

Biogas Resource Assessment, Procurement Plan, and Pilot Collection Program

Second SMUD Stakeholder Workshop

March 10, 2015



Project Overview

The **main objective** of the Study is to optimize and demonstrate that a patented additive process developed at Argonne National Laboratory can increase the productivity of anaerobic digestion process up to five times and simultaneously reduce the amount of carbon dioxide produced.

The success of this program will be measured by comparing real time baseline anaerobic digester performance to new process performance. The success of the project will result in proof of an inexpensive additive process that will increase biomethane production dramatically.

This **workshop will focus on Task 2** of the larger Study to enhance the collection of organic feedstock for the CleanWorld Sacramento-area facilities.

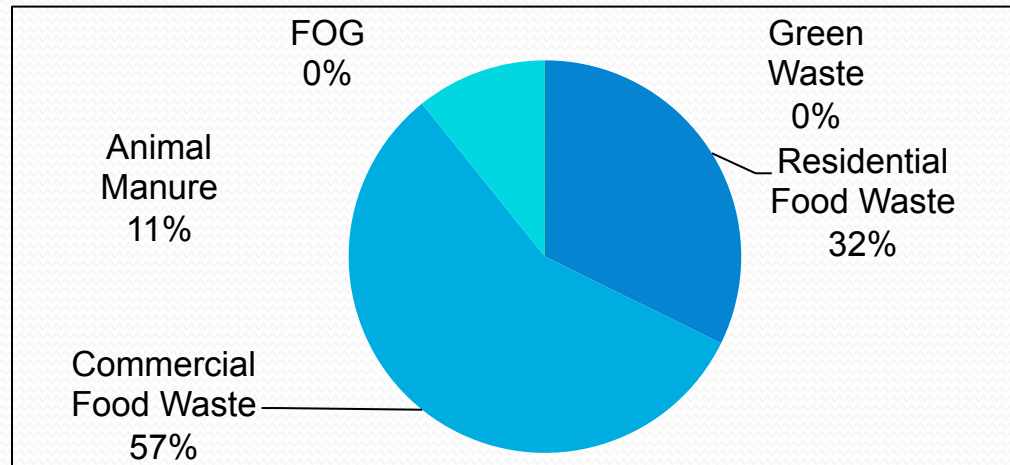
High-Level Feedstock Availability

- TSS performed a high-level feedstock availability assessment for organic feedstocks in the Sacramento area. Key findings include:
 - Lower cost disposal alternatives are the single largest barrier to economic availability of organic wastes
 - Co-mingled woody and non-woody green waste substantially limits green waste availability
 - Residential organics collection is limited due to existing waste handling contracts, small customer volumes, and the potential for increased fees
 - Businesses handling large volumes of food generally have minimized waste generation as an efficiency measure

High-Level Feedstock Availability

HAUL DISTANCE	GROSS AVAILABILITY (TONS PER YEAR)		TECHNICAL AVAILABILITY (TONS PER YEAR)		ECONOMIC AVAILABILITY (TONS PER YEAR)	
	HAUL ZONE TOTAL	CUMULATIVE	HAUL ZONE TOTAL	CUMULATIVE	HAUL ZONE TOTAL	CUMULATIVE
30-Minutes	610,339	610,339	307,244	307,244	35,323	35,323
60-Minutes	2,433,946	3,044,285	1,616,808	1,924,052	26,379	61,702
90-Minutes	3,913,513	6,957,798	2,705,374	4,640,726	8,653	70,355
120-Minutes	5,793,275	12,751,073	4,073,463	8,725,489	4,685	75,040
TOTALS	12,751,073		8,725,489		75,040	

Economic Availability



Infrastructure Assessment

- Atlas Disposal, Republic Services, Sacramento Rendering Company, and Waste Management are the commercial haulers in the Sacramento area offering food waste collection
- CleanWorld has 160 tons per day of design capacity to processes non-woody organic waste
- Sacramento WWTP has 42,000 gallons of design capacity to processes organic waste in a slurry form
- Greenwise Joint Venture, Green Restaurant Alliance of Sacramento (GRAS), ReSoil Sacramento, and Sacramento Clean Cities Coalition are non-profits and partnerships that are addressing the need for food waste diversion

Infrastructure Assessment

Early Adoption Challenges:

- Collection Density and Pick Up Routes
- Education & Training
- Cost
- Space
- Franchise System & Competitive Markets
- Odor

Pilot Projects

To address early adoption challenges, two pilot projects were identified:

- Sacramento Airport Pre-Consumer Food Waste Collection program
- Atlas Disposal and Republic Services Waste Characterization and Impact Assessments

Pilot Projects: SMF

Consistent with the newly adopted Recycling Policy, SMF engaged in food waste collection through a pilot study.

- Participants: 6 Restaurants
- Concourse B Food Court and Restaurants

Project goal is to test and refine a food waste collection system with the intention to expand to all airport food services.

