cover businesses that generate 2 cubic yards or more of commercial solid waste per week. Additionally, certain exemptions may no longer be available if this target is not met.

SB 350 (De León, 2015): SB 350 requires the following: 1) the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50 percent by December 31, 2030; 2) the California Energy Commission to establish annual targets for statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by January 1, 2030; and 3) provide for transformation of the Independent System Operator into a regional organization. SB 350 provides a stable market for renewable energy production.

SB X1-2 (Simitian), SB 107 (Simitian), SB 1078 (Sher): These measures, in sum, created the renewable portfolio standard, which requires retail sellers and local publicly owned electric utilities to increase the amount of energy procured from eligible renewable energy resources to meet at least 33 percent of their total retail sales by 2020, in what is known as the Renewables Portfolio Standard.

AB 32 (Nunez, 2006): AB 32 created a comprehensive program to reduce greenhouse gas (GHG) emissions in California. GHG reduction strategies include a reduction mandate of 1990 levels by 2020 and a cap-and-trade program. AB 32 also required the California Air Resources Board (ARB) to develop a Scoping Plan that describes the approach California will take to reduce GHGs. ARB must update the plan every five years.

Executive Order B-30-15: Governor Brown's Executive Order B-30-15 established a new interim statewide greenhouse gas emission reduction target to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030, to ensure California meets its target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050.

AB 2494 and SB 1016: With the passage of AB 2494 (Sher, Chapter 1292, Statutes of 1992), the system used to measure annual progress became disposal-based, and since 1995 CalRecycle has used the Disposal Reporting System (California Code of Regulations §18809.6, 18810.6, and 18811.6) to track solid waste disposal amounts and jurisdiction of origin. Prior to 2007, diversion rates were calculated using an adjustment method that relied on a complicated formula involving the amount of disposed waste, employment, population, and taxable sales adjusted for inflation.

Since the passage of SB 1016 (Wiggins, Chapter 343, Statutes of 2008), disposal rates are now calculated using a per capita disposal system that relies on existing reporting systems to determine whether the 50 percent diversion mandate has been met based solely on disposal and population. Under this system, waste generation is set based on the calendar years 2003 to 2006. This period corresponds to the time when California achieved 50 percent diversion statewide and to a boom in the housing market and strong economic activity. This base generation rate is then compared to the disposal rate for a given year. Statewide, the base waste generation level is 12.6 pounds per person per day, so on average California residents must (at home and at work)

dispose of less than 6.3 pounds per person per day to meet the 50 percent diversion mandate. In practice, each jurisdiction has its own generation estimates and per capita disposal targets and its own unique waste generators and waste stream, so these targets cannot be compared to each other or to the statewide numbers.

AB 341: In 2011, the Legislature implemented a new approach to the management of solid waste. AB 341 (Chesbro, Chapter 476, Statutes of 2011) required that CalRecycle oversee mandatory commercial recycling and established a new statewide goal of 75 percent recycling through source reduction, recycling, and composting by 2020. This paradigm adds to the policies in AB 939 in several significant ways[1].

First, AB 341 established a statewide policy goal, rather than a jurisdictional mandate. This places the onus for achieving the goal on the state rather than on the cities and counties that are directly responsible for waste disposal and recycling. Under the law, individual jurisdictions are not required to meet the new policy goal.

Second, CalRecycle uses different metrics to calculate the statewide recycling rate. Under the 75 percent recycling goal, a base generation level is calculated using the average per resident generation from 1990 to 2010 (10.7 pounds per person per day). This estimated solid waste generation is lower than the statewide generation estimate of 12.6 pounds per person per day under AB 939, which was based on a near-peak time (2003 to 2006) of historical generation. For AB 341, all years for which data existed at the time were included in the generation estimate.

AB 341 also required commercial generators of more than 4 cubic yards of solid waste per week, and multi-family residences of five or more units, to arrange for recycling services. This was later changed to 4 cubic yards or more by SB 1018 (Committee of Budget and Fiscal Review, Chapter 39, Statues of 2012). Furthermore, AB 341 requires jurisdictions to implement a commercial recycling program for those businesses subject to the law.

2.2 Local Enforcement Efforts

Within the SMUD territory, the SWA has the authority and leadership to engage in local implementation of statewide legislation. The SWA develops local diversion policies and ordinances and is formulating strategies to divert commercially generated food waste in response to AB 1826 mandates. In April 2015 the SWA Board directed staff to the actions below:[2]

- Require updated client lists from franchisees in order to update the Environmental Management Department's (EMD) database. This will allow EMD better ability to enforce generator compliance.
- Gather input from stakeholders (organic waste generators, franchisee haulers, and facility operators) on necessary market-based policy and infrastructure requirements.

[1] AB 939, *The Integrated Waste Management Act of 1989*, established the original California waste diversion mandates to achieve a 50% waste diversion goal by cities and counties by January 2000

[2] *Update on Meeting Regulatory Requirements for Organic Waste Diversion,* memo to SWA Board of Directors, May 12, 2016, http://www.swa.saccounty.net/SWA%20Meetings/5.%20Organic%20Waste%20Report.pdf

- Consider a range of policy solutions from a completely market-based, unregulated approach to material flow-controlled approach.
- Consider a framework for organics processing similar to SWA' Construction and Demolition management program.

In addition, the SWA Board adopted Ordinance 26 in 2016, which added commercial and multi-family organics recycling requirements to meet the mandates and implementation timeline as in AB 1826. Plus, the ordinance requires that food waste, in order for businesses and haulers to receive diversion credits, must be delivered to a SWA-Certified Putrescible Organics Facility. SWA certification has been granted to the CleanWorld anaerobic digestion facilities in Sacramento and Davis, as well as the Jepson Prairie Organics facility near Vacaville, CA.

The City and County of Sacramento both have personnel designed to help assist business owners comply with AB 1826. These efforts include inspections and delayed penalties. However, as an enforcement agency, stakeholder meetings revealed limited openness between generators and agency personnel.

3 Stakeholders / Focus Group Meetings

The Project Team conducted four stakeholder groups. The findings from the group meetings are discussed throughout the report and the invitation list, attendee list, agenda, and minutes from the meetings are availability in Appendix A.

- **First Stakeholder Meeting**: Conducted on February 23, 2017, the first stakeholder meeting was scheduled to build a foundational understanding of the region, particularly around existing local programs and the implementation of AB 1826. The working group consisted of stakeholders from a diverse group including SMUD, Atlas Disposal, Republic Services, Waste Management, Sacramento County Environmental Management Department, City of Sacramento Recycling and Solid Waste Division, Hyatt Hotel, Sacramento International Airport, UC Davis Medical Center, Civic Spark, ES Engineering, Mulvaney's B&L Restaurant, Costco, Sacramento County Department of Waste Management, Sacramento Metropolitan Air Quality Management District, Valley Vision, and TSS Consultants. The agenda included:

  - Identification and prioritization of issues, barriers, and potential solutions
  - Identification and evaluation of compliance strategies to meet existing regulatory, legislative, and policy drivers germane to the Sacramento region
  - Identification of regulatory and legislative gaps
  - Identification of research, development, deployment, and commercialization gaps
  - Identification of outreach and communication activities to be implemented

  The findings from the first stakeholder meeting were integrated into a draft discussion of barriers and opportunities, which was presented to SMUD in the form of a PowerPoint presentation (Appendix B).

- **Second Stakeholder Meeting**: Conducted on May 31, 2017, the second stakeholder meeting was scheduled to evaluate, validate, and modify (as needed) the market barriers and opportunities identified as a result of the first stakeholder meeting and to ensure that the framework for determining next steps was consistent with stakeholder-identified needs. To facilitate an open discussion, the SIP Project Team conducted the second stakeholder meetings without the local waste haulers to allow business to openly discuss challenges faced with their own waste haulers. The working group consisted of stakeholders from a diverse group, with significant overlap from the first stakeholder meeting including: SMUD, Sacramento County Environmental Management Department, Hyatt Hotel, California State University Sacramento, Sacramento International Airport, Civic Spark, Sacramento County Department of Waste Management, Sacramento Regional Business Alliance, McDonalds, Fat Family Restaurants, Valley Vision, and TSS Consultants. The agenda included:

  - Identification and prioritization of issues, barriers, and potential solutions
  - Identification ways to generate value from AB 1826 compliance
    - Infrastructure needs (e.g. bins)
    - Marketing value
    - Communication and coordination
    - Training

The findings from the second stakeholder meeting were integrated into the SP.

- **Third Stakeholder Meeting**: Conducted on June 21, 2017, the third stakeholder meeting was scheduled to evaluate, validate, and modify (as needed) the market barriers and opportunities identified as a result of the first stakeholder meeting and to ensure that the framework for determining next steps was consistent with stakeholder-identified needs. Whereas the second stakeholder meeting focused on generators, the third stakeholder meeting was a repeat of the second stakeholder meeting with a different audience: Waste haulers and associated downstream stakeholder. Attendees included: SMUD, Atlas Disposal, Republic Services, Waste Management, City of Sacramento Recycling and Solid Waste Division, Civic Spark, Sacramento County Department of Waste Management, Sacramento Metropolitan Air Quality Management District, City of Rancho Cordova, Hitachi Zosen Inova, Valley Vision, and TSS Consultants. The agenda included:

    - Identification and prioritization of issues, barriers, and potential solutions
    - Identification ways to generate value from AB 1826 compliance
        - Infrastructure challenges – regional facilities
        - Infrastructure needs
        - SMUD role
        - Communication and coordination

  The findings from the second stakeholder meeting were integrated into the Strategic Implementation Plan.

- **Fourth Stakeholder Meeting**: Conducted on August 16, 2017, the fourth stakeholder meeting was scheduled to evaluate, validate, and modify (as needed) the SIP recommendations and path forward. Valley Vision and TSS Consultants presented draft SIP recommendations for consideration by the stakeholder group. The working group consistent of a diverse group of stakeholders, including: SMUD, Atlas Disposal, Republic Services, CleanWorld, City of Sacramento Recycling and Solid Waste Division, CalRecycle, Sacramento International Airport, Civic Spark, Sacramento County Department of Waste Management, Hitachi Zosen Inova, GRAS, Cal Refuse Recycling Council, Valley Vision, and TSS Consultants. The agenda included:

    - Market champions
        - Information exchange is needed – what avenues of information would be most useful?
        - Promotion/visibility – identification of ways SMUD could highlight/promote/recognize generators and other who are "doing the right thing"
    - Infrastructure Development
        - Promote and improve existing facilities
        - Foster new facilities

  The responses from the fourth stakeholder meeting were integrated into the draft SIP and presented to SMUD for review.

4 Resource Availability

AB 1826 seeks to improve the ability for value-added utilization of food waste by mandating the diversion of organics at commercial facilities through a phased approach. While the SIP is focused specifically on the enhanced collection of food waste in the Sacramento region (for renewable energy production), food waste can be collected in both single-stream or co-mingled sources. To account for the potential of a co-mingled collection solution, the resource availability will evaluate food waste and green waste, including urban green waste, landscape and pruning waste (non-agricultural), nonhazardous wood waste, and food-soiled paper waste that is mixed in with food waste.

4.1 Definitions

Definitions and descriptions of these potentials and the biomass feedstock resources for opportunities in SMUD Region are presented below. Biochemical conversion pathways are evaluated for feedstock with high moisture content (>50%) and thermochemical pathways are evaluated for feedstock with low moisture content (<50%).

Gross Biomass Potential

Gross biomass potential is the overall maximum amount of biomass which can be considered theoretically available or the total amount of biomass resources that can be produced for electricity production (biopower), pipeline quality renewable natural gas (RNG) or biomethane and co-produce heat or combined heat and power, and other value-added products. It represents the maximum productivity or large numbers under theoretically optimal conditions because it will ignore all operation and management limitations including other competing uses and other socio-economic constraints.

Technical Biomass Potential

The technical biomass potential is the fraction of the gross potential that is available when accounting for limitations of recovery technology using standard management practices. These filters along with other technical and structural framework conditions with the current technological considerations such as collection techniques and efficiencies, infrastructure and accessibility, processing techniques and other technical and social constraints limit the amount of biomass that can technically or actually be used for energy production. For these reasons and consequential considerations, the amounts of biomass that can technically be supplied as feedstock for electricity production (biopower), RNG or biomethane and co-produce heat or combined heat and power, and other value-added products are substantially less than gross or theoretical potential.

Economic Biomass Potential

Economic constraints further limit development or utilization of the residual biomass resources. The economic potential is the fraction of the technical potential which meets criteria of economic cost competitiveness within the given framework conditions and other economic, environmental and sustainability considerations in the SMUD Region.

4.2 Methodology and Biomass Potential

This section details the manner by which the resource potentials are calculated based on publicly available information sources and interviews with relevant stakeholders.

4.2.1 Gross Biomass Potential

The gross biomass potential for organic resources was developed using 2016 CalRecycle Waste Characterization data across the entire County of Sacramento. Organic material suitable for bioenergy production include the categories of:

- Food
- Leaves and Grass
- Prunings and Trimmings
- Branches and Stumps
- Manures
- Other Miscellaneous Paper – Compostable
- Remainder/Composite Paper – Compostable

Clean construction and demolition material is not included in this assessment as it is not an organic feedstock that is expected to be mixed with food waste. CalRecycle Waste Characterizations identified the following characteristics of organic waste in the Sacramento region.

Table 1. Gross Availability of Food/Organic Waste by Collection Type

Material Type	Commercial Material Tons Disposed	Commercial Material Tons in Curbside Recycle	Commercial Material Tons in Curbside Organics	Commercial Material Tons in Other Diversion	Material Tons Single Family Residential	Material Tons Generated (Sum of all Streams)
Other Miscellaneous Paper - Compostable	2,348	1,853	322	93	653	5,269
Remainder / Composite Paper - Compostable	54,564	589	116	351	23,358	78,978
Food	128,125	1,869	7,579	21,211	74,905	233,689
Leaves and Grass	17,263	7	44,278	2,502	6,976	71,026
Prunings and Trimmings	8,156	166	724	7,065	5,965	22,076
Branches and Stumps	1,459	565	0	352	2,381	4,757
Manures	460	0	0	0	16	476
Total	**212,375**	**5,049**	**53,019**	**31,574**	**114,254**	**416,271**

The total gross availability of food waste/organic waste is summarized in Table 2. Energy conversion factors are the average of the distributed generation (DG) low and DG high categories along with renewable natural gas (RNG) low and RNG high categories identified by Black & Veatch in the most recent greater Sacramento region resource assessment.[3]

Table 2. Gross Availability of Food Waste/Organic Waste by Sector

Material Type	Commercial Tons	%	Residential Tons	%	Total (Wet Tons)	Moisture Content	Total (Dry Tons)
Other Miscellaneous Paper - Compostable	4,616	88%	653	12%	5,269	70%	**1,581**
Remainder / Composite Paper - Compostable	55,620	70%	23,358	30%	78,978	70%	**23,693**
Food	158,784	68%	74,905	32%	233,689	70%	**70,107**
Leaves and Grass	64,050	90%	6,976	10%	71,026	65%	**24,859**
Prunings and Trimmings	16,111	73%	5,965	27%	22,076	35%	**14,349**
Branches and Stumps	2,376	50%	2,381	50%	4,757	35%	**3,092**
Manures	460	97%	16	3%	476	80%	**95**
Total	**302,017**	**73%**	**114,254**	**27%**	**416,271**		**137,777**

Table 3. Energy Potential based on Gross Availability

Material Type	Total (Dry Tons)	DG Energy Conversion (kW/ BDT/yr)	DG MW Available	RNG Energy Conversion (kW/BDT/yr)	RNG MW Available
Other Miscellaneous Paper - Compostable	**1,581**	0.159	**0.3**	0.211	**0.3**
Remainder / Composite Paper - Compostable	**23,693**	0.159	**3.8**	0.211	**5.0**
Food	**70,107**	0.159	**11.1**	0.211	**14.8**
Leaves and Grass	**24,859**	0.0825	**2.1**	0.109	**2.7**
Prunings and Trimmings	**14,349**	0.0825	**1.2**	0.109	**1.6**
Branches and Stumps	**3,092**	0.0825	**0.3**	0.109	**0.3**
Manures	**95**	0.0735	**0.0**	0.0975	**0.0**
Total	**137,777**		**18.7**		**24.7**

It should be noted that residential source separated organics are not reported in the CalRecycle database. Since this material is already collected, it will not impact the final economic potential

[3] Final Report Biomass Smart Mechanisms Study in SMUD Service Territory, Oct 2017. Energy potential is calculated as the product of the total tonnage available and the appropriate energy conversion factor.

results. However, based on the findings of the workshops, there is significant potential for this collected organics stream to be processed locally instead of outside the region.

4.2.2 Technical Biomass Potential

Technical availability incorporates screens evaluating the operational and managerial feasibility of actually collecting and procuring feedstock. To determine technical availability from the collection routes, a recovery factor of 67% is applied to the gross availability for Commercial Material Tons Disposed, Material Tons in Curbside Recycling, and Material Tons Single Family Residential (per Table 1), consistent with the factor utilized in the most recent California Biomass Collaborative statewide resource assessment. A collection factor of 100% is applied to Commercial Material Tons in Curbside Organics and Commercial Material Tons in Other Diversion (per Table 1) as these resources are already being collected for alternative use.

