



Public Workshop 2016 Rate Determination Field Study Methodology



Introductions

**Michael Vanderburg - Supervisor
Division of Recycling
Market Statistics Section**



Field Survey Team

**Darald Walther, Elias Muniz, Cameron Swinko,
Amy Seyfried, Tina Novoa, Nick Valenzuela,
Tracy Redifer, Alex Grewal**



**Field
Survey
Team**



Agenda

- **Workshop Purpose**
- **2016 Rate Study**
 - Purpose
 - Definitions
 - Survey Methodology
 - Rate Calculations
- **2016 Rate Year Calendar**
- **Questions / Comments / Input**



Workshop Purpose

**California Beverage Container Recycling & Litter Reduction Act
Section: 14549.5**

“ . . . the department shall . . . consult with private and public operators of curbside recycling programs, collection programs, and recycling centers concerning the size of the statewide sample, appropriate sampling methodologies, and alternatives to exclusive reliance on a statewide commingled rate . . . ”



Rate Study Purpose

The Rate Study collects data to estimate the statewide average:

- Number of CRV containers per pound (CPP)
- Refund value per segregated pound (RVSP)
- Refund value per commingled pound (RVCP)



Containers per Pound (CPP)

- Estimates the average number of CRV containers per pound
- Specific to each material type and program, used in:
 - Recycling and redemption rate calculations
 - Processing fee and payment calculations



Refund Value per Segregated Pound (RVSP)

- Estimates the average value of CRV in a pound of segregated material
- Calculated for all programs and materials, but only applied to Recycling Centers (RCs)
- Allows redemption of 100% CRV loads by weight at RCs



Refund Value per Commingled Pound (RVCP)

- Estimates the average value of CRV weight to total weight in commingled loads
- Allows redemption of mixed loads by weight
 - Specific to CS, CP, & SP programs
 - Specific to each material type



Rate Study Methodology



Financial Risk Assessment

- Determine financial risk for each program and material type:
 - Determine the monetary value of each material type for each program type
 - Rank the monetary value from high to low



Financial Risk Assessment

- **Based on the financial risk:**
 - Determine confidence levels and error rates for each program and material type
 - Determine the number of containers to sample for each material for each program type
 - Determine the number of sites to survey for each program type



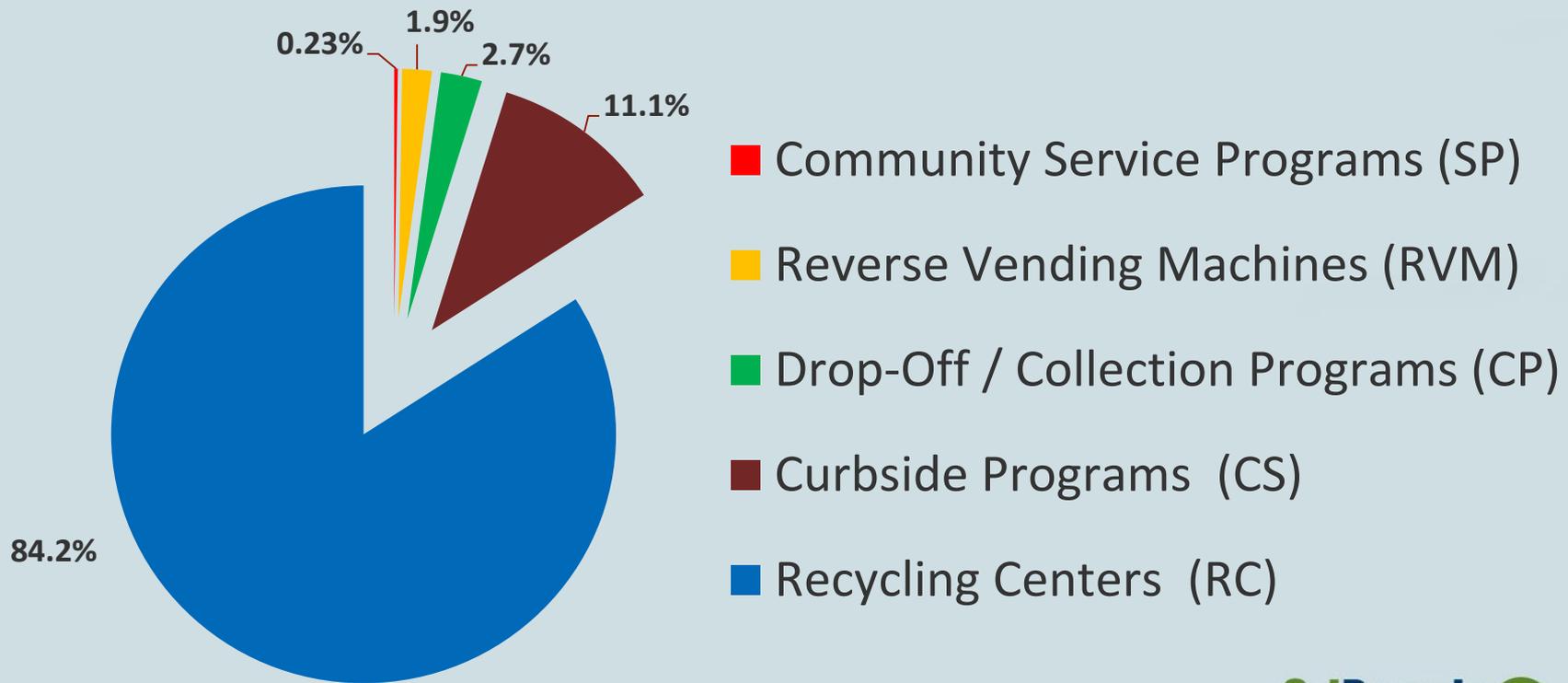
2016 CMRS Risk Assessment – All Programs