Pilot Projects: SMF



Pilot Projects: SMF

Pilot Program:

- New Containers
 - Slim Jims
 - Tilt Trucks
 - Re-Assigned Trash Compactor
- Training
- Monitoring
- Data Collection



Pilot Projects: SMF

	Date	Tonnage	Number of Days Collected	Number of Participating Restaurants	Average Daily Collection (lb/day)	Average Daily Collection (lb/day/ Restaurant)
Food Waste Pick Up 1	1/30/2015	3.17	10	6	634	106
Food Waste Pick Up 2	2/24/2015	5.87	18	6	652	109
Total		9.04	28	6	646	107.6

Pilot Projects: SMF

Lessons Learned:

- Recycling Needed a Refresher: Food waste training also became recycling training even though SMF has had a long-standing recycling program
- Slim Jim Quantities & Size: There is no uniform solution to determining size and quantity of slim jim containers – very specific to kitchen layout and food preparation system

Pilot Projects: SMF

Lessons Learned:

- Tilt Truck Size: Smaller trash tilt trucks would be appropriate to save space and to encourage recycling
- Convenience is Critical: The more work food waste diversion is, the less likely it is to be implemented – any program must have a clear action plan to incentivize and address all additional work

Pilot Projects: SMF

Lessons Learned:

- Monitoring: Participating restaurants were significantly more successful when they knew their diversion was being monitored
- Communication to Everyone: The impacts of food waste collection go beyond the primary participants and training is important to all ancillary parties.

Pilot Projects: SMF

Lessons Learned:

- Odor Mitigation: Everyone is sensitive to the potential for odor. Proper handling (e.g. bagging) and removal scheduling is critical.
- Internal Champions: The restaurants with internal champions, usually a manager, were significantly more successful



Pilot Projects: SMF

Lessons Learned:

- Staff Participation: Restaurant employee participation varied considerably – apathetic employees are the most challenging to reach
- TRAINING!: Training, training, and more training is the **most important** lesson. There was a significant correlation between successful participation and successful comprehensive training

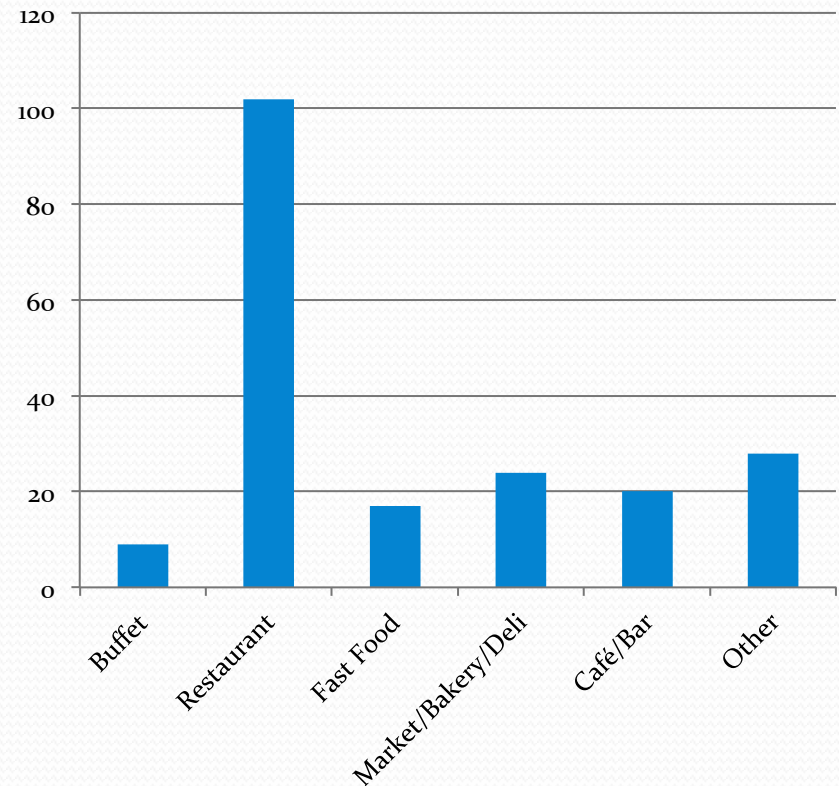
Pilot Projects: Waste Haulers

- Participants
 - Atlas Disposal and Republic Services
- Waste Characterizations
 - Goal: To assess a representative trash pick up to estimate food waste potential
- Impact Assessment
 - Goal: To estimate the potential economic impact of implementing a food waste collection program
- Targets
 - 100 high-priority customers for each hauler
 - Customers without existing food waste collection routes