Table 4. Technical Organics Availability by Material Type by Collection Type

Material Type	Commercial Material Tons Disposed	Commercial Material Tons in Curbside Recycle	Commercial Material Tons in Curbside Organics	Commercial Material Tons in Other Diversion	Material Tons Single Family Residential	Material Tons Generated (Sum of all Streams)
Other Miscellaneous Paper - Compostable	1,573	1,242	322	93	438	3,667
Remainder / Composite Paper - Compostable	36,558	395	116	351	15,650	53,069
Food	85,844	1,252	7,579	21,211	50,186	166,072
Leaves and Grass	11,566	5	44,278	2,502	4,674	63,025
Prunings and Trimmings	5,465	111	724	7,065	3,997	17,361
Branches and Stumps	978	379	0	352	1,595	3,303
Manures	308	0	0	0	11	319
Total	**142,291**	**3,383**	**53,019**	**31,574**	**76,550**	**306,817**

Table 5. Technical Availability of Food Waste/Organic Waste by Sector

Material Type	Commercial Tons	%	Residential Tons	%	Total (Wet Tons)	Moisture Content	Total (Dry Tons)
Other Miscellaneous Paper - Compostable	3,230	88%	438	12%	3,667	70%	**1,100**
Remainder / Composite Paper - Compostable	37,420	71%	15,650	29%	53,069	70%	**15,921**
Food	115,886	70%	50,186	30%	166,072	70%	**49,822**
Leaves and Grass	58,351	93%	4,674	7%	63,025	65%	**22,059**
Prunings and Trimmings	13,365	77%	3,997	23%	17,361	35%	**11,285**
Branches and Stumps	1,708	52%	1,595	48%	3,303	35%	**2,147**
Manures	308	97%	11	3%	319	80%	**64**
Total	**230,267**	**75%**	**76,550**	**25%**	**306,817**		**102,397**

Table 6. Energy Potential based on Technical Availability

Material Type	Total (Dry Tons)	DG Energy Conversion (kW/ BDT/yr)	DG MW Available	RNG Energy Conversion (kW/BDT/yr)	RNG MW Available
Other Miscellaneous Paper - Compostable	**1,100**	0.159	**0.2**	0.211	**0.2**
Remainder / Composite Paper - Compostable	**15,921**	0.159	**2.5**	0.211	**3.4**
Food	**49,822**	0.159	**7.9**	0.211	**10.5**
Leaves and Grass	**22,059**	0.0825	**1.8**	0.109	**2.4**
Prunings and Trimmings	**11,285**	0.0825	**0.9**	0.109	**1.2**
Branches and Stumps	**2,147**	0.0825	**0.2**	0.109	**0.2**
Manures	**64**	0.0735	**0.0**	0.0975	**0.0**
Total	**102,397**		**13.6**		**18.0**

4.2.3 Economic Availability

Economic availability is evaluated in two categories: material that is currently available via existing collection routes (Table 7) and potential for new recovery (Table 9).

Table 7. Current Market Economic Availability

Material Type	Commercial Material Tons in Curbside Organics	Commercial Material Tons in Other Diversion	Material Tons Collected	Moisture Content	Total (Dry Tons)
Other Miscellaneous Paper - Compostable	322	93	415	70%	**125**
Remainder / Composite Paper - Compostable	116	351	467	70%	**140**
Food	7,579	21,211	28,790	70%	**8,637**
Leaves and Grass	44,278	2,502	46,780	65%	**16,373**
Prunings and Trimmings	724	7,065	7,789	35%	**5,063**
Branches and Stumps	0	352	352	35%	**229**
Manures	0	0	0	80%	**0**
Total	**53,019**	**31,574**	**84,593**		**30,566**

Table 8. Potential Energy Production from Current Market Economic Availability

Material Type	Total (Dry Tons)	DG Energy Conversion (kW/ BDT/yr)	DG MW Available	RNG Energy Conversion (kW/BDT/yr)	RNG MW Available
Other Miscellaneous Paper - Compostable	**125**	0.159	**0.0**	0.211	**0.0**
Remainder / Composite Paper - Compostable	**140**	0.159	**0.0**	0.211	**0.0**
Food	**8,637**	0.159	**1.4**	0.211	**1.8**
Leaves and Grass	**16,373**	0.0825	**1.4**	0.109	**1.8**
Prunings and Trimmings	**5,063**	0.0825	**0.4**	0.109	**0.6**
Branches and Stumps	**229**	0.0825	**0.0**	0.109	**0.0**
Manures	**0**	0.0735	**0.0**	0.0975	**0.0**
Total	**30,566**		**3.2**		**4.2**

The 84,593 tons (30,566 dry tons) per year currently collected represents 27.6% of the total technically-available feedstock source. Today's availability is dominated by food waste that is diverted as self-haul by the generator (Other Diversion column) and curbside green waste, specifically leaves and grass and prunings and trimmings from landscaping. The food waste fraction appears to be going to land application, animal feed, and local anaerobic digestion. The curbside green waste appears to be going to composting facilities or use as ADC.

Improving the infrastructure, collection systems, and the market for organic wastes has the potential to dramatically improve that utilization of organic waste material in the region.

Table 9. Potential for Additional Resource Recovery

Material Type	Commercial Material Tons Disposed	Commercial Material Tons in Curbside Recycle	Residential Single Family Tons	Material Tons Collected	Moisture Content	Total (Dry Tons)
Other Miscellaneous Paper - Compostable	1,573	1,242	438	3,252	70%	**976**
Remainder / Composite Paper - Compostable	36,558	395	15,650	52,602	70%	**15,781**
Food	85,844	1,252	50,186	137,282	70%	**41,185**
Leaves and Grass	11,566	5	4,674	16,245	65%	**5,686**
Prunings and Trimmings	5,465	111	3,997	9,572	35%	**6,222**
Branches and Stumps	978	379	1,595	2,951	35%	**1,918**
Manures	308	0	11	319	80%	**64**
Total	**142,291**	**3,383**	**76,550**	**222,224**		**71,831**

Table 10. Potential Energy Production from Additional Resource Recovery

Material Type	Total (Dry Tons)	DG Energy Conversion (kW/ BDT/yr)	DG MW Available	RNG Energy Conversion (kW/BDT/yr)	RNG MW Available
Other Miscellaneous Paper - Compostable	**976**	0.159	**0.2**	0.211	**0.2**
Remainder / Composite Paper - Compostable	**15,781**	0.159	**2.5**	0.211	**3.3**
Food	**41,185**	0.159	**6.5**	0.211	**8.7**
Leaves and Grass	**5,686**	0.0825	**0.5**	0.109	**0.6**
Prunings and Trimmings	**6,222**	0.0825	**0.5**	0.109	**0.7**
Branches and Stumps	**1,918**	0.0825	**0.2**	0.109	**0.2**
Manures	**64**	0.0735	**0.0**	0.0975	**0.0**
Total	**71,831**		**10.4**		**13.7**

Table 9 shows that food waste and compostable papers represent approximately 89% of the available megawatt potential. Of the food and compostable paper material that has yet to be recovered, approximately two-thirds is in the commercial sector.

Table 11. Sources of Food and Compostable Paper Feedstock

Material Type	Commercial Tons	%	Residential Tons	%	Total (Wet Tons)	Total (Dry Tons)	Eco. MW
Other Miscellaneous Paper - Compostable	2,815	86.5%	438	13.5%	3,252	976	0.2
Remainder / Composite Paper - Compostable	36,953	70.2%	15,650	29.8%	52,602	15,781	2.5
Food	87,096	63.4%	50,186	36.6%	137,282	41,185	6.5
Total	**126,863**	**65.7%**	**66,274**	**34.3%**	**193,137**	**57,941**	**9.2**

Table 12. Energy Potential from Sources of Food and Compostable Paper Feedstock

Material Type	Total (Dry Tons)	DG Energy Conversion (kW/ BDT/yr)	DG MW Available	RNG Energy Conversion (kW/BDT/yr)	RNG MW Available
Other Miscellaneous Paper - Compostable	976	0.159	**0.2**	0.211	**0.2**
Remainder / Composite Paper - Compostable	15,781	0.159	**2.5**	0.211	**3.3**
Food	41,185	0.159	**6.5**	0.211	**8.7**
Total	**57,941**		**9.2**		**12.2**

4.2.3.1 Commercial Sector

To better understand the potential for additional recovery, Table 13 shows the fraction by business that is potentially available and already captured.

Table 13. Commercial Food and Compostable Paper Organics by Business Type

Business Group	Current Recovery (wet tons)	%	Potential Recovery (wet tons)	%	Potential Recovery (dry tons)
Restaurants	4,191	12.6%	29,135	87.4%	8,741
Multifamily	353	1.9%	18,595	98.1%	5,578
Services - Professional, Technical, & Financial	176	1.1%	15,514	98.9%	4,654
Retail Trade - All Other	89	0.7%	13,019	99.3%	3,906
Services – Mgmt., Admin., Support, & Social	73	0.6%	11,773	99.4%	3,532
Medical & Health	201	2.6%	7,594	97.4%	2,278
Public Administration	251	3.3%	7,418	96.7%	2,225
Education	276	4.9%	5,405	95.1%	1,622
Arts, Entertainment, & Recreation	471	8.8%	4,890	91.2%	1,467
Retail Trade - Food & Beverage Stores	14,800	78.2%	4,118	21.8%	1,235
Manufacturing - Food & Nondurable Wholesale	2,812	47.8%	3,077	52.2%	923
Hotels & Lodging	121	6.9%	1,650	93.1%	495
Not Elsewhere Classified	3,513	69.2%	1,563	30.8%	469
Durable Wholesale & Trucking	19	1.6%	1,154	98.4%	346
Services - Repair & Personal	2,300	68.9%	1,039	31.1%	312
Manufacturing - All Other	0	0.0%	724	100.0%	217
Manufacturing -Electronic Equipment	27	12.2%	196	87.8%	59
Total	**29,673**	**19.0%**	**126,863**	**81.0%**	**38,059**

Table 14. Energy Potential from Commercial Food and Compostable Paper by Business Type

Business Group	Potential Recovery (dry tons)	DG Energy Conversion (kW/ BDT/yr)	DG MW Available	RNG Energy Conversion (kW/BDT/yr)	RNG MW Available
Restaurants	8,741	0.159	1.4	0.211	0.3
Multifamily	5,578	0.159	0.9	0.211	0.1
Services - Professional, Technical, & Financial	4,654	0.159	0.7	0.211	0.3
Retail Trade - All Other	3,906	0.159	0.6	0.211	0.1
Services – Mgmt., Admin., Support, & Social	3,532	0.159	0.6	0.211	0.0
Medical & Health	2,278	0.159	0.4	0.211	0.2
Public Administration	2,225	0.159	0.4	0.211	0.0
Education	1,622	0.159	0.3	0.211	0.5
Arts, Entertainment, & Recreation	1,467	0.159	0.2	0.211	1.2
Retail Trade - Food & Beverage Stores	1,235	0.159	0.2	0.211	0.1
Manufacturing - Food & Nondurable Wholesale	923	0.159	0.1	0.211	0.5
Hotels & Lodging	495	0.159	0.1	0.211	1.8
Not Elsewhere Classified	469	0.159	0.1	0.211	0.8
Durable Wholesale & Trucking	346	0.159	0.1	0.211	0.3
Services - Repair & Personal	312	0.159	0.0	0.211	0.7
Manufacturing - All Other	217	0.159	0.0	0.211	1.0
Manufacturing -Electronic Equipment	59	0.159	0.0	0.211	0.1
Total	**38,059**		**6.1**		**8.0**

Restaurants and multi-family waste streams are the two largest sources of food/organic waste material. Table 13 shows that most business sectors are not effectively capturing food/organic waste. However, notably, food and beverage retail stores are leading the way in food/organic waste collection.

4.2.3.2 Residential Sector

CalRecycle data has significantly less data available for the residential sector. In Sacramento County, there are no commercial residential organics collection systems. While there have been limited pilot efforts, no commercial collection has been implemented. This trend is predominantly driven by the lack of infrastructure for processing facilities and the cost of source separating two organics streams, residential food and residential green waste. Consequently, Table 15 shows the feedstock that is currently economically available and potentially recoverable.

Table 15. Residential Economic Availability and Potential

Single Family Residential	Currently Recovered	%	Potential Recovery (wet tons)	%	Potential Recovery (dry tons)
Other Miscellaneous Paper - Compostable	0	0.0%	438	100.0%	131
Remainder / Composite Paper - Compostable	0	0.0%	15,650	100.0%	4,695
Food	0	0.0%	50,186	100.0%	15,056
Total	**0**	**0.0%**	**66,274**	**100.0%**	**19,882**

Table 16. Energy Potential from Residential Economic Availability and Potential

Single Family Residential	Potential Recovery (dry tons)	DG Energy Conversion (kW/ BDT/yr)	DG MW Available	RNG Energy Conversion (kW/BDT/yr)	RNG MW Available
Other Miscellaneous Paper - Compostable	131	0.159	**0.0**	0.211	**0.0**
Remainder / Composite Paper - Compostable	4,695	0.159	**0.7**	0.211	**1.0**
Food	15,056	0.159	**2.4**	0.211	**3.2**
Total	**19,882**		**3.1**		**4.2**

In summary, there is significant potential to better utilize food/organic waste resources across the SMUD service territory. With 10.4 DG MW and 13.7 RNG MW of not-yet-recovered material in the county (Table 10), of which 9.2 DG MW and 12.2 RNG MW is available as food waste and compostable paper (Table 12). Two-thirds of this material is available through commercial collection routes and the remaining third is available in the residential sector.

5 Barriers/Challenges and Opportunities

Based on the resource assessment, the three most prominent sources of food/organic waste material are restaurants, multi-family housing, and residential housing. Throughout the state of California, significant policy levers have been utilized to improve the market for commercial food waste collection systems, directly impacting hundreds of commercial customers within the SMUD territory.

The waste collection industry in the Sacramento Region is a highly competitive and highly regulated industry. While SMUD is not a regulating agency in this space, SMUD has a unique interest in the renewable electricity opportunities (including distributed generation and renewable natural gas production) that can be derived from more careful and coordinated collection of food/organic resources.

SMUD engagement can take two fundamental approaches to help reduce the cost of organics collection and conversion to energy: infrastructure development and market champion. These pathways are not mutually exclusive and should be implemented on a parallel pathway.

5.1 Infrastructure Development Challenges

Cost is the number one challenge facing the industry when collecting new organic resources. The costs of organic waste collection service are driven by a combination of transportation costs and tip fees for the processing of materials. For each commercial customer, haulers balance these costs to provide a competitive price. Transportation costs are driven by the geographic location and density of disposal facilities and the ability for these facilities to accept specific organic waste types.

5.1.1 Challenge: Transportation Costs

With the implementation of AB 1826, organics routes can be collected and directly transferred to organics processing facilities. Organic waste from the Sacramento area go to a variety of processing facilities (Figure 1 and Table 17).