- Annual Value of All Materials Redeemed

\$1.053 billion



Monetary Value – All Recycling Programs





Rate Study Sample Size Calculation

- Mathematically adjusted to account for weight
 - Standard Deviation
- Variable data based on the results of previous studies



Rate Calculation Goals

Minimum Goal:

95% Confidence Level

5% Error Rate

Most materials are at 95% Confidence Level
with a 2% - 5% Error Rate



Rate Calculation Goals

For Highest Value Materials:

99% Confidence Level

Less than 2% Error Rates

(RC - Aluminum, Glass, and PET material)

(82% of all redeemed CRV)



Rate Study Survey Sites

A collage of recycled plastic bottles and a metal can lid. The background features several clear and blue plastic bottles, some with their caps removed, and a close-up of a silver metal can lid with a pull tab. The items are arranged in a way that suggests recycling and environmental care.

Number of Sites Surveyed for 2016 Rate Year

- Recycling Centers 72 sites
- Curbside Programs 36 sites
- Drop-Off / Collection Programs 24 sites
- Reverse Vending Machines 24 sites
- Community Service Programs 14 sites
- Total 170 sites



Site Selection

Population Determination:

- Currently operational programs
- Certified at least eight months during prior fiscal year
- Reported volume to DORiiS during prior fiscal year
- Not receiving an Individual Commingled Rate (ICR)



Site Selection

Sites are grouped by region:

- **Southern California**
 - Los Angeles, San Diego, Orange, Riverside, San Bernardino, Ventura, Santa Barbara, and Imperial Counties (8 counties)
- **Northern California**
 - All other counties (50 counties)



Site Selection

- Sites selected using random number generator
- Sites placed in volume strata for each region
- Proportional number of sites selected from each volume strata

Stratified Random Sampling with Proportional Allocation Sampling Techniques,
3rd Edition, William Cochran, Professor of Statistics, Emeritus, Harvard University



Site Selection

Sites are stratified based on received PET volumes

- **Strata #1** Top 50% of volume (high volume)
- **Strata #2** Next 25% of volume (medium volume)
- **Strata #3** Lowest 25% of volume (low volume)



Site Selection For 2016 Survey Year

Example: 72 Recycling Centers to be surveyed. 66% of RC PET volume is in the South. $72 \text{ RC sites} \times .66 = 48$

<u>Stratum</u>	<u>PET Volume</u>	<u># of Sites</u>
1	50%	24
2	25%	12
3	<u>25%</u>	<u>12</u>
Total	100%	48