Pilot Projects: Waste Haulers

High-Priority Customers

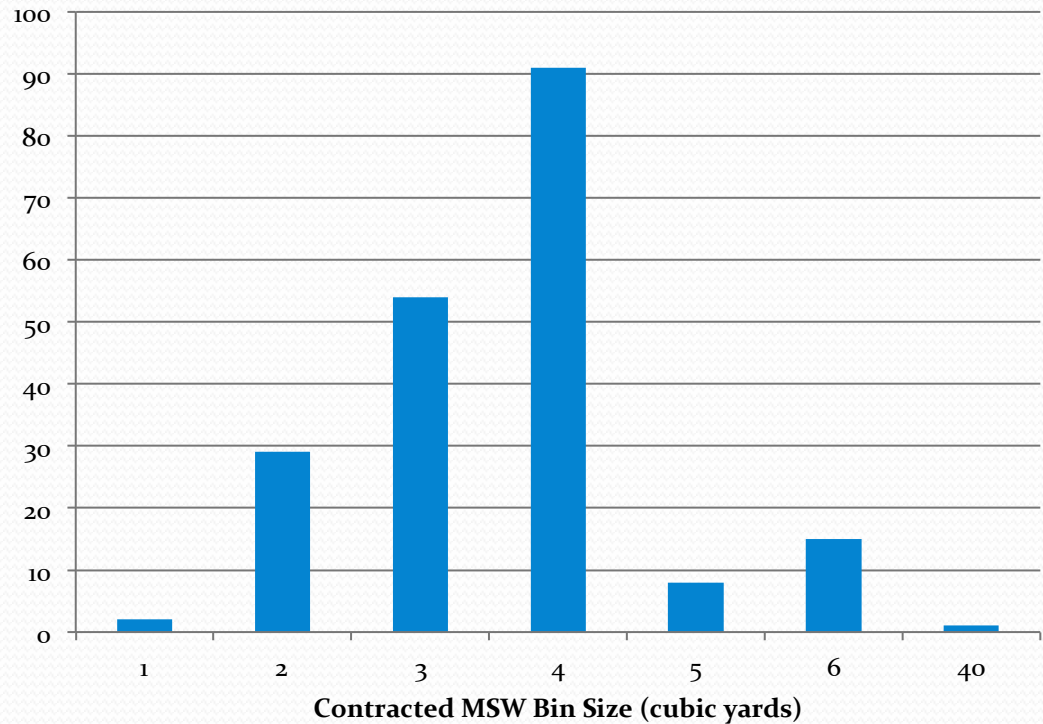
- Buffets: 9
- Restaurants: 102
- Fast Food: 17
- Markets/Bakery/Deli: 24
- Café/Bar: 20
- Other: 28



Pilot Projects: Waste Haulers

Contracted Bin Sizes

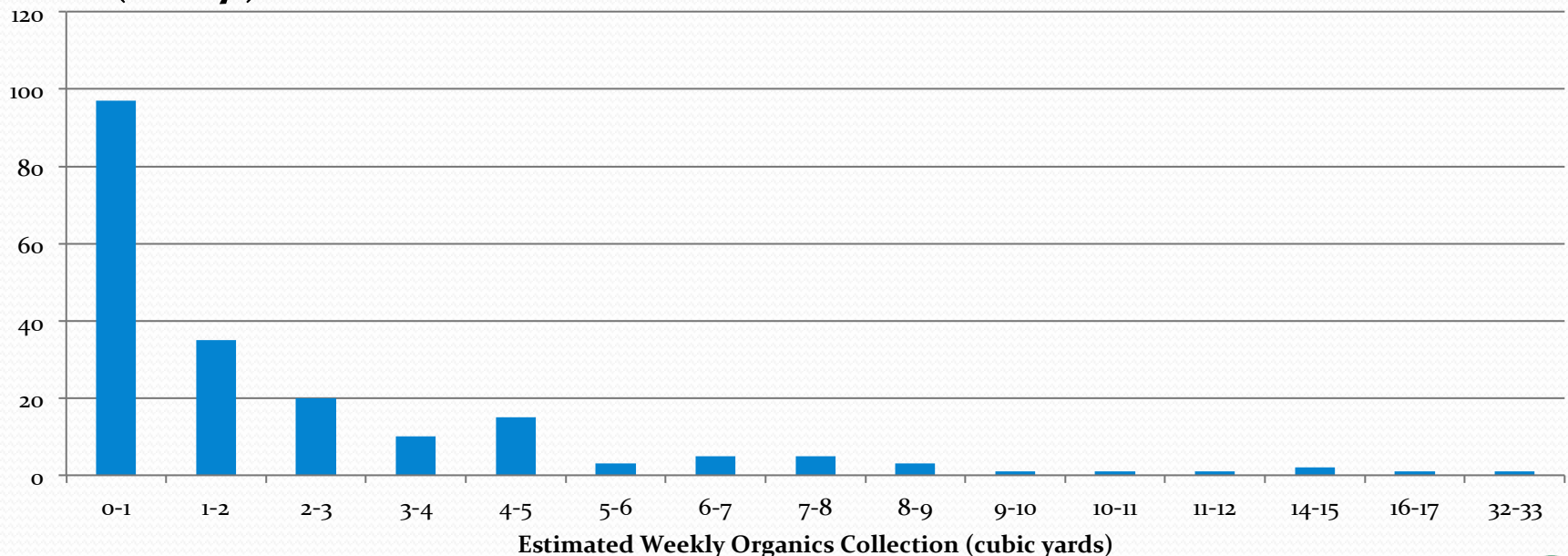
- 1 Yard: 2
- 2 Yard: 29
- 3 Yard: 54
- 4 Yard: 91
- 5 Yard: 8
- 6 Yard: 15
- 40 Yard: 1