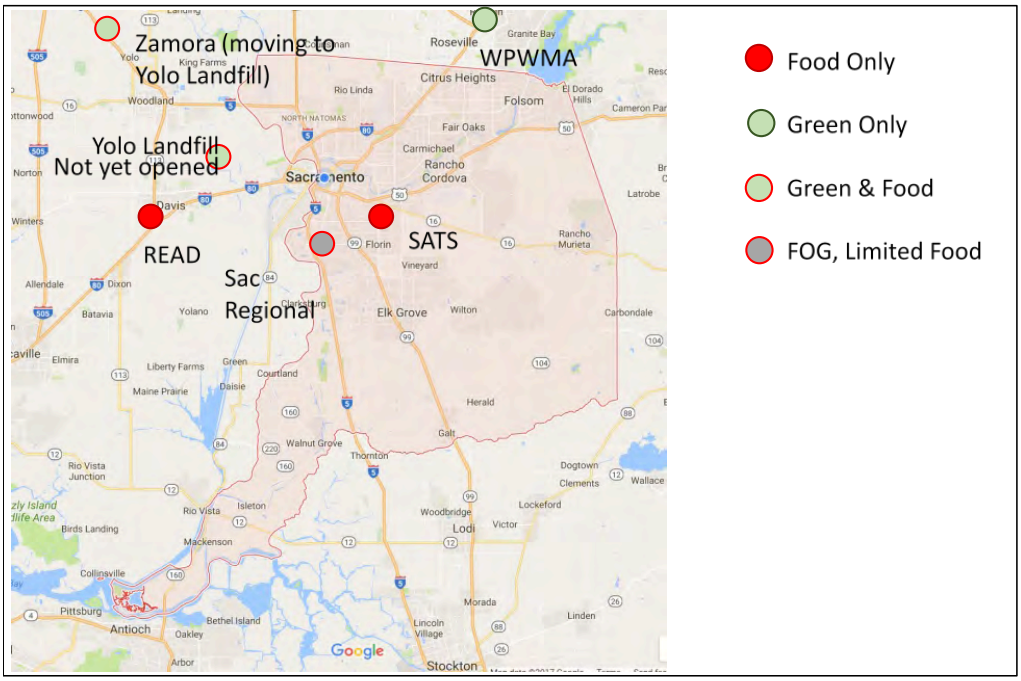
Table 17. Regional Organic Waste Facilities

Facility Name	County	Waste Accepted	Conversion	Capacity
South Area Transfer Station (SATS) Biodigester	Sacramento	Packaged food and liquid waste, clean food waste, bagged food waste including meat and dairy	AD	100 TPD
Sacramento Regional WWTP	Sacramento	FOG, Food Processing Waste (liquid)	AD	42,000 gallons per day
Silva Ranch	Sacramento	Fruit and vegetable based food waste (no dairy or meat, no packaging)	Land Application	Not available
Western Placer Waste Management Authority	Placer	Green	Compost	250 TPD

Facility Name	County	Waste Accepted	Conversion	Capacity
Renewable Energy Anaerobic Digester	Yolo	Packaged food and liquid waste, clean food waste, bagged food waste including meat and dairy	AD	50 TPD
Zamora (Northern Recycling Compost)*	Yolo	Green & Food	Compost	300 TPD
Yolo Landfill	Yolo	Green & Food	AD & Compost	500 TPD
Recology Jepson Prairie	Solano	Green & Food	Compost	750 TPD
Ostrom Road (Recology)**	Yuba	Green and Food	Compost	400 TPD (2018) 1,000 TPD (2022) 2,000 TPD (2027)
Forward	San Joaquin	Green & Food	Compost	50,000 TPY
City of San Jose	Santa Clara	Green & Food	AD & Compost	90,000 TPY

**Moving operations to Yolo County Landfill*
*** Currently conducting CEQA process*

Figure 1. Geographic Distribution of Organic Waste Facilities in Sacramento County and Neighboring Counties



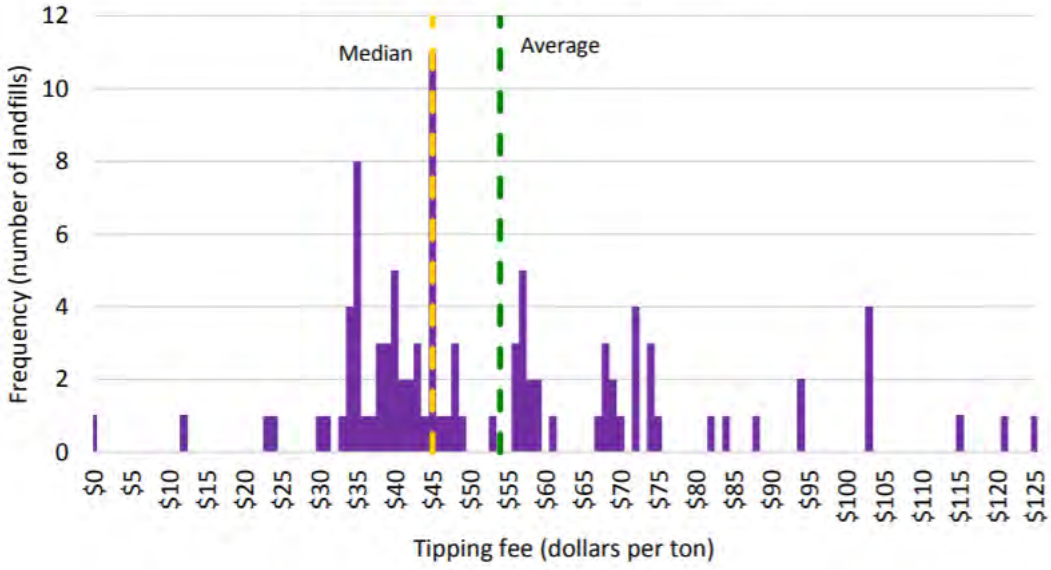
In stakeholder meetings conducted as part of this project, local area haulers identified the importance of a "north-of-the-river" and "south-of-the-river" solution for green and food waste. This potential addresses a significant transportation challenge specific to the Sacramento region. The American River divides the county into a northern and southern region. These regions are largely accessed by Highway 80 (north side) and Highway 50 (south side). There are many secondary roadways that cross the river; however, only Business Highway 80 and Interstate 5 allow for high-speed transit to these different areas. Both of these access points are very close to each other in the heart of the Sacramento downtown/midtown area and do not allow for effective access to the other side from any of the suburban areas to the east of the City, increasing the cost of transportation of organic material due to long transit distances and slow traffic increasing transit times.

The City and County of Sacramento have addressed this challenge for its existing collection routes with the North Area Transfer Station and the South Area Transfer Station (currently host to the SATS Anaerobic Digester). However, it was clearly identified in stakeholder meetings that there is currently no outlet for organic waste north of the river.

5.1.2 Challenge: Tip Fees

In the Sacramento area, tip fees are low compared to the rest of California (Figure 2). Tip fees are the fees paid for to drop material at the landfill.

Figure 2. Tip Fees Across California



Source: CalRecycle, Landfill Tip Fees in California. February 2015

At approximately $30 per ton at Keifer Landfill,[4] the Sacramento Area has one of the lowest in the state. Only 12 percent of all landfills charge between $0 and $35 per ton.[5] The tip fee

[4] http://www.wmr.saccounty.net/PublishingImages/Pages/KieferLandfill/KieferRate2015.pdf
[5] CalRecycle. "Landfill Tip Fees in California" February 2015. http://www.calrecycle.ca.gov/publications/Documents/1520%5C20151520.pdf

represents the value that can be received by a bioenergy project utilizing the same waste. In the Bay Area, where tip fees can exceed $90 per ton, the value of converting that waste to bioenergy is three approximately times higher than it is in the Sacramento area.

The tips fee in Sacramento is regulated by the SWA and is influenced by the lifespan of the facility and a variety of political pressures. Currently, Keifer Landfill has a life expectancy of at least another 50 years.[6]

Lastly, market prices to utilize food and green waste in composting and anaerobic digestion facilities has been driven by the high Bay Area tip fees. To avoid $90+ per ton fees in the Bay Area, haulers will transport organic feedstock to facilities in the Central Valley and pay more for disposal than local haulers can afford with their existing rate structures. The fact that Sacramento maintains a competitive commercial market makes it challenging to raise collection rates to adjust to new sustainability efforts as the first mover is often penalized with a loss in market share.

5.1.3 Challenge: Cost of Infrastructure Reliability

Stakeholders identified challenges associated with the ability of existing facilities to handle the types feedstock and variety of contamination in the organics that are being collected. Specifically, for food waste, the SATS biodigester as historically experienced periodic shutdown due to feedstock contamination. The uncertainty of the system's availability makes it challenging for the local haulers to manage food waste collection in a cost-effective manner if there is not a reliable outlet for food waste. Additionally, for green waste, there are no facilities in Sacramento County that accept green waste. The lack of infrastructure results in long haul transportation to facilities that can accept the material.

5.1.3.1 Case Study: SATS Challenges

Although the SATS Biodigester began operations several years ago (Fall 2012), it has had numerous issues and challenges, both technical and regulatory. One of the biggest challenges is that of obtaining sufficient food waste to meet the capacity of the biodigester system, now rated at 100 tons per day (TPD). On the average, food waste coming to the SATS facility has been below 50 TPD. Indeed, this deficit has been one of the reasons SMUD has initiated food and organic waste collection studies in the Sacramento area.

The SATS biodigester, in addition to not being able to process green waste, which is a very significant organic waste stream in the Sacramento area, has also had difficulties with wastes related to food, such as food-soiled paper plates and containers, both of compostable and non-compostable varieties. This has led SATS to not accepting such wastes anymore.

On the regulatory side, one of SATS biggest challenges has been the extensive number of odor complaints the facility has had over the last few years. These odor complaints appear to have been caused by facility operations and leaks from the digester tanks themselves. Additional odors disturbing the SATS neighbors also appear to have been caused by the open-air receiving area of the SATS facility. In regards to tank leakage of biogas as recently as June 2017, SATS has petitioned the Sacramento Metropolitan Air Quality Management District to allow some

[6] http://www.saccounty.net/news/latest-news/Pages/Kiefer-Landfill-Celebrates-Major-Milestone.aspx

minor leakage of biogas until the facility can retrofit and/or replace the facility tanks and stop the leakage. The facility is also examining the construction of a building in which food waste will be received. The current owners of the SATS Biodigester[7] have indicated that they will conduct the repairs, replacements, and building construction at the facility. The current owners have also indicated that they would like food and organic waste coming to their facility to already be in liquid or slurried form[8]

5.2 Infrastructure Development Opportunities

Bioenergy from food/organic wastes can be produced primarily through anaerobic digestion technologies that create biogas. The biogas can be injected into the SMUD-owned pipeline or can be utilized onsite to produce renewable distributed power. Developing the infrastructure to accept food/organic waste locally provides important market certainty to feedstock collectors and processers as new routes and technologies are implemented to collect food/organic waste. With a robust network of infrastructure, private investment risk can be mitigated through long-term feedstock offtake contracts at attractive market rates. The coordination of public and private investment is a role that SMUD has significant experience with. SMUD has the opportunity to provide attractive long-term renewable energy offtake agreements for new infrastructure investment along with supporting grant fund applications. This cooperative and collaborative partnership is essential to developing a market for food/organic material in the area.

Case Study: Sacramento Biodigester and Atlas Refuel

> In 2013, CleanWorld's Sacramento Biodigester located at the South Area Transfer Station (SATS) won the Renewable Energy World-Power Engineering "International Bioenergy Project of the Year." The project vaulted Sacramento to the forefront of the world as a central hub for the clean technology industry. Since the initial launch as a 25 ton per day facility, CleanWorld has been able to expand its operations to 100 tons per day. The CleanWorld Biodigester is co-located with Atlas Refuel, a natural gas fueling station used by several of the region's bus fleets and heavy-duty truck fleets. With the passing of AB 32 the landmark legislation requiring green house gas (GHG) emissions reduced to 1990 levels by 2020, and to a level 80% below 1990 levels by 2050, the Greater Sacramento Region was under intense pressure to develop strategies and programs for projects in the area.
>
> SMUD also has direct interaction and coordination with the Sacramento Biodigester. SMUD was a partner with CleanWorld in its initial, and successful, grant application to the California Energy Commission (CEC) for funding to build the Sacramento Biodigester. SMUD, and contractors, have also performed other CEC-funded research activities at the Sacramento Biodigester and participated in additional grant funding application opportunities.
>
> The Atlas Refuel project began as a response to a request for proposals from the County of Sacramento to repurpose the South Area Transfer Station (SATS) - a waste transfer

[7] CleanWorld Partners, the original owner and developer of the SATS Biodigester, completed sale of the facility in early 2017.

[8] Personal communication with SAT Biodigester, October 26, 2017

facility that had been closed for years, located in the heart of the Sacramento non-attainment area. It is a public private partnership between the City and County of Sacramento, Atlas Disposal and CleanWorld that would provide the Capital Region with the nation's first commercial scale anaerobically derived (AD) renewable natural gas (RNG) fueling facility.

The project was first in the nation to prove that the AD based RNG with its negative carbon footprint, is actually better for engines than conventional natural gas while developing a commercial demand for RNG and that continues to grow exponentially.

The Atlas ReFuel facility continues to provide many economic and environmental benefits. It is a sustainable, ecological alternative that reduces dependence on fossil fuel and foreign oil and it delivers a critically needed alternative to landfilling organics while creating a product that is priced competitively with fossil based natural gas. The project has reduced GHG by over 13,000 metric tons of CO2 each year and has a lasting effect on the overall quality of our environment and public health.

Case Study: Sacramento Regional County Sanitation District

In 2009, SMUD partnered with the Sacramento Regional County Sanitation District (SRCSD) in conducting a Biogas Enhancement pilot test that examined the feasibility of using food and organic based wastes such as fats, oils, and grease (FOG) and liquid food processing wastes. The examination included injection of these wastes directly into an anaerobic digester at the Sacramento Regional Water Treatment Plant (SRWTP). The pilot testing at the SRWTP confirmed that the injection of FOG and food processing wastes into the SRWTP digesters improved overall biogas production and would result in the production of additional electricity from a renewable source such as food and organic wastes.

Continuing into the next phase, SMUD and the SRSCD received funding from the U.S. Department of Energy for the construction of the SRWTP Biogas Enhancement Facility in 2010. In 2013, the Biogas Enhancement Facility was completed and began receiving waste as a new regional disposal option for commercial haulers of FOG and liquid food processing wastes. The additional biogas produced is used by SMUD to generate renewable energy SMUD's Consumes Power Plant located in southern Sacramento County. The additional biogas is combined with the biogas already coming from the SRWTP, and conveyed to the SMUD power plant through the SMUD owned gas pipeline system.

5.2.1 Opportunity: Develop Dry Fermentation

The cost to haul material is very expensive. With the north-south geographic transit challenges facing the Sacramento Area, it is imperative that infrastructure is developed on the north and south side of the American River to reduce haul distances.

However, even before addressing the north-south challenge, the region faces a severe issue with green waste. There are no facilities in the Sacramento area that can accept green waste; stranding more than 150,000 tons per year of green waste without a Sacramento County outlet. This material is currently transported long distances across the Central Valley (both north and south)

to find adequate composting capacity. It is imperative that a green waste facility be created in the Sacramento area to accept this feedstock.

The addition of an accessible green waste facility (dry fermentation) would open up the potential to collect residential food waste. Similar to the collection methods used in the City of Davis, green waste and food waste can be co-mingled in the existing yard waste bins and processed at a single facility. The City and County of Sacramento clearly stated that a fourth food waste bin was not an economically feasible option for the region due to the additional cost of collection.

In stakeholder meetings, the County of Sacramento was identified as a critical leader in the development of any new facility that can accept green waste. The County and the City both manage over 150,000 wet tons per year of urban green waste collected from residential routes. The City works closely with the County's transfer stations to manage this material, putting the County in the lead position as the ultimate manager of much of the region's material. Unlike the commercial sector, where there is fierce competition between haulers to keep costs low and retain customers, the City and County have exclusive access to their collection streams. This non-competitive access puts the City and County in a position to better absorb some of the financial risk associated with long-term feedstock contracting that is necessary to support new development.

5.2.2 Opportunity: Promote and Improve Existing Facilities

When evaluating opportunities for regional infrastructure improvement, it is important that strategies are developed in a way to support and leverage the existing regional assets. The ability for existing facilities to tolerate contamination in the waste stream was frequently acknowledge in the stakeholder workshops. Efforts to improve the pre-processing capabilities of the existing local infrastructure would help improve the availability of these facilities and reduce the costs to waste haulers associated with finding alternative outlets.

Existing facilities include the dedicated food waste facility at SATS and the Sacramento Regional WWTP. Outside of SMUD territory, this includes the READ facility and the Yolo County landfill. At this time, none of these facilities are operating at full capacity. In some cases, the challenges have been technical, lack of feedstock, or business models that incentivize the transportation of organics outside of the region. Below is a list of potential areas of improvement for each of the existing regional projects that would help these facilities better serve the needs of the area:

- SATS Digester: Develop more robust pre-processing infrastructure (on-site or off-site) so that SATS can utilize a wider range of feedstock with more variable contaminations. Additionally, pipeline injection infrastructure may reduce costs compared to use directly at the Atlas Refuel station. Lastly, the co-location of a green waste processing facility would significantly impact that viability of the SATS project by providing an outlet for digestate management that could also benefit from green waste tip fees. This type of co-location is being utilized at anaerobic digestion sites across the state.
- READ Facility: Develop more robust pre-processing infrastructure so that READ can utilize a wider range of feedstock. This may have limited impact to SMUD since this facility contracts directly with UC Davis for the sale of its electricity.

- Yolo County Landfill/Biodigester: The SMUD pipeline runs in close proximity to the Yolo County's new anaerobic digestion system. This could be a cost-effective mechanism to bring new bioenergy into SMUD's service territory. Additionally, the new composting facility may be an appropriate target for high solids AD as it will be the closest facility that can accept green waste to Sacramento's urban center.
- Sacramento Regional WWTP: Improve the biosolids management infrastructure. One of the biggest challenges with accepting additional organics is the back-end challenging of managing additional biosolids. Innovative new technologies and methodologies may reduce the cost of biosolids management and encourage the WWTP to lower prices and accept more organic material.
- South County Dairies: SMUD has been a leader in promoting dairy digesters. Dairy digesters can dramatically improve performance with the addition of food waste for co-digestion. While only a small amount of food waste may be available within an economic haul distance, several of the south county urban areas (e.g. Galt, southern Elk Grove) may find it most cost-effective to bring organics to these facilities for co-digestion.

5.2.3 Opportunity: Conversion of Composting to Anaerobic Digestion

Siting and permitting remain some of the biggest barriers to new facilities. The SMUD service territory consists of a large urban center concerned about the impacts of an organic waste processing center near their homes. NIMBY issues have stopped composting and anaerobic digestion projects in the past and are expected to continue to be a major issue for future development. One mechanism to reduce the friction associated with development is to target the conversion of composting facilities into high solids digesters. The transition from composting to anaerobic digestion is traditionally viewed favorably by the local air district and the state regional water quality control board facilitating an easier permit modification. Additionally, the advantage of reduced odor may garner support by nearby residential neighborhoods and businesses.