Site Selection For 2016 Survey Year

Example: 72 Recycling Centers to be surveyed. 34% of RC PET volume is in the North. $72 \text{ RC sites} \times .34 = 24$

<u>Stratum</u>	<u>PET Volume</u>	<u># of Sites</u>
1	50%	12
2	25%	6
3	<u>25%</u>	<u>6</u>
Total	100%	24



Site Selection

- **Alternate Methodology**
 - For material(s) that do not receive enough surveyed containers using normal methodology to meet confidence and error goals
- **Example - #5 Plastic Resin**
 - Use reported DORiiS volumes
 - Contact sites – confirm #5 plastics are CRV
 - Conduct “special” surveys of selected sites
 - Goal = most accurate rates for all materials



Rate Study Periods

- 12 month study / Two six-month periods
 - Period #1 - October 1, 2014 to March 31, 2015
 - Period #2 - April 1, 2015 to September 30, 2015
- Same sites surveyed in each six-month period
- The same number of containers are surveyed for each material type at each type of recycling program



Rate Study Periods

- Surveys are scheduled every month of the year
- Surveys are scheduled most weeks of the year
- Surveys are distributed evenly over all seasons
 - To reflect “seasonality”



Materials Sampled

- **Recycling Centers (RCs)**
 - Aluminum
 - Glass
 - HDPE plastic
 - PET plastic
 - Bi-Metal
 - #3 - #7 plastics



Materials Sampled

- Curbside, Drop-Off/Collection, RVMs, Community Service Programs
 - Aluminum
 - Glass
 - HDPE plastic
 - PET plastic



Materials Sampled

- No line breakage containers
- No rejected containers
- No out-of-state containers
- Plastics must be labeled with resin number
- Whole containers only



Containers Surveyed at Each Site: Recycling Centers

- Aluminum = 100 containers
- Glass = 100 containers
- HDPE = 80 containers
- PET = 300 containers
- Bi-Metal = 30 containers
- #3 - #7 plastics = 30 containers



Annual Sample: Recycling Centers

- Aluminum = 14,000+ containers
- Glass = 14,000+ containers
- HDPE = 10,000+ containers
- PET = 40,000+ containers
- Bi-Metal = 2,000+ containers
- #3 - #7 plastics = 2,000+ containers



Containers Surveyed at Each Site: Curbside Programs (CS)

- Aluminum = 50 containers
- Glass = 80 containers
- HDPE = 100 containers
- PET = 100 containers



Annual Sample: Curbside Programs

- Aluminum = 3,000+ containers
- Glass = 5,000+ containers
- HDPE = 7,000+ containers
- PET = 7,000+ containers



Containers Surveyed at Each Site: Drop-Off/Collection Programs

- Aluminum = 50 containers
- Glass = 80 containers
- HDPE = 100 containers
- PET = 100 containers



Annual Sample: Drop-Off/Collection Programs

- Aluminum = 2,000+ containers
- Glass = 3,000+ containers
- HDPE = 4,000+ containers
- PET = 4,000+ containers



Containers Surveyed at Each Site: Reverse Vending Machines

- Aluminum = 80 containers
- Glass = 80 containers
- HDPE = 80 containers
- PET = 400 containers



Annual Sample: Reverse Vending Machines

- Aluminum = 3,500+ containers
- Glass = 3,500+ containers
- HDPE = 500+ containers
- PET = 15,000+ containers



Containers Surveyed at Each Site: Community Service Programs

- Aluminum = 50 containers
- Glass = 80 containers
- HDPE = 100 containers
- PET = 100 containers



Annual Sample: Community Service Programs (SP)

- Aluminum = 1,200+ containers
- Glass = 2,000+ containers
- HDPE = 2,500+ containers
- PET = 2,500+ containers



Total Containers Surveyed for 2016 Rates

140,000+ containers

(Aluminum, Glass, HDPE, PET, Bi-Metal, and #3 - #7 plastics)



Survey Sample Selection

- **Recycling Centers**
 - **After customer transaction completed**
 - **Confirm “basis” of purchase from customer**
 - **Random / unbiased selection**
 - **Survey whole containers only**



Recycling Centers





Survey Sample Selection

- Reverse Vending Machines
 - Confirm containers went through machine
 - Random / unbiased selection
 - Survey whole containers only