Pilot Projects: Waste Haulers

Contracted Weekly Estimates of Organics Volumes

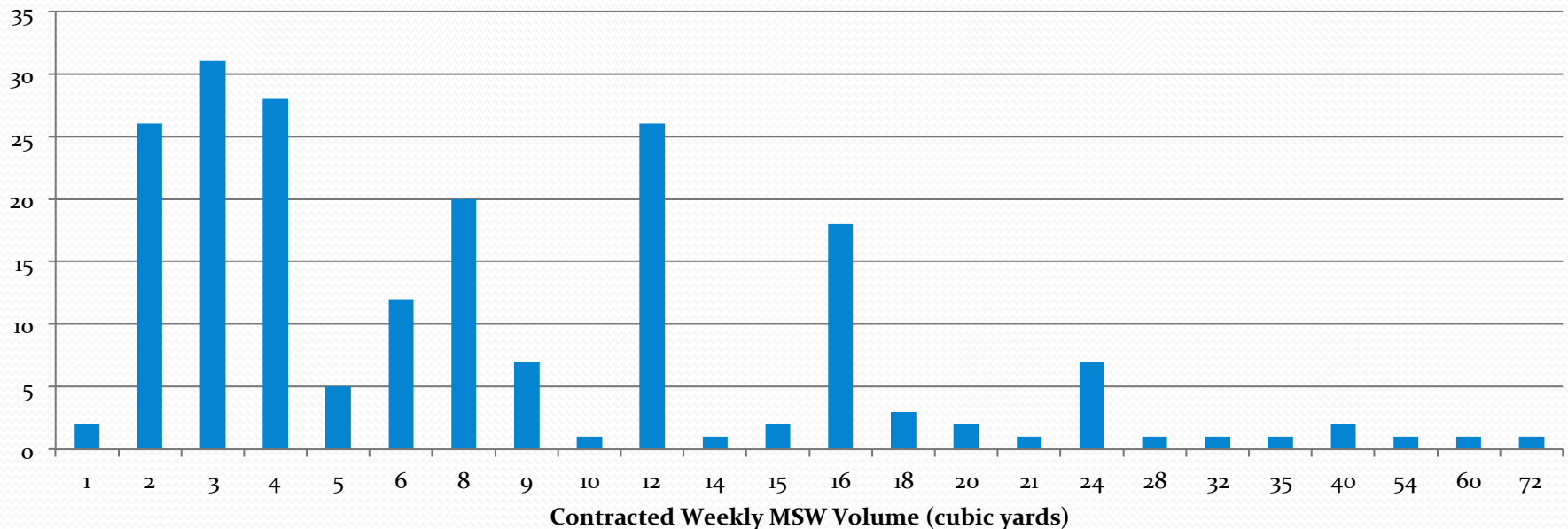
- 5% 8 or more cubic yards per week of organics (2016)
- 19% 4 or more cubic yards per week of organics (2017)