Converting these facilities to dry fermentation to capture the energy value of the existing resources could streamline and accelerate SMUD's ability to generate more local renewable energy from biomass resources. These facilities may also be appropriate to permit with co-mingled food waste to help facilitate the adoption of local policies that improve food waste collection.

5.3 Market Champion Challenges

The infrastructure development focuses on the back end of the biomass to energy pathway, the conversion technologies and energy markets. An alternative approach, Market Champion, focuses on the front-end of the pathway—the generator. Many of SMUD's customers are food/organic waste generators. SMUD is in a unique position in the region because it interacts with all of these generators. The waste service providers—principally Atlas Disposal, Republic Services, and Waste Management—do not have this level of customer interface and the regulating agencies—principally the SWA and CalRecycle—do not have direct customer engagement on a broad-scale or regular basis. SMUD has a history of engaging the community at large to foster the growth of an industry through collaborative planning.

SMUD has a long history of serving as a market champion, deploying emerging alternative energy technologies to benefit the community it serves looking forward into the future.

5.3.1 Challenge: Multiple Points of Communication

Sacramento County area is one of the few remaining competitive waste management systems without a single franchised waste hauler. The dynamics of this market have keep the cost of waste collection services low; however, this system can also stifle innovation. With multiple waste service providers, there is no unifying leader across the region. At this point in time, the County's SWA is the stakeholder that most closely resembles a single-point leader; however, since its role is also one of regulation, the SWA will always struggle to be a strong advocate in the community.

5.4 Market Champion Opportunities

SMUD is well positioned to solidify its position as a community leader and sustainability activist as a food waste market champion. With the expansion of the scope and role of the Biomass Technical Advisory Group (BTAG), this collaboration could become the permanent "home" for actions and discussions amongst partners involved in the Information Exchange and Promotion and Visibility elements of this plan. BTAG could serve an important role as a neutral third-party facilitator between interested stakeholders.

5.4.1 Opportunity: Information Exchange

The stakeholder meetings conducted throughout this process demonstrated a clear need for peer-to-peer information exchange. There are many early-adopters and sustainability leaders within the community that have years of experience with food waste diversion. However, there is no organized way for business colleagues to learn from these efforts.

SMUD serves a central role in the Sacramento community as one of the only organizations that routinely interacts with almost every business and resident in the area. SMUD has the marketing reach and knowledge of local area businesses across industry sectors to be a leader in the promotion and facilitation of peer-to-peer education. SMUD exercise its leadership through partnerships with industry organizations and a dedicated effort to highlight the successes that already exist in the region.

Building familiarity with sustainable organic waste management will help new organizations adopt policies that improve the success of AB 1826. Instead of going at it alone, business need a resource network learn best practices, ask questions with the fear of approaching a regulatory body, and understand that they are not the first to implement cost-saving sustainability strategies.

With a central role as an industry facilitator, SMUD can foster the growth of food waste collection in the region through situational analysis of the current beliefs and behaviors of target audiences. Specific, measurable, realistic goals for the region can be set to provide a framework for programmatic messaging that will share common features and benefits that will be germane throughout the campaign. Target areas for SMUD's participation include advertising, direct mail, promotions, special events, website and landing pages, and mobile social media.

Successful information exchange programs use a systematic approach that takes place in six stages: Awareness, Interest, Evaluation, Trial, Adoption and Advocacy. This approach will take

the potential participants from start to finish and provide for the information gathering needed to set the stage for a broad roll out within the SMUS service area.

Awareness: This first stage is to create awareness about the program. It is important that SMUD develops a successful avenue for the target audience to become aware of the program. Key messaging with marketing materials, such as one-sheets, video teasers, images, and landing pages are all important ways to raise awareness. Materials need to be easily accessible. In this era of social media, many tools are available in the market that provide the techniques and methods to increase product awareness through social channels–enabling them to reach a large number of customers at a low cost.

Interest: In this stage potential participants are ready to learn more about the program. SMUD must guide the potential participants through the interest stage by providing easily accessible information on the program. Among the methods used in today's business landscape include a website describing the program, blog posts, tutorial or instructional videos, digital white papers, and other sources of info that the potential consumer can discover and review.

Evaluation: Prior to participating, potential participants will examine and evaluate the features, benefits of the program. Commonly, consumers go online and utilize social media channels to ask other individuals about programs and services. In addition, they find online reviews and recommendations. In order to simplify a potential participant's search and evaluation of the program, creating information that outlines what separates this program from others with an emphasis on the strengths of the program will encourage participation. Another great system to utilize is the webinar. This platform allows you to communicate with potential participant in depth with information about the program and it provides time for questions and answers.

Trial: This is the stage where the participant "kicks the tires." Nothing helps a participant make a decision about the program more than actually trying it out. There are many ways this can be accomplished. For example, the participant can be provided with a free trial or a proof of concept campaign. In this stage it is very important to set the customer expectations correctly and deliver on said expectations.

Adoption: When the participant enters the program adoption phase, they are ready to participate in the program. When they are at this stage, the process for full participation must be simple, intuitive, and pain free.

Advocacy: This stage is the point where when the participants have experienced a positive outcome related to the program and they are willing to share that result with others who may not yet be participating. This last step is the strongest link to determining a successful program.

SMUD should use this framework to develop an Outreach and Information Exchange program to engage interested stakeholders in a meaningful way.

5.4.1.1 Case Study: Electrification or Electric Vehicle Pathway

SMUD has evaluated the opportunity to utilize biomass energy for electric vehicle charging to capture the environmental benefits of this resource, specifically Low Carbon

Fuel Standard (LCFS) and Renewable Fuel Standard (RFS) or Renewable Identification Number (RIN) credits. This evaluation, authored by Black & Veatch and TSS Consultants,[9] identified the combined potential value of biomass to electricity for vehicle charging environmental credits to be $0.1615/kWh. This evaluation was conducted based on an LCFS carbon intensity of -34.70 gCO_2e/MJ (consistent with LCFS pathway CNG005), electricity conversion efficiency of 33.5%, an Energy Economy Ratio of 3.4 for light-duty vehicles, and the displacement gasoline with a carbon intensity of 99.78 gCO_2e/MJ (consistent with LCFS pathway CBOB001). These environmental attributes combined with the ratepayer price of electricity offer a compelling value proposition for SMUD to engage in more renewable biomass energy investment.

5.4.1.2 Case Study: Greenergy and SolarShares

SMUD launched its award-winning Greenergy program at the turn of the century as a way to introduce the viability of solar energy to its customers. Following on the heels of the California energy crisis, the utility was looking forward to alternative resources to augment the supply of electricity. Greenergy offers SMUD customers the opportunity to purchase renewable energy credits generated from alternative sources--such as solar and wind--for a small monthly premium on their electric bill. SMUD customers have responded positively over the years, voluntarily paying more for electricity to benefit the environment. Another example of marketing leadership is SMUD's SolarShares program. This innovative offering gives SMUD customers the opportunity to receive solar power without upfront costs or equipment installation, and makes the opportunity for utilizing solar power available to residents of multifamily dwelling or those who would not otherwise be able to install rooftop solar due to technical or financial feasibility.

5.4.1.3 Case Study: Biomass Technical Advisory Group (BTAG)

SMUD has been coordinating the BTAG group over the past several years, engaging key stakeholders in the examination of the feasibility of utilizing biomass for electricity and biomethane generation. In the evaluation of the technical potential for biomass generated electricity and biomethane, opportunities are emerging for advancing biomass utilization in the context of the broader community. Moving forward, this group can help identify technical and political barriers for utilizing biomass to the highest benefit for the community SMUD serves.

5.4.2 Opportunity: Promotion & Visibility

While sustainability is a long-term goal shared by most businesses and customers, the realities of running a business can make sustainable decisions challenging, particularly for early-adopters who incur additional costs ahead of a market-wide shift in prices. As AB 1826 affects smaller food and organic waste generators, the economics of transitioning to an organics collection program often become more challenging as the higher-volume customers have more flexibility in how service might change. For example, a Tier 1 generator, with four 4-yard bins taken five times per week may easily transition to two 4-yard trash bins taken twice a week and three 4-yard organics bins taken three times per week with no change in costs. However, a smaller

[9] Final Report Biomass Smart Mechanisms Study in SMUD Service Territory, Oct 2017

generator with only one 4-yard bin taken twice a week may need one 2-yard trash bin taken once a week and one 2-yard organics bin taken three times a week to add organics diversion. This compliance scenario adds two pick up times to the account, which may add significant cost. These examples do not include costs associated with any changes that need to be made to a generator's internal business operations to facilitate the transition to food and organic waste separation.

Promotion and recognition may be a way to incentivize generators to make the switch if such promotion and recognition results in additional business or an enhanced reputation/recognition from generators' customers. SMUD's extensive reach into the community, through television and radio, billboards, flyers, emails marketing, and billing inserts, among other avenues, could be used to promote and recognize early adopters in the community. Something as simple as a door decal program can provide value to generators via customer recognition and the resulting benefits to reputation. As well, SMUD is in a leadership position to help facilitate small competitions to promote innovation and sustainability around organics waste management, including partnering with existing local events to maximize publicity and impact (e.g. Farmers' markets, Second Saturday, Wide Open Walls, Cool CA, Business Environmental Resource Council (BERC)).

Promotion and recognition events and programs would be designed to reward early-adopters of innovative technologies with free advertising in key target markets tailored to the specific businesses. These low-cost activities can create high impact by helping to increase awareness among consumers of the importance of organics management as part of overall sustainability conversation and create friendly competition to improve the region.

5.5 Technology Opportunities

The anaerobic digestion industry is poised for rapid development. The Sacramento Region was one of the leaders in California with the development of the CleanWorld Sacramento Biodigester in 2013. The volume of applicants applying to both California Energy Commission research, development, and deployment (RD&D) programs and CalRecycle commercial demonstration programs clearly indicates a robust market that is ready for commercial deployment. The robust agency support does not show specific gaps in RD&D, deployment, or commercialization that SMUD should fill. Instead, the challenge for the market penetration of the technology is the business model.

SMUD is well positioned to lead the development of local efforts, bringing stakeholders and technology partners together to develop strong projects that will be favorable to the financial communities and to CalRecycle's very competitive funding program.

6 Recommendations and Strategic Planning

6.1 Overview of Recommendations and Strategic Planning

The recommendations are designed to prepare a five-year Strategic Implementation Plan with specific milestones, schedule, control, and metrics mechanisms. To effectively implement the proposed recommendations, it is imperative that SMUD step up as a community leader and organizer, driving progress in the space. However, SMUD cannot implement any part of this plan without significant community engagement and support. In continuation of the four workshops that occurred during the development of this report, the following organizations should be engaged throughout the implementation process:

- Waste Haulers
  - Atlas Disposal
  - Republic Services
  - Waste Management
- Technology Developers
  - CleanWorld
  - Hitachi Zosen Inova
- Food Waste Generators
  - Hyatt Hotel
  - California State University Sacramento
  - Sacramento International Airport
  - UC Davis Medical Center
  - Restaurants (e.g. Mulvaney's B&L, Fat Family Restaurants, McDonalds, and others)
- Non-Profit Organizations/Industry Associations
  - Valley Vision
  - Civic Spark
  - GRAS
  - Sacramento Regional Business Alliance
  - Power Inn Alliance
- Agencies
  - Sacramento County Environmental Management Department
  - City of Sacramento Recycling
  - Sacramento Solid Waste Authority
  - CalRecycle
  - Sacramento County Department of Waste Management
  - Sacramento Metropolitan Air Quality Management District
  - City of Rancho Cordova

Additional stakeholders, as identified in the various Advisory Groups (outlined below), should be included.

6.2 Recommendations: Infrastructure Development

SMUD is in a strong position to lead the regional efforts to develop additional infrastructure through the organization and facilitation of key stakeholders, assistance with public fund development, and support of early-stage pre-development work. While SMUD may ultimately

decide to take an own/operate role, TSS and Valley Vision have set forth recommendations that will create a strong platform for investment private investment, allowing flexibility throughout the process. These recommendations include a series of actions with specific tasks and corresponding milestones, and implementation timeline to guide SMUDs engagement and investment into food waste collection programs and metrics to evaluate success.

1. Develop Dry Fermentation
1.1 Detailed Stakeholder Collaboration including one-on-one and workshop-based approach to build support and consensus around new infrastructure development, business models, feedstock specifications, and siting requirements.
1.2 Siting Study and Permitting to identify an appropriate location, secure site control, and acquire necessary permits—primarily CEQA—for development of a new facility to help attract private investment.
1.3 Request for Qualifications in partnership with the stakeholder group identified in subtask 1.1, develop a detailed request for qualifications to evaluate technology solutions. This subtask should be focused on bringing in a technology developer that has the commercial expertise at utilizing the desired feedstock.
1.4 Long-Term Contracting including energy offtake agreement in the form of a power purchase agreement or renewable gas purchase agreement of sufficient duration to attract outside investment, long-term contracting of feedstock to meet a minimum threshold of performance and allowing for spot market opportunities and widespread participation.
1.5 Site Development specifically the interconnection to the SMUD electric grid or the natural gas pipeline.
1.6 Commercial Operations support to effectuate continual improvement and to ensure that the business model supports long-term performance.

2. Promote and Improve Existing Facilities
2.1 Infrastructure Upgrade Strategic Plan to be created with existing facilities to better understand the challenges and barriers prohibiting full capacity operations. This plan will prioritize items that can improve technical and economic performance of the existing systems. SMUD will use this information to assist with public funding campaigns and the development of smart mechanisms.
2.2 Assist with Fund Development through partnerships in grant opportunities and facilitation of key stakeholder meetings for non-grant funded opportunities as they arise. This assistance may include technology studies and due diligence reviews for feedstock pre-processing or digestate post-processing technologies, assistance with co-product marketing or partnership development, or permit/regulatory assistance.

3. Conversion of Compost to Anaerobic Digestion
3.1 Identify Appropriate Composting Facilities that are good targets for conversion based on their proximity to SMUD energy infrastructure, challenges with air permit thresholds, or approaching challenges with new water board regulations. This process would include a detailed assessment of the status of all regional composting facilities.
3.2 Develop Strategic Partnerships that support the existing composting operator improve performance and meeting permit needs through conversion to an in-vessel anaerobic digestion system. Bring together key stakeholders to create a coalition in support of the project conversion.
3.3 Assist with Permit Modification to streamline the process of converting from a composting facility to an energy production facility.
3.4 Technology Selection Assistance targeting established commercial technology developers that can handle the targeted feedstock. This can be conducted as a Request for Qualifications.
3.5 Long-Term Contracting including energy offtake agreement in the form of a power purchase agreement or renewable gas purchase agreement of sufficient duration to attract outside investment, long-term contracting of feedstock to meet a minimum threshold of performance and allowing for spot market opportunities and widespread participation.
3.6 Site Development and Commercial Operations specifically the interconnection to the SMUD electric grid or the natural gas pipeline.

Key milestones for each subtask are outlined below.

Task	Key Milestone
1 Develop Dry Fermentation	
1.1 Detailed Stakeholder Collaboration	M1.1 Secure Meetings with Key Stakeholders M1.2 Stakeholder Action Plan M1.3 Signed Memorandum of Understanding
1.2 Siting Study and Permitting	M1.4 Complete Siting Study M1.5 Achieve Site Control M1.6 Submit CEQA Permit Application M1.7 Complete CEQA Permitting
1.3 Request for Qualifications	M1.8 Develop Target Stakeholder List M1.9 Develop Request for Qualifications M1.10 Receive Responses M1.11 Evaluate Responses M1.12 Select Technology Developer
1.4 Long-Term Contracting	M1.13 Finalize Long-Term Site Control M1.14 Finalize Long-Term Feedstock M1.15 Finalize Long-Term Co-Product Offtake M1.16 Finalize Long-Term Credit Offtake M1.17 Finalize Long-Term Energy Offtake
1.5 Site Development	M1.18 Ground Breaking M1.19 Site Interconnection M1.20 Commissioning
1.6 Commercial Operations	M1.21 Commercial Operations

Task	Key Milestone
2 Promote and Improve Existing Facilities	
2.1 Infrastructure Upgrade Plan	M2.1 Complete Infrastructure Upgrade Plan for SATS Digester M2.2 Complete Infrastructure Upgrade Plan for READ Digester M2.3 Complete Infrastructure Upgrade Plan for Sacramento Region WWTP M2.4 Complete Infrastructure Upgrade Plan for Yolo County Landfill/Biodigester M2.5 Complete Infrastructure Upgrade Plan for South County Dairies
2.2 Assist with Fund Development	M2.6 Implement Infrastructure Upgrade Plans as identified in each Plan
3 Conversion of Compost to AD	
3.1 Identify Composting Facilities	M3.1 Complete Compost Facility Study
3.2 Develop Strategic Partnerships	M3.2 Signed MOU with Priority Facilities
3.3 Assist with Permit Modification	M3.3 Submit CEQA Permit Application M3.4 Complete CEQA Permitting
3.4 Technology Selection Assistance	M3.5 Develop Target Technology List M3.6 Develop Request for Qualifications M3.7 Receive Responses M3.8 Evaluate Responses M3.9 Select Technology Developer
3.5 Long-Term Contracting	M1.10 Finalize Long-Term Feedstock M1.11 Finalize Long-Term Co-Product Offtake M1.12 Finalize Long-Term Credit Offtake M1.13 Finalize Long-Term Energy Offtake
3.6 Site Development	M1.14 Ground Breaking M1.15 Site Interconnection M1.16 Commissioning
3.7 Commercial Operations	M1.17 Commercial Operations

Metric for success for each milestone are identified below.