Reverse Vending Machine (RVM)





Survey Sample Selection

- Material from Sort Lines (CS, CP, SP)
 - Rapid / random / unbiased selection
 - Survey whole containers only



Sort Lines





Survey Sample Selection

- Material from Piles & Bins (CS, CP, SP)
 - Grid method
 - Random / unbiased selection
 - Survey whole containers only



Curbside Pile





Curbside Pile with “Grids”





Recycling Bins





Survey Sample Analysis

- Containers of a single material type are counted and weighed into batches
 - RC / RVM – as purchased
 - CS / CP / SP – in “market ready” condition
 - To best represent bales reported to CalRecycle



Survey Sample Analysis

- Container batches are further sorted, counted, weighed, and analyzed
 - CRV less than 24 oz. (5 cents)
 - CRV greater \geq 24 oz. (10 cents)
 - Non-CRV material
 - Contaminants



Our Mobile Office



Data Analysis & Rate Calculations



Calculating Containers Per Pound (CPP)

Total # of CRV Containers

Total Weight of CRV Containers



Calculating Containers Per Pound (CPP) - Example

100 CRV Containers

Total Weight of 5 lbs.



Calculating Containers Per Pound (CPP) - Example

CPP = 20 Containers per Pound

(100 containers / 5 lbs.)



Calculating Refund Value Per Segregated Pound (RVSP)

Refund Value of CRV Containers Sampled

Total Weight of CRV Containers Sampled



Calculating Refund Value Per Segregated Pound (RVSP)

**(# of CRV Containers \geq 24 oz. X 10 cents)
+ (# of CRV Containers $<$ 24 oz. X 5 cents)**

Total Weight of CRV Containers Sampled



Calculating Refund Value Per Segregated Pound (RVSP)- Example

(40 containers X 10 cents)
+ (60 containers X 5 cents)

Total Weight of 10 lbs.



Calculating Refund Value Per Segregated Pound (RVSP)- Example

$$(\$4) + (\$3)$$

Total Weight of 10 lbs.



Calculating Refund Value Per Segregated Pound (RVSP)- Example

(\$7)

Total Weight of 10 lbs.



Calculating Refund Value Per Segregated Pound (RVSP)- Example

RVSP = 70 cents per Pound

(\$7 / 10 lbs.)



Calculating Refund Value Per Commingled Pound (RVCP)

Refund Value of CRV Containers Sampled

Total Weight of All Containers Sampled
(CRV & Non-CRV)



Calculating Refund Value Per Commingled Pound (RVCP)

**(# of CRV Containers \geq 24 oz. X 10 cents)
+ (# of CRV Containers $<$ 24 oz. X 5 cents)**

Total Weight of All Containers Sampled



Calculating Refund Value Per Commingled Pound (RVCP)- Example

(20 containers X 10 cents)
+ (60 containers X 5 cents)

Total Weight of 10 lbs.



Calculating Refund Value Per Commingled Pound (RVCP)- Example

$$(\$2) + (\$3)$$

Total Weight of 10 lbs.



Calculating Refund Value Per Commingled Pound (RVCP)- Example

(\$5)

Total Weight of 10 lbs.



Calculating Refund Value Per Commingled Pound (RVCP)- Example

RVCP = 50 cents per Pound

(\$5 / 10 lbs.)



Calendar for 2016 CMRS Survey

- **Organizing / Planning** Apr. - Sep. 2014
- **Public Workshops** May 2 / Oct. 2014
- **First Period Surveys** Oct. 2014 – Mar. 2015
- **Second Period Surveys** Apr. 2015 – Sept. 2015
- **Public Hearing for 2016 Rates** October 2015
- **Notice of 2016 Rates** Dec. 1, 2015
- **2016 Rates Effective** Jan. 1, 2016



Questions? / Comments? / Input?



Thank You!



Contact Information:

Mike Miller
Division of Recycling, Operations
Branch Chief
(916) 323-0713
mike.miller@calrecycle.ca.gov

Michael Vanderburg
Division of Recycling, Operations
Market Statistics Section Supervisor
(916) 327-2769
michael.vanderburg@calrecycle.ca.gov