Pilot Projects: Waste Haulers

Contracted Weekly Trash Volumes

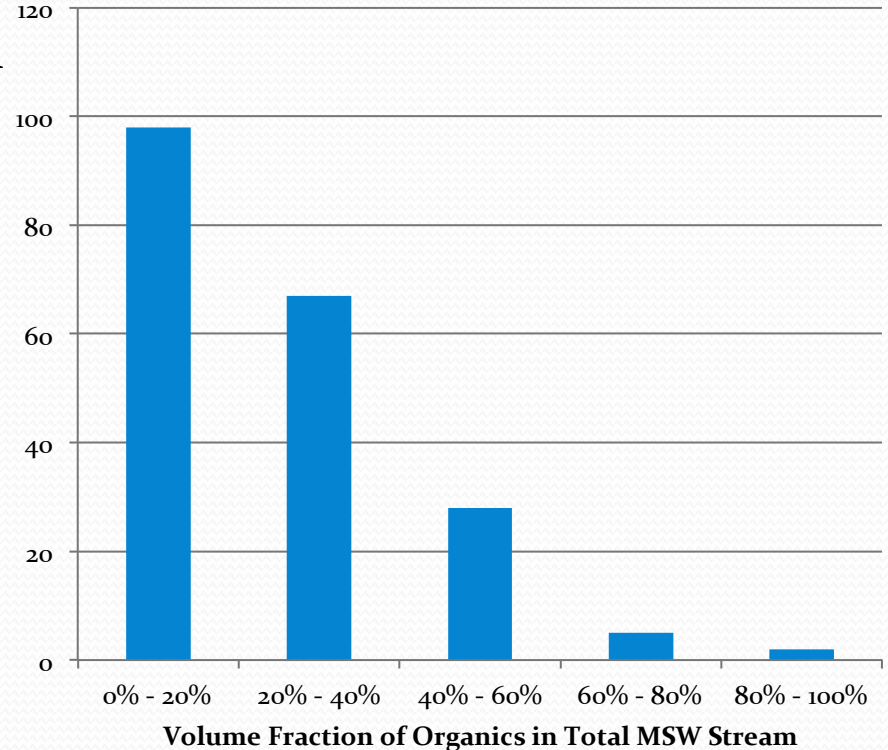
- 71% 4 or more cubic yards per week of MSW (2019)
- 99% 2 or more cubic yards per week of MSW (2020)



Pilot Projects: Waste Haulers

Overall Volume Estimation

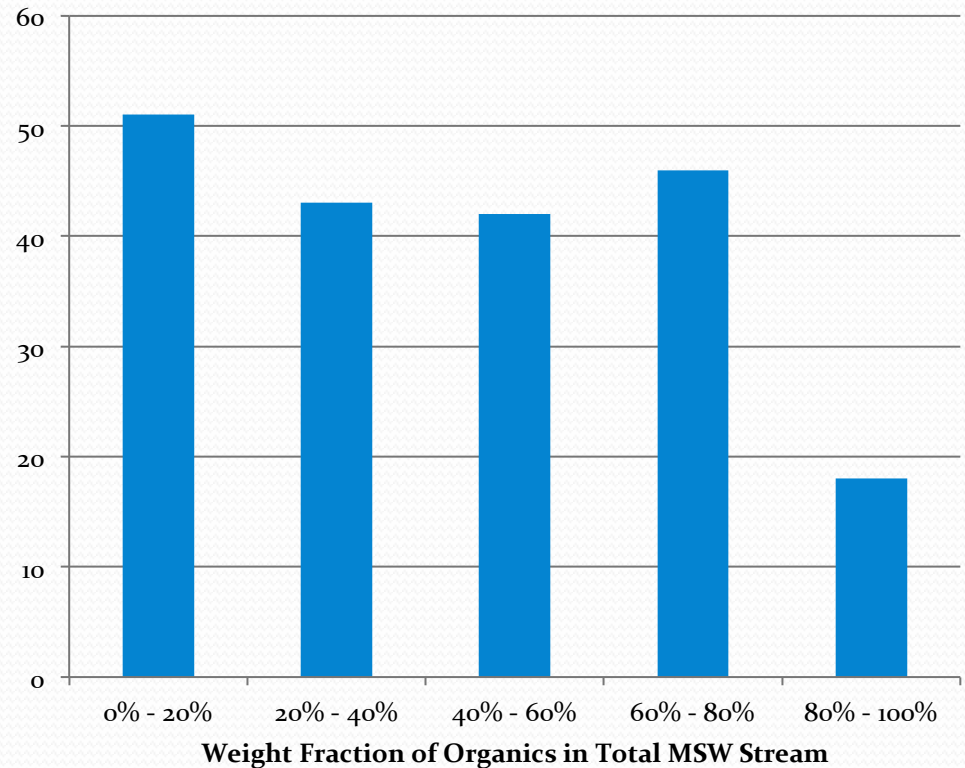
- 0% - 20%: 98
- 20% - 40%: 67
- 40% - 60%: 28
- 60% - 80%: 5
- 80% - 100%: 2