Task	Key Milestone	Success Metrics
1	**Develop Dry Fermentation**	
1.1	M1.1 Secure Meetings with Key Stakeholders	Meetings with Atlas Disposal, Republic Services, Waste Management, City and County of Sacramento
	M1.2 Stakeholder Action Plan	Identification of a path forward with broad stakeholder support
	M1.3 Signed Memorandum of Understanding	MOU signed by all parties outlining the roles and responsibilities of all parties moving forward

Task	Key Milestone	Success Metrics
1.2	M1.4 Complete Siting Study	Identify three priority sites with potential for success
	M1.5 Achieve Site Control	An MOU from the site's landowner agreeing to continue forward with the development of an AD facility
	M1.6 Submit CEQA Permit Application	Develop supporting material for an initial study that is accepted by the lead agency
	M1.7 Complete CEQA Permitting	Receive a mitigated negative declaration or negative declaration allowing for the AD facility development
1.3	M1.8 Develop Target Technology List	Identify at least 10 qualified technologies
	M1.9 Develop Request for Qualifications	Create an RFQ that is approved by the stakeholders that took part in the MOUs
	M1.10 Receive Responses	Receive responses from at least 3 bidders
	M1.11 Evaluate Responses	Reach consensus with stakeholders that took part in the MOUs about the preferred technology developer
	M1.12 Select Technology Developer	Sign an MOU with technology developer and other engaged stakeholders
1.4	M1.13 Finalize Long-Term Site Control	Legal contracts have been signed between the developer and the site host
	M1.14 Finalize Long-Term Feedstock	Legal contracts have been signed for long-term feedstock supply
	M1.15 Finalize Long-Term Co-Product Offtake	Legal contracts have been signed for co-product offtake
	M1.16 Finalize Long-Term Credit Offtake	Legal contracts have been signed for credit valuation
	M1.17 Finalize Long-Term Energy Offtake	Power purchase agreement has been signed between the developer and SMUD
1.5	M1.18 Ground Breaking	Ground breaking ceremony
	M1.19 Site Interconnection	Facility is interconnected to SMUD's energy infrastructure
	M1.20 Commissioning	Facility is ready for commercial operations
1.6	M1.21 Commercial Operations	Energy is delivered to SMUD energy infrastructure
2	**Promote and Improve Existing Facilities**	
2.1	M2.1 Complete Infrastructure Upgrade Plan for SATS Digester	Develop formal plan with clear priorities in collaboration with SATS operators
	M2.2 Complete Infrastructure Upgrade Plan for READ Digester	Develop formal plan with clear priorities in collaboration with READ operators
	M2.3 Complete Infrastructure Upgrade Plan for Sacramento Region WWTP	Develop formal plan with clear priorities in collaboration with Sacramento Regional WWTP operators

Task	Key Milestone	Success Metrics
	M2.4 Complete Infrastructure Upgrade Plan for Yolo County Landfill/Biodigester	Develop formal plan with clear priorities in collaboration with Yolo County Landfill/Biodigester operators
	M2.5 Complete Infrastructure Upgrade Plan for South County Dairies	Develop formal plan with clear priorities in collaboration with dairy operators
2.2	M2.6 Implement Infrastructure Upgrade Plans as identified in each Plan	Reference the individual plans
3	**Conversion of Compost to AD**	
3.1	M3.1 Complete Compost Facility Study	Complete formal study process
3.2	M3.2 Signed MOU with Priority Facilities	Signed MOU
3.3	M3.3 Submit CEQA Permit Application	Develop supporting material for an initial study that is accepted by the lead agency
	M3.4 Complete CEQA Permitting	Receive a mitigated negative declaration or negative declaration allowing for the AD facility development
3.4	M3.5 Develop Target Stakeholder List	Identify at least 10 qualified technologies
	M3.6 Develop Request for Qualifications	Create an RFQ that is approved by the stakeholders that took part in the MOUs
	M3.7 Receive Responses	Receive responses from at least 3 bidders
	M3.8 Evaluate Responses	Reach consensus with stakeholders that took part in the MOUs about the preferred technology developer
	M3.9 Select Technology Developer	Sign an MOU with technology developer and other engaged stakeholders
3.5	M1.10 Finalize Long-Term Feedstock	Legal contracts have been signed between the developer and the site hose
	M1.11 Finalize Long-Term Co-Product Offtake	Legal contracts have been signed for long-term feedstock supply
	M1.12 Finalize Long-Term Credit Offtake	Legal contracts have been signed for co-product offtake
	M1.13 Finalize Long-Term Energy Offtake	Legal contracts have been signed for credit valuation
3.6	M1.14 Ground Breaking	Power purchase agreement has been signed between the developer and SMUD
	M1.15 Site Interconnection	Ground breaking ceremony
	M1.16 Commissioning	Facility is interconnected to SMUD's energy infrastructure
3.7	M1.17 Commercial Operations	Facility is ready for commercial operations

A schedule for these task items is shown below.

Task	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1 Develop Dry Fermentation																				
1.1 Detailed Stakeholder Collaboration																				
1.2 Siting Study and Permitting																				
1.3 Request for Qualifications																				
1.4 Long-Term Contracting																				
1.5 Site Development																				
1.6 Commercial Operations																				
2 Promote and Improve Existing Facilities																				
2.1 Infrastructure Upgrade Plan																				
2.2 Assist with Fund Development																				
3 Conversion of Compost to AD																				
3.1 Identify Composting Facilities																				
3.2 Develop Strategic Partnerships																				
3.3 Assist with Permit Modification																				
3.4 Technology Selection Assistance																				
3.5 Long-Term Contracting																				
3.6 Site Development																				
3.7 Commercial Operations																				

6.3 Recommendations: Market Champion

The successful implementation of AB 1826 is critical to the long-term performance of existing food waste infrastructure and will drive the market for new development. TSS and Valley Vision have set forth recommendations that will create a strong platform for market acceleration through demand for organics management services. These recommendations include a series of actions with specific tasks and corresponding milestones, and implementation timeline to guide SMUD's engagement and investment into food waste collection programs and metrics to evaluate success.

1. Information Exchange
1.1 Communications Planning to identify appropriate channels for market outreach to a diverse stakeholder group.
1.2 Establish Strategic Partnerships with industry organizations with a wide reach across Sacramento's commercial network. These partnerships will lay the foundation for promoting peer-to-peer information exchanges.
1.3 Outreach and Information Exchange Plan Development to develop key messages and identify appropriate platforms for message dissemination.
1.4 Develop Tools to Carry Messages including website and landing pages, videos, direct mail, and mobile social media.
1.5 Host Targeted Information Exchange Activities based on the feedback received from the Outreach and Information Exchange Plan. Coordinate with waste haulers to evaluate the effectiveness of the activities.

2. Promotion and Visibility
2.1 Create and Regularly Convene a Generator-Led Advisory Group, recruiting 10-15 waste generators from a range of business types and sizes, to serve as a "think tank" and focus group for creating and testing recognition and visibility efforts.
2.2 Develop Objectives and Desired Outcomes for any promotion and visibility efforts, to help guide decision-making and prioritization.
2.3 Assess Current Ideas and Existing **Regional Programs** for fit, impact, and potential to incorporate organic waste recognition.
2.4 Develop New Concepts to fill any gaps with existing regional programs and better meet the stated objective.
2.5 Secure Strategic and/or Funding Partners to activate the overall plan in relation to AB 1826
2.6 Create Pilot Programs as needed to evaluate the effectiveness of different types of promotional activities (e.g. competitions, awards, community recognition).
2.7 Develop Long-Term Programs to provide continuity and build awareness throughout the community. Work with waste haulers to evaluate the long-term effectiveness of the program in relationship to AB 1826.

Key milestones for each subtask are outlined below.

Task	Key Milestone
1 Information Exchange	
1.1 Communications Planning	M1.1 Identify Critical Subgroups M1.2 Develop Budget
1.2 Establish Strategic Partnerships	M1.3 Engage Industry Associations M1.4 Establish Funding Partners
1.3 Outreach and Information Exchange Plan Development	M1.5 Hold Initial Working Sessions M1.6 Develop Key Messages M1.7 Translate Features to Benefits M1.8 Pilot Test with Single Target Group M1.9 Widespread Implementation
1.4 Develop Tools to Carry Messages	M1.10 Develop Website and Landing Pages M1.11 Create Video Content M1.12 Develop Direct Mailing M1.13 Create Mobile Social Media Platform
1.5 Host Targeted Information Exchange Activities	M1.14 Conduct Workshops M1.15 Engage Advertising, Direct Mailings, Website Management as appropriate
2 Promotion and Visibility	
2.1 Create and Regularly Convene a Generator-Led Advisory Group	M2.1 Recruit Advisory Group Members M2.2 Set Meeting Schedule M2.3 Conducting Meetings
2.2 Develop Objectives and Desired Outcomes	M2.4 Develop Statement of Objectives M2.5 Predict Expected Outcomes
2.3 Assess Current Ideas and Existing Regional Programs	M2.6 Develop an Inventory of Existing and Proposed Programs M2.7 Engage Identified Stakeholders
2.4 Develop New Concepts	M2.8 Create Additional Concepts to add to the Overall Inventory M2.9 Develop a Budget
2.5 Secure Strategic and/or Funding Partners	M2.10 Engage with Strategic Partners M2.11 Establish Funding Partners
2.6 Create Pilot Programs	M2.12 Identify Pilots Programs M2.13 Conduct Pilot Program M2.14 Evaluate Pilot Program
2.7 Develop Long-Term Programs	M2.15 Establish Lasting Long-Term Programs M2.16 Continue to Conduct Advisory Group Meetings

Metric for success for each milestone are identified below.

Task	Key Milestone	Success Metrics
1	**Information Exchange**	
1.1	M1.1 Identify Critical Subgroups	Identify and prioritizes five subgroups that require unique messaging
	M1.2 Develop Budget	Identify budgetary targets consistent with the size of the audience that will be engaged
1.2	M1.3 Engage Industry Associations	Develop cooperative agreements with at least one industry association for each subgroup
	M1.4 Establish Funding Partners	Create partnerships with agencies and companies with aligned goals to raise funding
1.3	M1.5 Hold Initial Working Sessions	Hold half-day workshops with subgroup stakeholders to identify critical avenues for company engagement
	M1.6 Develop Key Messages	Identify up to five universal messages that apply to all subgroups and tailor messaging for each subgroup individually
	M1.7 Translate Features to Benefits	Quantify the value of food waste diversion with the target audience in mind.
	M1.8 Pilot Test with Single Target Group	Evaluate the messaging platform with a target audience and finalize the Outreach and Information Exchange Plan
	M1.9 Widespread Implementation	Implement the Outreach and Information Exchange Plan
1.4	M1.10 Develop Website and Landing Pages	Create online content
	M1.11 Create Video Content	Develop videos
	M1.12 Develop Direct Mailing	Develop direct mailing
	M1.13 Create Mobile Social Media Platform	Create mobile social media platform
1.5	M1.14 Conduct Workshops	Host workshops with target stakeholders to allow for direct peer-to-peer interaction
	M1.15 Engage Advertising, Direct Mailings, Website Management as appropriate	Implement awareness activities to bring users to the workshops.
2	**Promotion and Visibility**	
2.1	M2.1 Recruit Advisory Group Members	Secure interest from representatives of appropriate stakeholder groups (e.g. waste haulers, renewable energy facilities, business leaders)
	M2.2 Set Meeting Schedule	Create a meeting schedule appropriate for time commitment expectations
	M2.3 Conducting Meetings	Hold meetings with the Advisory Group

Task	Key Milestone	Success Metrics
2.2	M2.4 Develop Statement of Objectives	Create a clear mission statement with explicit targets
	M2.5 Predict Expected Outcomes	Hypothesis outcomes to later evaluate performance
2.3	M2.6 Develop an Inventory of Existing and Proposed Programs	Build a database with existing and proposed programs
	M2.7 Engage Identified Stakeholders	Engage stakeholders involved with existing and proposed programs
2.4	M2.8 Create Additional Concepts to add to the Overall Inventory	Identify gaps in existing efforts
	M2.9 Develop a Budget	Develop a budget to reasonably address these gaps
2.5	M2.10 Engage with Strategic Partners	Bring in new partners with interest to address identified gaps
	M2.11 Establish Funding Partners	Identify beneficiaries of the programs for funding assistance
2.6	M2.12 Identify Pilots Programs	Find interested relevant parties
	M2.13 Conduct Pilot Program	Implement the pilot program
	M2.14 Evaluate Pilot Program	Evaluate the benefits of the new programs with a small target audience
2.7	M2.15 Establish Lasting Long-Term Programs	Broaden pilot program to engage a larger audience
	M2.16 Continue to Conduct Advisory Group Meetings	Hold meetings to refine goals, objectives, and sustain funding.

A schedule for these task items is shown below.

Task	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1 Information Exchange																				
1.1 Communications Planning																				
1.2 Establish Strategic Partnerships																				
1.3 Outreach and Information Exchange Plan Development																				
1.4 Develop Tools to Carry Messages																				
1.5 Host Targeted Information Exchange Activities																				
2 Promotion and Visibility																				
2.1 Generator-Led Advisory Group																				
2.2 Objectives and Desired Outcomes																				
2.3 Assess Ideas and Programs																				
2.4 Develop New Concepts																				
2.5 Secure Strategic Partnerships																				
2.6 Create Pilot Programs																				
2.7 Develop Long-Term Programs																				

7 Conclusions and Next Steps

There is significant potential to improve the collection and utilization of food and organic waste materials generated in the SMUD service territory. The Sacramento area is home to some of the state's pioneering renewable energy infrastructure and is one of the last major cities in California to maintain a competitive commercial waste management system. The competitive commercial waste management system leaves a void of clear leadership for sustainability within the sector as each major hauler must balance its price to customers with its sustainability objectives. In franchised regions, with one waste hauler, the local waste management authority has the flexibility to demand sustainability services as part of regularly negotiated contracts with the winning hauler.

By fully engaging the recommendations in the SIP, SMUD will be able to fill the void of leadership for environmental sustainability in the waste management sector within its service territory. Implementing the recommendations will increase the production of energy from biomass resources, providing addition opportunities for SMUD to engage and utilize programs developed identified in its Smart Mechanisms report.

As identified in the recommendations, the table below identifies the first step for each of the six parallel pathways.

Task	Key Milestone
Market Champion	
1 Information Exchange	
1.1 Communications Planning	M1.1 Identify Critical Subgroups M1.2 Develop Budget
2 Promotion and Visibility	
2.1 Create and Regularly Convene a Generator-Led Advisory Group	M2.1 Recruit Advisory Group Members M2.2 Set Meeting Schedule M2.3 Conducting Meetings
Infrastructure Development	
1 Develop Dry Fermentation	
1.1 Detailed Stakeholder Collaboration	M1.1 Secure Meetings with Key Stakeholders M1.2 Stakeholder Action Plan M1.3 Signed Memorandum of Understanding
2 Promote and Improve Existing Facilities	
2.1 Infrastructure Upgrade Plan	M2.1 Complete Infrastructure Upgrade Plan for SATS Digester M2.2 Complete Infrastructure Upgrade Plan for READ Digester M2.3 Complete Infrastructure Upgrade Plan for Sacramento Region WWTP M2.4 Complete Infrastructure Upgrade Plan for Yolo County Landfill/Biodigester M2.5 Complete Infrastructure Upgrade Plan for South County Dairies
3 Conversion of Compost to AD	
3.1 Identify Composting Facilities	M3.1 Complete Compost Facility Study

Specifically, for each parallel path:

- **Communication Plan for the Information Exchange Pathway**: This first step should result in the identification and prioritization of up to five subgroups within the food/organics supply chain that require unique messaging. These subgroups may include: full service restaurants; fast food restaurants; food service providers (e.g. hotels, hospitals); buffets; and multifamily housing. This pathway should be integrated into the BTAG efforts.

- **Create and Regularly Convene a Generator-Led Advisory Group for the Promotional Activities Pathway**: This first step should result in the identification of an interested group of food/organics supply chain representatives (e.g. waste haulers, industry associations) that can facilitate the roll-out of promotional activities. These representatives should have a wide-reaching network of the target stakeholders (food waste generators). After identifying appropriate targets, meetings should be scheduled and conducted on a regular basis (quarterly is recommended) to determine the appropriate path forward. The leader of the Generator-Led Advisory Group should be able to present the advisory group with options for promotional activities (e.g. stickers recognizing participation, free billboard space, art competitions, etc.) for the advisory group to evaluate. This pathway should be integrated into the BTAG efforts.

- **Detailed Stakeholder Collaboration for the Develop Dry Fermentation Pathway**: This first step should result in the meeting of key stakeholders from the waste management sector (Atlas Disposal, Republic Services, Waste Management, City of Sacramento, County of Sacramento, and other incorporated cities in the SMUD service territory) to discuss the mutual needs of the waste management industry in the region. Outcomes of the stakeholder meetings will identify a path forward with broad stakeholder support and a Memorandum of Understanding (MOU) that the parties will work together to facilitate the execution of the identified path forward.

- **Information Upgrade Plan for the Promote and Improve Existing Facilities Pathway**: This first step should result in the development of Infrastructure Upgrade Plans for all bioenergy production facilities utilizing food/organic waste. All Infrastructure Upgrade Plans should utilize the same format structure; however, the content should be tailored to each of the identified existing food waste collection to bioenergy facilities: SATS, READ, Sacramento Regional WWTP, Yolo Landfill/Biodigester, and South County Dairies. SMUD may consider prioritizing facilities that currently sell bioenergy into the SMUD service territory (SATS, Sacramento Regional WWTP, South Coast Dairies) and subsequently address facilities that could sell into SMUD service territory but are not yet doing so (Yolo County Landfill/Biodigester). It may not be appropriate to expend SMUD resources of facilities with little chance of contributing to SMUD's renewable energy goals (READ, which sells all energy to UC Davis).

- **Identify Composting Facilities for the Conversion of Compost to AD Pathway**: This first step should result in the identification and assessment of regional composting facilities to thoroughly understand the potential opportunity to convert these facilities to dry fermentation facilities creating either renewable electricity or biogas/biomethane to

the SMUD pipeline. Historically, it is has been challenging to site new organic waste processing facilities in the SMUD service territories and the conversion of a new facility may result in faster realization of dry fermentation goals than developing a new facility. This process could provide an alternative home for food waste, providing much needed redundancy in the area for local waste haulers. However, this approach is unlikely to successfully address the green waste handing challenges that are faced in the region.

Appendix A Workshop Invitation List, Attendee List, Agenda, and Minutes

SMUD Food Waste Collection Project
Stakeholder Meeting Attendees

	Food Waste Collection Stakeholders Invited Meeting	Representative	Email	Attended 2/23	Attended 5/31	Attended 6/21	Attended 8/16
1	SMUD	Valentino Tiangco	Valentino.Tiangco@smud.org	X	X	X	X
2	SMUD	Dagoberto Calamateo	Dagoberto.Calamateo@smud.org		X		X
3	SMUD	Reynaldo Lopez	Reynaldo.Lopez@smud.org			X	X
4	TSS Consultants	Frederick Tornatore	fatoxic@tssconsultants.com	X	X	X	X
5	TSS Consultants	Matt Hart	matt@hartcleantech.com	X	X	X	X
6	TSS Consultants	Andrea Stephenson	alstephenson@gmail.com	X	X	X	X
7	Valley Vision	Meg Arnold	Meg.Arnold@valleyvision.org	X	X		X
8	Valley Vision	Tammy Cronin	Tammy.Cronin@valleyvision.org	X	X	X	
9	Atlas Disposal	Dave Sikich	dave@atlasdisposal.com			X	X
10	Atlas Disposal	Steve Bruce	steve@atlasdisposal.com	X		X	X
11	Republic Services	Tony Cincotta	tcincotta@republicservices.com			X	
12	Republic Services	Collin Wallace	cwallace@republicservices.com	X			
13	Republic Services	Lisa Avila	lavila2@republicservices.com	X		X	X
14	Republic Services	Ron Cassity	rcassity@republicservices.com	X			X
15	Waste Management	Tisha Gill	tgill2@wm.com	X		X	
16	Waste Management	Jeff Campbell	jcampbel@wm.com	X		X	
17	CleanWorld	Michele Wong	michele.wong@cleanworld.com				X
18	Sac County Env. Mgmt Dept.	Sharon Zimmerman	zimmermans@saccounty.net	X	X		
19	City of Sac Recycling and Solid Waste Division	John Febbo	JFebbo@cityofsacramento.org	X		X	X
20	Sac Solid Waste Authority	Etienne Ozorak	ozorake@saccounty.net				X
21	CalRecycle	Joe Rasmussen	joseph.rasmussen@calrecycle.ca.gov				X
22	CalRecycle	Caroll Mortensen	caroll.mortensen@calrecycle.ca.gov				X
23	Hyatt Hotel	Charlie Bane	charlie.bane@hyatt.com	X			
24	Hyatt Hotel	David Martin	david.martin@hyatt.com		X		
25	CSUS	Joey Martinez	jmartinez@csus.edu		X		
26	CSUS	Ryan Todd	ryan.todd@csus.edu		X		

SMUD Food Waste Collection Project
Stakeholder Meeting Attendees

	Food Waste Collection Stakeholders Invited Meeting	Representative	Email	Attended 2/23	Attended 5/31	Attended 6/21	Attended 8/16
27	Sacramento International Airport	Bree Taylor	Taylorb@saccounty.net	X			X
28	Sacramento International Airport	Tiffany Pham	phamti@saccounty.net	X	X		X
29	UC Davis Med Center	John Danby	jgdanby@ucdavis.edu	X			
30	Civic Spark	Skyler Johnson	sjohnson@civicspark.lgc.org	X	X	X	X
31	Civic Spark	Emma Bennett	ebennett@civicspark.lgc.org	X			
32	ES Engineering	George Eowan	geowan@pacbell.net	X			
33	Restaurant	Patrick Mulvanney	info@mulvaneysbl.com	X			
34	Grocery Store - Costco	Mona Alsaker	mona.alsaker@gmail.com	X			
35	Sac County Dept of Waste Mgmt	Chris Lehon	lehonc@saccounty.net	X	X	X	X
36	SMAQMD	Shelley Jiang	sjiang@airquality.org	X		X	
37	Waste Management	James Von Steg	jvonste@wm.com	X			
38	Valley Vision	Jenny Wagner	jenny.wagner@valleyvision.org	X	X	X	X
39	Region Restaurtants	Robert Abelon	robert@regionbusiness.org		X		
40	Power Inn Alliance	Tracy Schaal	tracey@powerinn.org		X		
41	McDonalds	Alan Godlove	alan.godlove@partners.mcd.com		X		X
42	McDonalds	Nate Haderlie	nhaderlie@moroch.com		X		
43	Fat Family Restaurants	Kevin Fat			X		
44	City of Rancho Cordova	Steve Harriman	sharriman@cityofranchocordova.org			X	
45	Hitachi Inova	William Skinner	william.skinner@hz-inova.com			X	X
46	GRAS	David Baker	grasacramento.org				X
47	Cal Refuse Recycling Council	Josh Pane	pane@cwo.com				X
48	Yolo County Landfill	Ramin Yazdani	Ramin.Yazdani@yolocounty.org			X	

SMUD Food Waste Collection
Stakeholder First Workshop

SMUD Customer Service Center, 2nd Floor – Lighting Classroom
6301 S Street, Sacramento
February 23, 2017 – 9:30 to 11:30 AM

1. Introductions (9:35 – 5 min.)

2. Purpose of meeting (9:40 - 5 min.)
   - Gain input and buy-in in order to develop a strategic plan around organic food waste disposal
   - Series of three meetings, of which this is the first, to plan and strategize around the plan for pilot programs in the SMUD vicinity
   - Strategic plan draft and results are expected to be released late-Fall

3. Review SMUD's project (9:45 - 5 min.)

   a. SMUD's overall objective: Establishing food waste/organic waste for all sectors in Sacramento County for the purpose of generating feedstock for biomethane production and electricity generation (with co-production of value-add products)

      i. The AB 1826 mandate

   b. Tasks to be conducted

      i. Lessons Learned

      ii. Strategic Implementation Plan

      iii. Selected pilot collection enhancement programs
         - Will be continuing hands-on food waste disposal programs, including with Sac State
         - Planning to implement smaller pilot programs within the 1-1.5 mile radius of SMUD and Sac State

      iv. Benefit metrics (greenhouse gas reduction, job creation, etc.)

4. Previous SMUD food waste/organic waste project recap (9:55 - 10 min.)
   - Previously looked at food waste collection programs when there was not a mandate
   - Conducted a high-level study in order to determine the potential for programs in the SMUD/Sac State area, and looked at existing infrastructure throughout the region including clean waste facilities, sewage plants, and composting facilities

5. Review of Lessons Learned task (10:05 - 10 min.)

- Several challenges were encountered during 'Food Waste 1':
    1) Acceptable levels of contamination – communication is limited between the food waste supply chains about acceptable quality
    2) Bins and containers – standard recycling containers are not usually appropriate for food waste
    3) Comingling vs. source separation
    4) Composting vs. anaerobic digestion – has caused confusion among generators, including between wet and dry AD
    5) Cost – low landfill costs within the Sacramento region create difficulties; more advanced in the Bay Area
    6) Employee participation – with generators in particular, need clear and repetitive training
    7) Industry standards – standards are competitive; do have a lot of waste dollars in the Sacramento area and want to make sure that there are standards to follow
    8) Project Champions – needed especially when beginning a new waste collection program, among generators in particular
    9) Road Map – education for stakeholders and generators is necessary so that they make the right decisions about food waste
    10) Space – during dumpster diving, hearing more and more about space as an issue; having another containing within a constrained space is a barrier; often times containers have to be in an enclosed space and there is not room
    11) Training – continual training is necessary
    12) Waste removal – food waste removal looks different than other waste; frequent removal is necessary; route densities for removal are a concern, as food waste may need to be picked up once or twice a week, for example

6. Group discussion of local programs, implementation of AB 1826, and challenges (10:15 - 40 min.)

Generator Perspectives

- Sacramento International Airport
    - One challenge in implementing and expanding implementation of food waste program has been arranging logistics, such as getting contracts in place, obtaining an additional compacter, etc.
    - A major issue has been contamination of post-consumer food waste due to container waste, and from a management perspective, it was not a good idea to have passengers sort their waste due to travel time constraints
    - Within Concourse B, currently implementing a pre-consumer food waste program, but no longer requiring post-consumer food waste separation.
- Costco
    - Costco has one staff person dedicated to separating waste generated from food demonstrations, snack bar, etc. into three containers – recyclables, food waste, and trash
    - Money collected from recyclables is donated to a children's hospital

    - Costco already has separate bins for waste throughout the store, but also has a person dedicated to waste separation
- Hyatt
    - Part of their success has been from training and also buy-in from staff
    - Kitchen has separate bins for food waste and recycling, and trash bin has been completely removed
    - Ease of food waste removal is key; process is made easier by containers made specifically for food waste with no bags required, and flatbed truck which collects the bins
    - The Hyatt also has seven tenant spaces filled by other restaurants, and encountered barriers in obtaining buy-in from business owners due to lack of understanding of 'organic waste'
    - Recommends clear messaging and terminology, such as 'food waste' removal as opposed to 'organic waste' removal
- UC Davis Health
    - University of California has a zero waste by 2020 policy (or 95% waste-free by 2020)
    - One challenge with pre-consumer food waste separation is the wait time for removal; it is difficult to safely remove the food waste in a timely manner
    - UCD has a lot of post-consumer food waste and likes the idea of removing trash bins
- Mulvaney's
    - Started about 7 years ago with only pre-consumer food waste separation, which was a challenge because it meant that a lot of (post-consumer) food waste was still going into the dumpster
    - Partnership with Atlas Disposal has helped reduce food waste going into the dumpster, and in the last three years has dropped from about 3-4 cubic yards to less than a 5-gallon bucket of trash per week
    - Recommends using these success stories in marketing food waste removal programs
- Sac State
    - Waste audit revealed very little trash going into the compactor in the dining commons, so it became a food waste compactor
    - Dining commons do not use any paper products; use only reusable plates, silverware, etc.
    - At other restaurants on campus, there are separate bins for trash and food waste
    - Goal moving forward is to capture the material that is elsewhere on campus, since students often grab-and-go

Hauler Perspectives

- Atlas Disposal
    - Crucial for generators to embrace the program
    - Need infrastructure to process the material; volume continues to grow daily; recently, due to floods and other challenges, infrastructure to process the waste has been limited
    - Number one challenge is infrastructure

- It is also challenging to keep revenue neutral; introducing a food waste program is difficult because people don't want to pay for the container and don't want to pay if they can't fill it; getting people to embrace the program is a huge challenge
- Best resource is using drivers to identify who is generating a lot of food waste; sales representatives can then see if they are interested in participating in the program; however, cost is a barrier for a lot of people

Key Points

- Education/training and motivation are crucial to achieve program adoption among generators, including business owners, staff, and neighborhood residents
- Incentives such as cost neutrality may help to gain buy-in from community
- May be opportunities for collaboration in marketing food waste programs under the new ordinance
- Peer-training among generators, community members, etc. may be more impactful
- In food waste pilot programs it will be necessary to address real-world challenges for businesses, such as scarcity of time, turnover in the workplace, space, etc.
- Small businesses may be more resistant to food waste removal programs for several reasons, including time to separate waste with limited staff capacity, language barriers, program costs, etc.
- Catering to businesses' needs is crucial; food waste is something that needs to be continually managed, so champions are necessary to make the effort successful
- Infrastructure is a major challenge in the region
- There are misconceptions even now about recycling, which was established decades ago; people are unsure of what they can and cannot recycle; in regard to concessions, some say 'when in doubt, recycle'; however, due to current high contamination rates within the industry, some now say 'when in doubt, throw it out'
- Recycling practices are becoming stricter; contamination results in entire loads being rejected
- Timely and consistent communication to the public is necessary; communication is a challenge because it takes time to get the message out to everyone, and by the time it does, things may have changed again
- Best practices in food waste removal must take into account turnover within businesses; one way to address this issue may be to have a champion on-site and ensure training of all new staff
- Residents are resistant to a fourth waste container; until Sacramento has a local facility that can process food waste and green waste together, residential food waste removal probably can't happen
- Lessons can be learned from food waste removal programs in San Diego, where composting facilities are common and have been managed for a long time; food waste removal has become common practice for residents
- Getting key messages across requires consistency and repetition, and hearing the same messages from different sources adds to that reinforcement
- One potential strategy to reach smaller businesses would be to reach out to business associations, which could mitigate language barriers and others

- A potential best practice to support smaller businesses may be to develop a road map for how to implement a new food waste removal program
- Air District has been working with partners to develop a data tool that helps identify businesses that are high food waste generators and determine who is in compliance with regulations and who is not
- A greater media presence may help to spread the word about food waste removal practices among the general public; generally, people don't know where to look for information or which websites to go to; however, infrastructure issues need to be addressed before residential food waste programs can be effectively implemented

7. Strategic implementation planning task (10:55 - 25 min.)

    a. Identification and prioritization of issues, barriers, and potential solutions

    b. Identification and evaluation of compliance strategies to meet existing regulatory, legislative, and policy drivers germane to the Sacramento region

    c. Identification of regulatory and legislative gaps

    d. Identification of research, development, deployment, and commercialization gaps

    e. Identification of outreach and communication activities to be implemented

8. Path Forward (11:20 - 10 min.)

    a. Summary and conclusions from the discussion with the stakeholders

- Will be having more discussions with people one-on-one over the coming months, including more discussion of how to address challenges identified in today's meeting
- There will be two more meetings as the strategic plan is developed

SMUD Food Waste Collection
Stakeholder Second Workshop

SMUD Customer Service Center, 2nd Floor – Lighting Classroom
6301 S Street, Sacramento
May 31, 2017 | 9:30 – 11:30 AM

1. Introductions

2. Purpose of Meeting

- This meeting is specifically related to generators of food waste
- Next meetings will focus on haulers, collectors
- In process of developing Strategic Implementation Plan, for which we are gathering your input today and at future stakeholder meetings

3. Review SMUD's Project

a. SMUD's overall objective: Establishing food waste/organic waste collection facilitation for all sectors in Sacramento County for the purpose of generating feedstock for biomethane production and electricity generation (with co-production of value-add products)
   i. The AB 1826 mandate
      - Eventually thousands of small businesses in Sacramento and SMUD Territory will be required to comply

b. Tasks to be conducted
   i. Lessons learned from initial food waste study – Food Waste 1 (was conducted a few years ago)
   ii. Strategic Implementation plan
      - In process, gathering input at today's meeting
   iii. Selected pilot collection enhancement programs
      - Identified a number of businesses and organized by 'priority'
      - Highest priority – businesses which would benefit most from SMUD's assistance
      - Addressing barriers to participating in food waste separation program, such as language, parking lot constraints, other logistics
   iv. Benefit metrics of food waste production
      - Job creation
      - Greenhouse gas reduction

4. Review of Pilot Projects

a. Geographic location
      - Working closely with Sac State food diversion project
      - Other candidate establishments within 1.5 miles of Sac State

- Have prepared a priority list of candidate establishments and contacted them for potential involvement in pilot program