Pilot Projects: Waste Haulers

Overall Mass Estimation

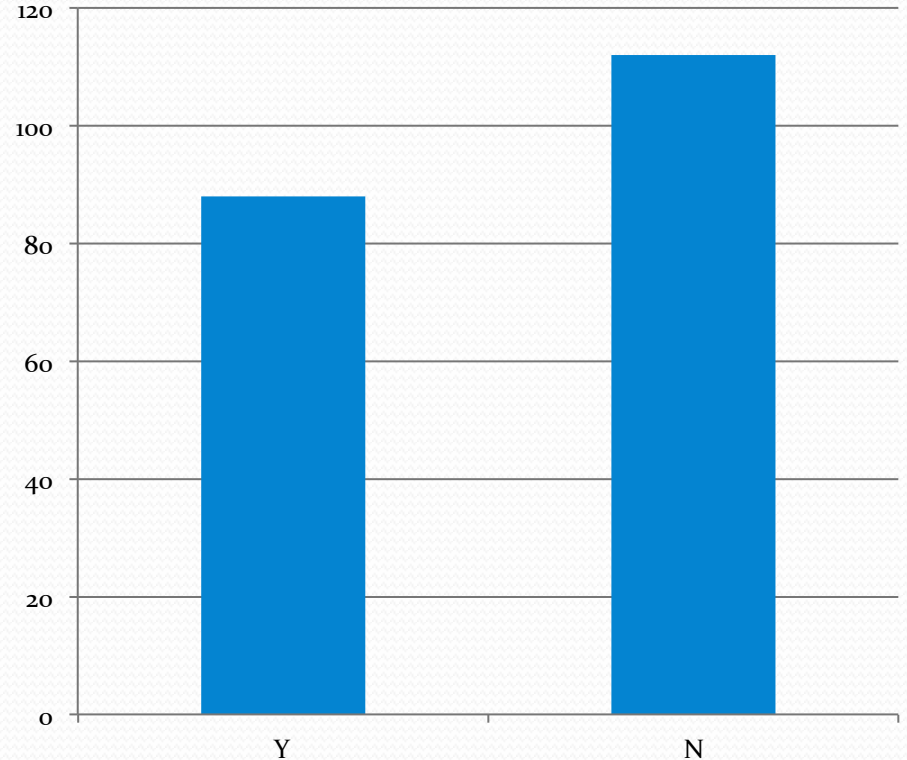
- 0% - 20%: 51
- 20% - 40%: 43
- 40% - 60%: 42
- 60% - 80%: 46
- 80% - 100%: 18



Pilot Projects: Waste Haulers

Potential to Reduce Contracted Trash Volume

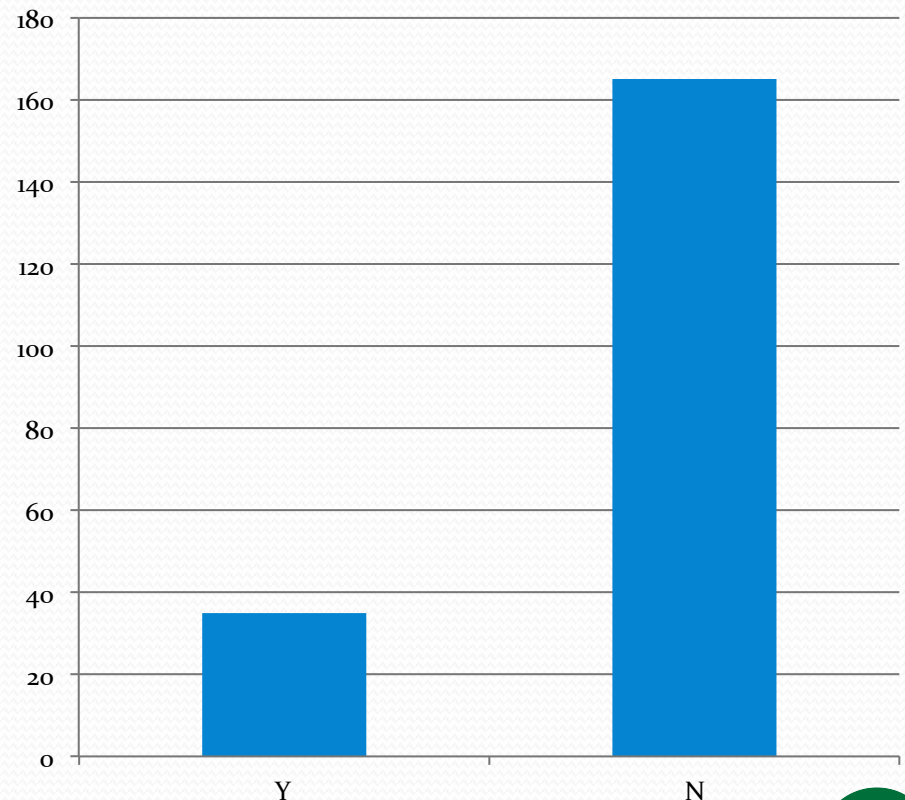
- Yes: 88
- No: 112



Pilot Projects: Waste Haulers

Potential to Increase
Contracted Recycling
Volume

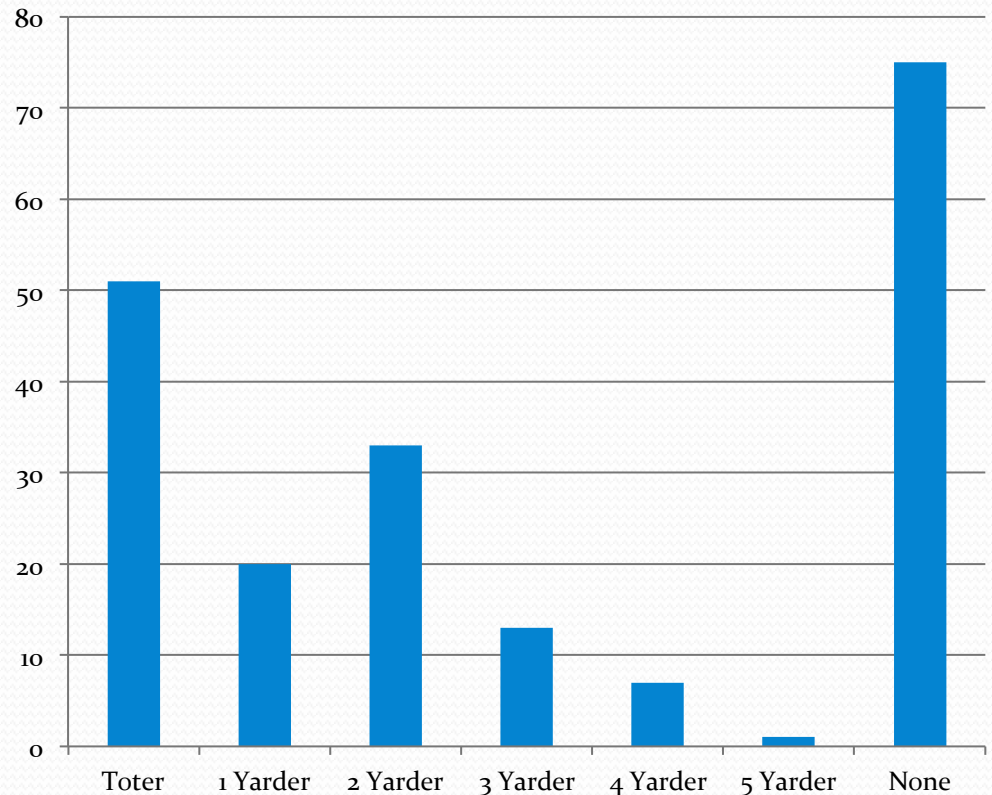
- Yes: 35
- No: 165



Pilot Projects: Waste Haulers

Estimated Bin Size for Food Waste Diversion

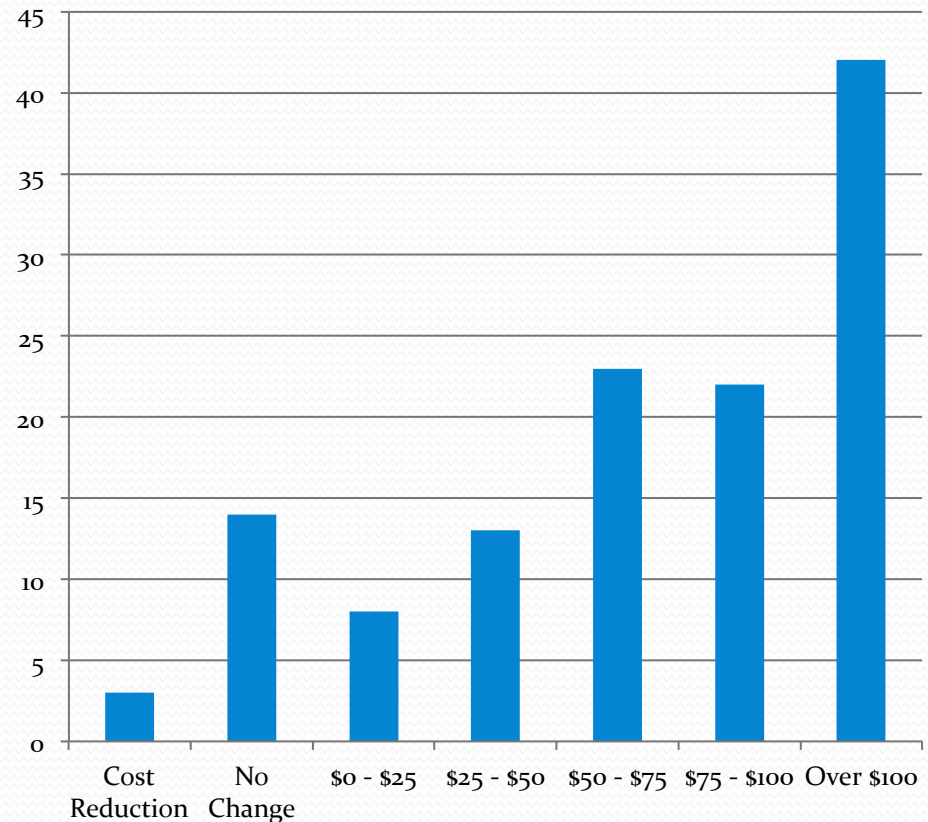
- Toter: 51
- 1 Yarder: 20
- 2 Yarder: 33
- 3 Yarder: 13
- 4 Yarder: 7
- 5 Yarder: 1
- None: 76