5. Group Discussion: challenges of implementation of AB 1826
    a. Infrastructure needs
        - Hyatt just added six more bins today; in the last six months have also added four other businesses in the building to the food waste program (shared compacter)
        - Sharing bins and/or compactors with other businesses is a common challenge
        - Issues with other businesses arise, such as misunderstanding of what the food waste bins are for (i.e. general recycling); Requires education – some staff are part time and may not care as much as others; this comes down to education and who is the responsible party – whoever pays for the garbage
        - Challenge with other operators not following regulations when bins are shared; responsible party needs to figure out logistics and get other operators to comply
        - Another main challenge is spacing – both interior and exterior – which can reduce efficiencies of processes and staff; Infrastructure is a huge issue and one of the delays in implementation
        - Sac State – most people are used to using existing bins, which are nice-looking, built-in, etc. Can be difficult to change behaviors when people are not used to something different
        - Making space for additional bins is difficult
        - Important to consider the design of the bins when implementing a new system; Contamination happens when you have three bins next to each other, but employees are getting used to it; Design example – put food waste in a rolling bin and other items in bins without wheels (food waste is much heavier and would be more difficult to move if it is not put in the right bin)
        - Forcing consumers to physically not be able to put certain items in certain bins is going to be the only way it will work for McDonald's – for example, will design bins so that you can't fit trays/containers in food waste bin; eventually expect consumers to get used to system

    b. Marketing value
        - McDonald's has had a strong PR presence within brand that has grown over the last few years; spend a lot of time educating consumers on where the food comes from, how it is made, etc. but it took five years to get the message across and get buy-in from consumers; McDonald's operators will want messaging to be consistent, as they move better as one unit
        - McDonald's sees value in educating consumers about what we are doing in terms of food waste separation and why; consumers will see operator as better business owner for doing this; some sort of recognition mechanism would be good – there is benefit to it from business owner's standpoint

- Sac State student population is very different from typical consumer – have been demanding food waste separation since before it became a law and therefore expected the changes; food separation program has brought a lot of attention to Sac State as a sustainable campus; recognition helps build reputation; Sac State just got award from Breathe; awards are definitely incentives
- Need to educate consumer in multiple ways; signage is one of the biggest opportunities and having consistent messaging (and being around the messaging more often); saturate the consumer to change behavior; making signage/education part of regular life, just as recycling has become
- Need to use broad-based messaging, but need to be careful to avoid confusion and to actually reach the target audience
- Developing this messaging is one of the potential opportunities through this pilot program; Ex. 'food to fuel', 'keeping it out of the landfill' – these types of messages resonate with consumers
- People tend to be more conscious of these issues in this region – could even make the difference of which restaurant people choose; potential to recognize restaurants/businesses who are part of program so that consumers consider them in this regard the next time they are going out; telling businesses that, if they make these changes, they will be recognized at the bottom of SMUD bill/notices/other communications; these types of business recognition can change consumers' decisions
- Sac State fills up buses at Clean World, where they send their food waste – closing the loop; advertise to students that shuttles are operating on gas that has been generated from the food waste that they have produced; cool way to get message out, emphasizing negative carbon footprint

c. Communication and coordination
    - Property owners are often times removed from process, but are responsible for paying bills and therefore responsible for being in compliance. Some type of specific outreach to property management firms is needed.
    - AB 1826 – There will be a soft rollout; Sac EMD compliance officers will be willing to work with operators; get 60 days to adjust if there is a problem, and then it is another six months before the next inspection; regulator's goal is to help businesses get in compliance, and are willing to work with businesses to help address the issues they are having with implementation
    - McDonald's has not had a conversation with Atlas about incentives (as well as each of the other participants today have had any conversions with their haulers about incentives); collection frequency was a problem (not frequent enough), and there were negative ramifications for not filling bin, as opposed to other types of incentives
    - Will need signage to reach and educate consumers, and will need different languages

- Airport is a great example because bins look nice, signs are very visible – but signs need to be very visual graphically so that people who don't speak English or don't read are still able to understand
- Restaurant associations at state and local levels are very connected – meet regularly (every two months) in person and through email blasts; could be an opportunity to get the message across; provide information about local, county, state regulations; work that Air District is doing could be integrated into that messaging; restaurant community here is very close, all talk regularly; restaurant owners communicate with each other and share information
- With chains like McDonald's, communication between franchisees is not as regular, but still some interaction
- McDonald's uses 'Retail Radio' at all locations – one idea for consumer education is to play a radio message about food waste separation program
- Operators can also talk with waste haulers for tips; five haulers in SWA that handle food waste; ask hauler what they can do; should be able to do it without huge cost; for example, with taking food waste out of the trash, may be able to reduce size of trash bin and/or adjust frequency of pick-up
- Take advantage of neighborhood association newsletters for messaging; free; monthly community meetings
- See Sac State, Hyatt, Airport for great examples of efficient systems

d. Training
    - Need to consider both 'front of house' and 'back of house' food waste – McDonald's doesn't have a lot of 'back of house' food waste (systems are already in place to minimize/eliminate 'back of house' food waste); biggest issues are educating consumers, making space for extra bins in lobbies, preventing contamination
    - Therefore, need to distinguish between different opportunities for education – 'front of house' and 'back of house' education, considering consumers, staff, third-party vendors, etc.
    - Need to educate janitorial staff as well – multiple opportunities for education (could be an independent third-party as opposed to employees who are responsible for waste removal)
    - Expect staff to have a high learning curve; daily training required for customer service alone; waste separation will be another layer/extra step of staff education needed
    - Waste separation doesn't need to be hard, but difficult when new employees are coming in and haven't had training or don't practice waste separation in their own lives
    - Air District – working within SWA to develop sector-specific guides and education materials for businesses; conducting outreach to businesses; offering free, friendly tips and guidance to support implementation and achieve compliance

- Voluntary workshops for businesses would be very helpful moving forward with implementation of bill
- Selland's is a great example – 95% waste-free at H street location, but to achieve this, needed both passion and guidance; Selland's had a soil expert in the family who created a plan for them, and they were very successful over a few years with this blueprint for what to do

6. Path Forward
    - Ideas will be incorporated in pilot design and Strategic Implementation Plan, which will be rolled out later in the summer
    - Meeting notes from this meeting and last meeting, along with meeting attendees and their emails, will be sent out.

AGENDA

SMUD Food Waste Collection
Stakeholder Third Workshop

SMUD Customer Service Center, 2nd Floor – Lighting Classroom
6301 S Street, Sacramento
June 21, 2017 – 9:00 to 11:00 AM

1. **Introductions (*9:05 – 5 min*.)**
    a. Meeting #1: more general, included generators, haulers, others
    b. Meeting #2: focused on generators
    c. Meeting #3 (today): focuses on haulers and infrastructure
2. **Purpose of today's workshop (*9:10 - 5 min.)***
3. **Review SMUD's project (*9:15 - 10 min.)***
    a. SMUD's overall objective: Establishing food waste/organic waste for all sectors in Sacramento County for the purpose of generating feedstock for biomethane production and electricity generation (with co-production of value-add products)
        i. The AB 1826 mandate
            - Several hundreds of generators that need to comply now, but beginning in January there will be thousands
    b. Tasks to be conducted
        i. Lessons Learned
        ii. Strategic Implementation Plan
            - Purpose of these stakeholder meetings is to get input for the Strategic Implementation Plan
        iii. Selected pilot collection enhancement programs
            - Within 1.5 miles of Sac State
            - Working with Sac State to enhance existing food waste programs on campus
        iv. Benefit metrics (greenhouse gas reduction, job creation, etc.)
            - Ultimately benefits of having food waste converted to energy
    c. Takeaways from previous stakeholder's workshops on 2/23 and 5/31.

4. **Review of Pilot Project (*9:25 - 5 min.)***
    a. Geographic location
    b. Target audience
5. **Group discussion: challenges of implementation of AB 1826 (*9:30 - 60 min.)***
    a. Identification and prioritization of issues, barriers, and potential solutions
        i. May be beneficial to categorize what food waste collection will look like based on type of customer, type of waste, etc. – not a one-size-fits-all situation
        ii. Amount of contamination, what type of contamination, and age of waste are important infrastructure considerations and will determine the cost of processing
        iii. One challenge is identifying who the processors are and what they can process – currently we are having to haul waste farther away to processor who will accept the waste not accepted in Sac County
        iv. From technology side, willing to work with agencies to process the waste even with contamination up to ~10%;
            - The technology is present, just a matter of getting all of the facilities on the same page;
            - $60-80 million for facility (one being built in San Luis Obispo);
            - Issue with building the facility is always location – this is the key factor, whether it's north area, south area, and want to avoid transport cost;
            - A lot of this decision falls to the County and the City; are they willing to commit to one or two facilities; ideal for haulers that waste is taken to one location
        v. On the commercial side, will get a lot of food waste with little green waste; on the residential side will be more green waste;
            - There is not a facility that will accept both, and the County and City will not want to do a separate facility for food waste – will need to incorporate food waste into an existing facility;
            - Ideally, we should put food waste in with the green waste, and do collection weekly as opposed to bi-weekly – but there is no one facility nearby that can take both; City and County will need to adjust schedules/sync up collection
        vi. Yolo County – trying to develop a technology that could be implemented locally over the last 10 years;
            - Got funding from State of CA to study food waste, all reports published; anaerobic digest process; basically going to be individual cells that operate as digester; not a lot of food waste

currently, but city of Davis is beginning to mix food waste into green waste; can handle contaminated material, plastics and containers are easy to remove;

- Cost of project infrastructure will be $2.5 million; have ability to expand system; composting is not ultimately the best option for food waste, so want to keep most of this in digester and the rest go to composting; purchased power plant and working with SMUD on pipeline; within Yolo County, not all cities want to participate

vii. In our region, processing capacity is the biggest obstacle
   - Financing is the challenge; in order to get financing, need long-term commitments from all haulers, and price structure in place;
   - City and County control 150,000 tons of green waste, and could build a model around this; other areas are building digesters, which can take food waste and green waste depending on the technology;
   - Ideally would have a system that could handle both green waste and food waste

viii. Problem is with technology – still finding better ways to do things
   - Food waste from commercial sector should go into liquid digester;
   - All comes back to dollars; some of the facilities we have today are struggling because they don't have enough feed stock;
   - SWA had estimated 100k tons of food waste

ix. No one wants to pay more, but the reality is that we need the infrastructure; region is very sensitive to cost increases

x. From a transportation standpoint, ideal number of digesters – considering greenhouse gas emissions from driving trucks, it would make the most sense to have multiple locations in each geographic corner; two would be great but at this point even one that was open all the time would be great
   - Need facilities north of the river and south of the river;
   - One makes sense if it has enough capacity, but two would be good in case one was not working properly
   - Only so many SWA certified facilities;
   - To build a local site that meets our needs, we have to make sure that the material gets there; this has always been a

challenge in our region of ensuring that recyclables, green waste, etc. get where they need to go

xi. Trying to do regional food waste won't work without the green waste; don't think commercial food waste is going to be processed through anaerobic digestion; if we solve the green waste problem, there is another outlet for food waste right there

xii. What is the green waste solution for the County?
- River and traffic are the biggest issues; need to get trucks off the streets north of the river to a facility north of the river; would be less traffic, less impact on air pollution, overall more efficient process;
- if we could get two facilities north and south of the river, this would be ideal; but need long-term commitments for feedstock to ensure availability of financing facilities.

xiii. Hauler system is born of the north/south river issue;
- County has the facilities;
- Transfer facilities are there, it's just about where you can go 20 tons after that;

xiv. There would need to be a sort of RFP process, since it is not one-size-fits-all; different procurement processes; etc.

xv. Currently have someone at Sac County doing long-term projections for commercial, residential;

xvi. Composting – permitting is a challenge due to air quality issues in Sacramento County. Would increase VOC and ozone issues.
- Also dealing with flooding;
- Adding food waste, tier 2 permitting is a lot of work;
- Air districts are going to require offsets for anything; northern recylcling has a lot of emissions; air district allows you to travel up to 15 miles; but for any composting facility, still need to pay for emissions

xvii. In SLO, facility is located on the hauler's property
- Helped with emissions/permitting; emissions side of permitting process was actually pretty easy in this situation

xviii. Seems that existing infrastructure that could be taken advantage of as opposed to developing a new facility, but there are SMUD/PG&E territory issues;

xix. Other options for haulers – using transfer stations to transport food waste to another facility regionally (Dixon, Zamora but not yet SWA

certified; Stockton), but then these facilities will see huge increases in volume, and some are maxed out already

- Yolo County's timeline for accepting commercial food waste – have a timeframe for manufacturing equipment, which will take 4-5 months; will be January or February of next year; but by October of this year there will be capacity for liquids; don't yet have firm rates from northern recycling; have rates already established; liquid waste processing is less expensive than green waste (which is same as food waste cost-wise)
- Clean World is the first option, then transported out (Zamora)
- Some food waste doesn't have enough energy in it, so it goes to animal feed

xx. Depending on waste stream, can have ammonium issues, which is a problem with digesters; with food waste will have a lot of salts; process liquid with high salts to minimize

xxi. Liquid waste is the number one hurdle to successful operation of any of the digesters in the country; high salts, ammonia area issues

- 30k gallons per day of liquid effluent; need technology to take liquid effluent and turn it into something that can be used; not enough farmland to use 30k gallons per day;
- UC Davis is working on a pilot project right now that turns this into fertilizer that contains about 4.5% nitrogen, but very expensive process

xxii. In SLO, facility is surrounded by 15k acres of vineyards; working with a third party to take all solid compost and liquid

- Three factors to look at in business case – commitment from supplier on tonnage, …

b. Identification of ways to generate value from AB 1826 compliance
   i. Infrastructure challenges – regional facilities
   ii. Infrastructure needs
   iii. SMUD role
   iv. Communication and coordination

6. Path Forward (*10:30 - 30 min.)*

a. Summary and conclusions from the discussion with the stakeholders
   i. Interest in SMUD's financial incentive programs
      - SMUD has greenhouse gas reduction goals
      - Have biomass initiatives that SMUD wants incentive programs to support

- Smart mechanisms to use the waste they have

ii. For the City, to put a green waste facility north of the river is the biggest thing that will help (150 tons per day in the north area)
    - Green waste-only transfer station that can handle 200 tons per day

iii. Technology – infrastructure costs, rate increases
    - In SLO, have seen rate increases for all facilities
    - Creating renewable energy on the back end for 20 years
    - Consider SMUD's goals for greenhouse gas emission reductions as part of the strategy
    - A lot of moving parts; goal to get everyone aligned

iv. County – for commercial sector, there is a rate structure, but need to help people better understand this system
    - Marketing side – still today getting people who think haulers should be paying for the byproduct (since they are making something out of it) rather than charging to take it away;
    - Just a lot of misconceptions that need to be clarified

v. Regional green waste facility that can handle food waste is a piece of the puzzle, although not a solution for commercial food waste
    - Would get buy-in from cities over time if the price is right
    - If we can't do this here in our own backyard, need to work with transfer systems to make sure there are facilities to go to north and south of the river

vi. City is at the County's mercy – City can beg the County to let them into the north area; may be able to offer green waste tonnage in the south area to take a regional approach

vii. Reliable outlets for both residential green waste/food waste mix and also on the commercial side
    - Scary that we are heading into 2020 and in a metro area with 2.2 million people without a solution
    - Need facility north of the river with low tip fees

viii. From a waste management perspective, eager to find a solution and want to know how can partner with SMUD
    - Rates are always an issue and this area is very sensitive to rate increases; however, this is also inevitable;
    - Finding a facility makes sense for the residential piece, the commercial piece, green waste, food waste, etc.

ix. From generator's perspective – More options, more facilities; need education
    - Goes back to one-size-fits-all issue; customers will have different needs, and needs change daily

x. Air District – a lot of businesses don't know about the law yet; working on education materials for businesses
    - With climate change, don't want to see composting facilities in the County
    - Want to see food waste conversion to energy from air quality perspective

xi. There are a lot of moving parts here that need to be aligned
    - People want to pay less than $30 per ton and not have any emissions and not use any water, and this just isn't possible
    - AB 1826 was there but not being enforced, so people are still sending waste to the landfill, which is less expensive
    - Can't operate these facilities on $30 per ton or even $50 per ton
    - Co-locating digestion facility with composting is the only way to do it – can use liquid from digester to use in composting; but odor is an issue even with enclosed composting

xii. Any way for SMUD to help with EIR process? Something to consider…

7. Next Steps

a. There will be one more meeting soon to discuss draft Strategic Implementation Plan

SMUD Food Waste Collection
Stakeholder Fourth Workshop Notes

SMUD Customer Service Center, 2nd Floor – Lighting Classroom
6301 S Street, Sacramento
Wednesday, August 16, 2017 – 9:00 to 11:00 AM