Pilot Projects: Waste Haulers

Estimated Monthly Cost for Food Waste Diversion

- Cost Reduction: 3
- No Change: 14
- \$0 - \$25/Month: 8
- \$25 - \$50/Month: 13
- \$50 - \$75/Month: 23
- \$75 - \$100/Month: 22
- Over \$100/Month: 42

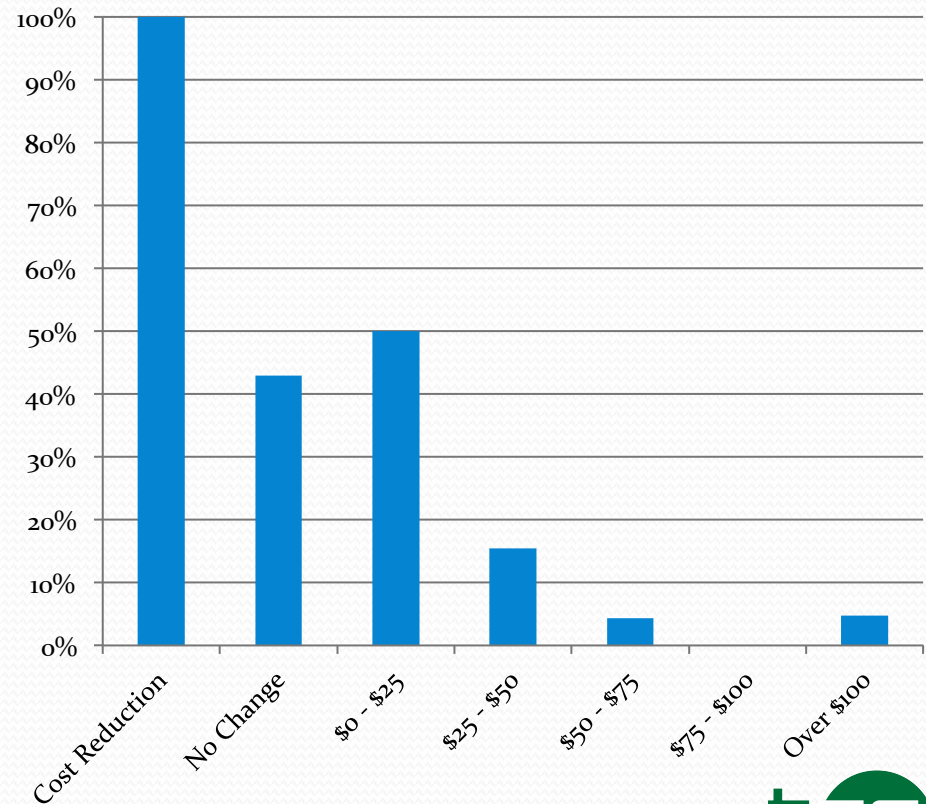


Pilot Projects: Waste Haulers

18 Conversions Occurred

Conversion Rate based on Collection Cost

- Cost Reduction: 100%
- No Change: 43%
- \$0 - \$25/Month: 50%
- \$25 - \$50/Month: 15%
- \$50 - \$75/Month: 4%
- \$75 - \$100/Month: 0%
- Over \$100/Month: 5%



Pilot Projects: Waste Haulers

Lessons Learned:

- Space Constraints: Many locations are constrained by space because of the need to have waste in an enclosure than cannot accommodate another bin
- Recycling Needs Improvement: Many customers were observed to have poor recycling habits and do not fully utilize their existing services

Pilot Projects: Waste Haulers

Lessons Learned:

- Language Barrier: In several locations, there was a significant language barrier that prevents important discussions about food waste diversion and would be a barrier to implementation
- Fast Food & Take Out: These facilities were generally not good sources of food waste as they tend to be efficient with food preparation and food is consumed offsite

Pilot Projects: Waste Haulers

Lessons Learned:

- High End Restaurants: These tend to be better sources of food waste because of the use of fresh ingredients and a more prevalent use of cloth napkins which help reduce waste contamination
- Geographic Clusters: Haulers found several clusters to target for food waste routes

Pilot Projects: Waste Haulers

Lessons Learned:

- De-packaging is Essential: No waste characterization revealed perfectly clean food waste, the ability to remove contamination is critical to sourcing from commercial waste streams
- Larger Volume Food Throughput = Less Food Waste: The larger volume of food throughput generally corresponded to a lower volume of food waste – predicting that this trend is due to a greater need for efficiency

Pilot Projects: Waste Haulers

Lessons Learned:

- Significant Managerial Opposition: Many customers did not entertain the idea of food waste diversion due to operational challenges including extra bins, additional systems, and training
- Cost was a Driving Influence: Cost was the most prevalent reason, behind space, for facilities that decided not to pursue food waste diversion

Questions?

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