1. **Introductions (9:05 – 5 min.)**

2. **Purpose of meeting (9:10 - 5 min.)**

3. **Review SMUD's project to date (9:15 - 5 min.)**

    a. **SMUD's overall objective: Establishing food waste/organic waste for all sectors in Sacramento County for the purpose of generating feedstock for biomethane production and electricity generation (with co-production of value-add products)**

        i. **The AB 1826 mandate**

    b. **Tasks to be conducted**

        i. **Lessons Learned**

        ii. **Strategic Implementation Plan**

        iii. **Selected pilot collection enhancement programs**

        iv. **Benefit metrics (greenhouse gas reduction, job creation, etc.)**

4. **Review of Past Stakeholder Meetings (9:20 - 5 min.)**

5. **Group discussion: Regional Opportunities (9:25 - 60 min.)**
    - Regional opportunities to advance food waste collection and roles that SMUD might play in our communities – considering needs and challenges, as well as solutions and possibilities
        - Need education on multiple levels
            - McDonalds – very little back-of-the-house food waste; development will focus on post-consumer food waste; education/messaging will target the consumer
            - Green Sac – there is not a lot of time to educate most consumers on-the-spot, but leave them with the idea and hopefully continue the behavior; nature of the waste is important
            - Limited opportunities to educate consumers, may need a broader consumer education campaign involving multiple restaurants in order to make waste separation a standard process
            - Educate children in schools; often times children are dragging parents to fast food restaurants, so engaging kids will help bring along the rest of the community
            - Integrated waste management agency in San Luis Obispo has hired a company to educate children – 80 kids at a time, three times per week, kids come to the facility to learn about waste and waste separation
            - BREATHE California – Natomas Unified School District has implemented food waste separation program in several schools and is expanding program to Sacramento City

Unified School District; need to have champions of the program to ensure program success
        - Sac County – by 2022, will need to consider residential organic waste collection; gearing up for this now; partnership opportunity with SMUD and other programs such as school-based education that BREATHE is doing; use SLO waste management education programs as a potential model
        - SMUD – Important to consider who is going to pay for education programs; issue of funding needs to be addressed (consumers, SMUD, etc.)
- Opportunities for collaboration within this group
    - Need to consider that haulers do different things with organic waste; how can SMUD help without hurting any individual interests?
        - Collection methods and end uses vary; the focus has been on collection, but need to also consider infrastructure and generators – start by identifying generators that have clean, quality organic waste to engage and implement as a pilot in order to develop a solid process; get haulers and infrastructure the feedstock they really need (this is the purpose of the existing pilot program)
        - Restaurants are very different; some restaurants have more back-of-the-house food waste while others are more post-consumer
- Working first with today's infrastructure but also considering what future needs of the region will be (infrastructure to blend green waste and food waste)
    - Republic – tried to make things easiest for the generators so they would buy-in to the process, but resulted in really dirty waste and process; now trying to figure out how to do things better
    - Clean World – at this point we need to pick our battles and focus on where we can have biggest impact (ex. Target grocery stores that are sending tons of produce to places it shouldn't be going, vs. fast food restaurant with cartons of fries, i.e. not a lot of food waste)
    - Post-consumer level – still should be helping people get used to waste separation and providing education; takes time and repetition to instill these processes into the culture
    - Atlas – Maybe we should focus first on residential side so that when people go to restaurants, they understand and are used to waste separation; look at educating residentially so that this transfers to behaviors in restaurants and elsewhere

a. Market champions

- SMUD as a potential market champion – SMUD is one of the only organizations in the Sacramento area that accesses most everybody; can serve a role that spans across different haulers' customers
- SMUD has the opportunity to support sustaining of behaviors and messaging that support implementation

i. Information exchange is needed – what avenues of information would be most useful?

ii. Promotion/visibility – identification of ways SMUD could highlight/promote/recognize generators and other who are "doing the right thing"

- Need to help restaurants/businesses understand the benefits of this movement to them – transition from education alone to sustaining behaviors through incentives
    - Sustainable business programs – stickers to show that a business is using sustainable practices
    - Sac County – has used an incentive/rebate program for customer participation; $36,000 per year
    - McDonalds – if SMUD wants to incentivize participation, not going to say no; also see opportunities to educate consumers (can do surveys and talk to people, can talk to

people in drive-thrus, do some education and can try different variations of education/marketing materials); if people are starting to learn about this at home, at school, at restaurants, etc., behavior change can happen; recognition would also be beneficial for businesses to build customer loyalty, share benefits, etc.
    - Republic – have been considering education more so than incentive programs
    - Clean World – everybody would need to agree on a consistent message so that it is recognizable (incentive sticker would need to be the same no matter who the hauler is)
    - We are ahead of schedule so we have the potential work together to make the signage/messaging the same across the industry
    - Consistency across businesses; consistency across jurisdictions.
    - At F65 using yellow bins for food waste; have seen green elsewhere as well
    - Important to communicate the benefits of food waste separation down to the least common denominator; people want to know what is in it for them
    - Should consider how much and what kind of food waste a restaurant is generating; some restaurants just don't have food waste; process won't be worthwhile for some cases in the end; some restaurants have a lot of food waste back-kitchen and some have a lot of post-consumer waste, so difficult to determine who really should be targeted in waste separation programs
    - Focus first on where we are seeing tons of food waste, like grocery stores, to focus on building strong infrastructure and processes before going down to a lower level
    - Collaboration will be extremely valuable as part of AB 1383 implementation
    - Would be interesting if we could have a program where a restaurant could apply for a waiver to waste separation program, including a food waste 'audit' process so that a restaurant could prove whether or not a waste separation program is necessary for them
    - County inspectors focus on health issues but also verify compliance with waste separation requirements – would pick up on a business that was not in compliance or that was not actually generating the waste
    - Costco – trying to do post-consumer waste separation but results in contamination; if just stuck with back-of-the-house separation, the waste quality would be much better
    - Some people don't understand why they have to separate out food waste at restaurants when they don't have to do it at home; on the flip side (living in Davis, for example) food waste separation might be standard practice at home but not an option at a restaurant or other business – can be frustration in both cases

b. Infrastructure Development

i. Promote existing facilities

- Need to make sure existing facilities are being promoted and supported; Clean World has put in some of the first food waste digesters in the State, and have learned a lot of lessons on how to do this effectively; we don't have very strong infrastructure right now to handle green waste – this all gets trucked away; this is a resource that could be providing energy that customers then get to use again; need to support and ensure success of existing infrastructure
    - Clean World – existing infrastructure; technology company, went into digester business, but have now sold facilities; UC Davis now owns their own facility and is operating the digester; Clean World employees still work for Clean World and have been subcontracting to UCD for labor, but very soon will become employees of UCD, and Clean World will play more of a regulatory role;
        - ES Online – company is now operating Fruitridge facility; Clean World is providing support but not operating the facility; took a long time to get through the transition; maintenance was not getting done for months and are now not accepting food waste at this time; digester is still running, but not accepting solid waste since maintenance is now being done; making significant improvements; everything was being diverted to

UCD – but have found potential leaks in one of the tanks and now need to drain the tank so that it can be inspected – subsequently UCD is now not accepting waste at this time either; should be back up by November; so, no digesters accepting solid waste right now (everything for the time being is going to Zamora); opportunity to now step back and figure out what has been working over the last few years and what hasn't
        - Contamination has not been a huge issue; taking mostly packaged waste; odor that gets generating when the waste is processed has been more of an issue; new processes being implemented to keep the odor down
        - There is a project down in San Bernardino that Clean World is participating in and is providing tech support; serving technology role that they were always meant to play; project is mid-construction right now
    - Yolo County project – likely will focus first on accepting waste from within the County and phase in waste from Sacramento County
    - Conversion process is complicated; not like a landfill that is always open and never breaks down; at the very least we have options in the region, but would be ideal to have more

ii. Foster new facilities

- Need for additional programs
    - A digester can take green waste like grass clippings – the problem is when the green waste contains too much wood, branches, etc.
    - Need for Sacramento County to step up as a champion and develop another facility
        - Co-located green waste and food waste facility
        - Residents do not want a fourth container; need green waste and food waste to be in the same container and have a facility that can take both
        - County operates transfer stations in the north and south; transfer issues due to traffic across the river; need to come up with a way to serve the north area and reduce transfer time
        - Facility that can accept both green waste and food waste – financial support from SMUD?
        - County and City are the two biggest players – have the most green waste
        - City of Sac is already the highest in terms of residential collection rates
        - SWA – problem is getting the City and County to make an agreement with an outside entity; need to look at existing capacity of the region; if there is one facility for green waste and food waste, it will be used; need something that is less expensive for consumers
        - Rancho Cordova has been developing more residential areas near landfill, so really can't do anything more at the landfill
        - CalRecycle awarded grants yesterday
        - County and City share issue with the river – half of service area is north and half is south of the river; incorporations over time have made things more difficult
        - RFP a few years ago – GreenCycle – prices coming back were $60-70 per ton, so the project did not move forward
        - Funds needed to improve transfer station could easily be through the County and City, doesn't need to be the SWA; need reasonable price for green waste, reduced traffic; etc.
        - Need to take advantage of existing infrastructure

6. Path Forward (10:25 - 20 min.)

a. Summary and conclusions from the discussion with the stakeholders

- Will be compiling notes and preparing strategic implementation plan; once SMUD has reviewed it, will share with the stakeholder group, likely in the next month or so

Appendix B. Interim PowerPoint Presentations

Organic Food Waste Collection Program

TASK 3: STRATEGIC IMPLEMENTATION PLAN

May 2017

Objective

- Coordinate food waste collection program tailored to SMUD and local stakeholders
- Improve the collection of food waste in the region for use in bioenergy facilities (e.g. CleanWorld)
- Address key regional gaps within the context of regulatory and legislative drivers
- Identify specific milestones and metrics for successful implementation

Market Drivers

- Disposal cost is the primary market driver
  - Transportation: How much does it cost to drive there
  - Tip Fee: How much does it cost to off-load
- Haulers balance these costs to determine the fate of organic material collected

Market Drivers: Transportation

- Strategically distribute organic waste processing infrastructure (Infrastructure)
- Improve the ability for existing infrastructure to accept material (Infrastructure)
- Improve the density of organics collection routes (Market)
- Improve the quality of organics collected (Market)

Market Drivers: Tip Fee

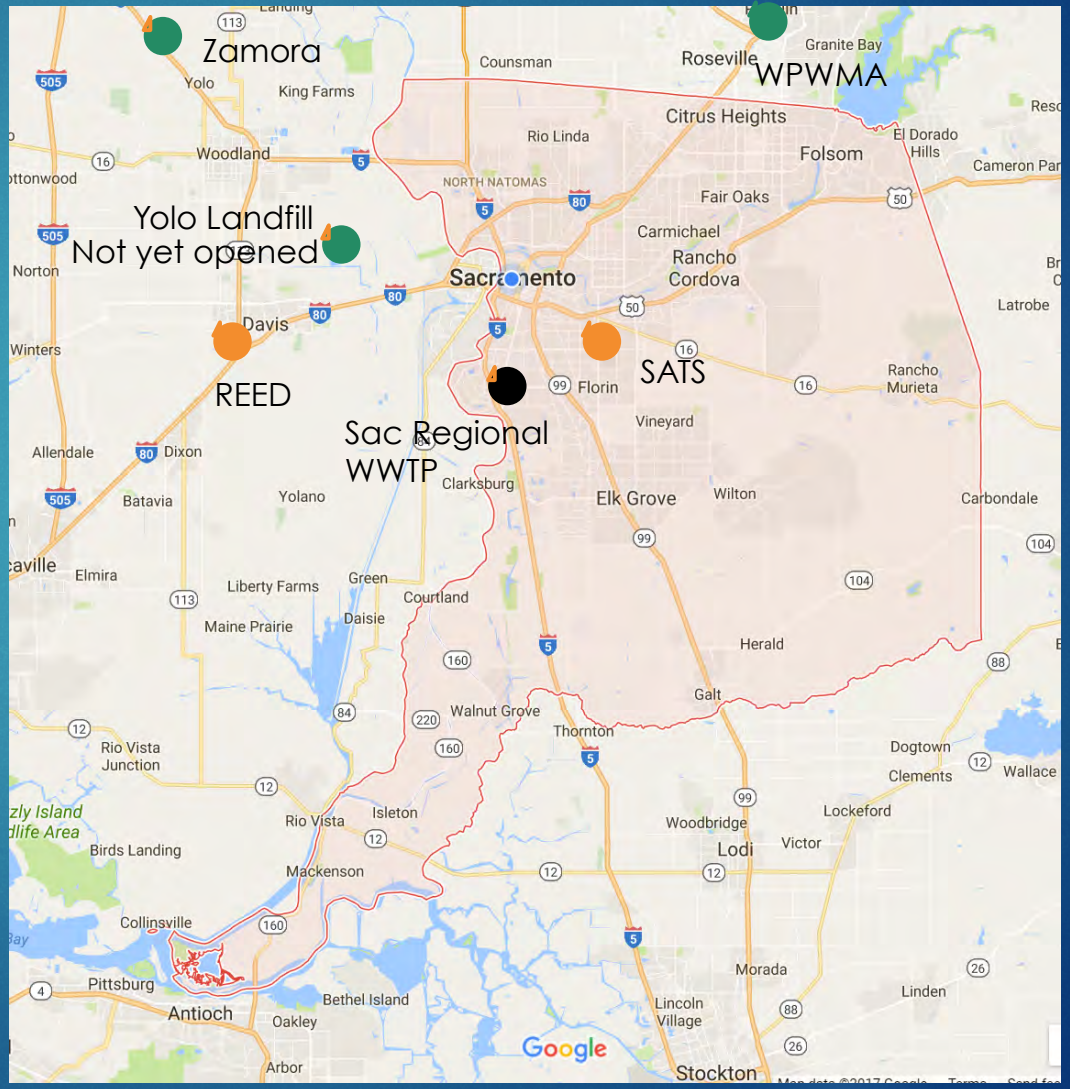
- Controlled by both private and public entities
- Public entities require political and voter approval for rate increases (Market)
  - Long-term process, highly political
- Private entities have greater flexibility to change fee structure, but limited oversight to enforce change (Market)

Market Intervention

- Two principal approaches:
  - Infrastructure
    - Address the infrastructure challenges to create more cost competitive markets for local organics-to-energy utilization
    - Focus on haulers and disposal (back-end)
  - Market Champion
    - Support and promote organics recovery and demand for sustainable waste collection services
    - Focus on generators (front-end)

Infrastructure Approach

- Limited food waste options across the County
- No green waste facilities in Sacramento County
- Historic operational challenges with food waste infrastructure



- Food Only
- Green Only
- Green, Some Food
- FOG, Limited Food

Infrastructure Approach

- Promote and improve existing facilities
  - Upgrade existing assets to accommodate feedstock received through the implementation of AB 1826
    - Improved ability to manage contamination
    - Long-term, financeable, energy contracts (electricity or pipeline RNG)
  - Convert compost facilities to in-vessel AD

- New facilities
  - Improve geographic dispersion to reduce trucking costs
  - Add green waste capabilities within the County

Market Champion Approach

- No cohesive leader
  - Competitive market for waste services
    - Mixed messaging
    - Focuses customers on bottom-line price
- Uphill battle against "Business-as-Usual"
  - How does recycling benefit me (generator)?

Market Champion Approach

- Create an ecosystem that provides businesses value from sustainable organics management
  - Promotion/Visibility
    - Elevate local sustainability leaders
    - Reward for doing the right thing
  - Information Exchange
    - Peer-to-peer interaction to spread best practices
    - Best practices for purchasing choices, how to "eliminate the trash bin"
  - Engage business customers
    - Residential opt-in programs (e.g. Solar Shares, Grenergy)

Next Step

- How to apply these principals to the local Sacramento County markets
- Develop initial visions, goals, and objectives for stakeholder meetings
  - Stakeholder Meeting #2: Market Champion
    - Stakeholder Groups: Food/Organic waste generators
  - Stakeholder Meeting #3: Infrastructure
    - Stakeholder Groups: Haulers, Regulatory Agencies, Facility Operators

Organic Food Waste Collection Program

TASK 3: STRATEGIC IMPLEMENTATION PLAN

March 2017

Objective

- Coordinate food waste collection program tailored to SMUD and local stakeholders
- Improve the collection of food waste in the region for use in bioenergy facilities (e.g. CleanWorld)
- Address key regional gaps within the context of regulatory and legislative drivers
- Identify specific milestones and metrics for successful implementation

Stakeholder Meeting #1

- February 23, 2017 – 27 participants
- Significant participation among a diverse stakeholder group
- Discussed challenges to food waste collection implementation surrounding AB 1826 compliance
  - Peer training
  - Small businesses are more burdened
  - Infrastructure limitations
  - Timely and consistent communication

Strategic Implementation Plan Overview

- Two principal directions:
  - Infrastructure
    - Develop the infrastructure and the markets will follow
  - Market Champion
    - Support early adopters to allow for sufficient demand to attract private investment

Strategic Implementation Plan Overview

- Infrastructure investment
  - How to manage green waste without negatively impacting existing facilities
  - No tolerance for a 4th bin
  - Improved processing infrastructure for CleanWorld

Strategic Implementation Plan Overview

- Market-based programs
  - Business rebates
  - Funded program similar to SMUD's renewable energy charge
  - Peer to peer networking and engagement
  - Business "challenges" that reward early adopters