

# **2015 Processing Fee and Handling Fee Cost Surveys**

## **Handling Fee Final Report**



California Department of Resources Recycling and Recovery

**May 13, 2016**

Contractor's Report  
Produced Under Contract By:  
Crowe Horwath LLP

# 2015 Processing Fee and Handling Fee Cost Surveys

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Publication # DRRR 2016-01562

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*Prepared as part of contract number DRR 14044.*

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## Acknowledgments

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The CalRecycle cost survey requires a high degree of communication and collaboration by all involved. Crowe Horwath LLP thanks CalRecycle management and staff for their support throughout the entire project. In addition, we acknowledge and appreciate the cooperation and time commitment of the many recycling centers that were selected to participate in the handling fee cost survey.

# Executive Summary

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The processing fee and handling fee cost surveys were performed under contract by Crowe Horwath LLP (Crowe) for the California Department of Resources Recycling and Recovery (CalRecycle). This report provides estimates of the statewide weighted-average cost per beverage container to recycle for recycling centers that do not receive handling fees (processing fee recyclers) and recycling centers that do receive handling fees (handling fee recyclers). This report also summarizes the tasks Crowe and its subcontractors conducted in order to obtain the final, statewide weighted-average costs per container. Finally, this report provides analyses of the results of this handling fee cost survey.

This executive summary is organized as follows:

- A. *Handling Fee Cost Survey Background*
- B. *Handling Fee Cost Survey Objectives*
- C. *Handling Fee Cost Survey Results*
- D. *Handling Fee Cost Survey Tasks*
- E. *Handling Fee Cost Analyses*

## **A. Handling Fee Cost Survey Background**

In 1986, the California State Legislature enacted AB 2020, the California Beverage Container Recycling and Litter Reduction Act (Margolin, Chapter 1290, Statutes of 1986). This “bottle bill” program is the only one of its kind in the nation in terms of its unique program structure.

A major subprogram within AB 2020 is the convenience zone system. AB 2020 established specific goals for convenient recycling in order to allow consumers to redeem their containers and receive back their refund value. A traditional deposit system requires beverage retailers (dealers) to accept and sort returned empty containers. However, part of the compromise behind AB 2020 was to develop a mechanism to avoid, or minimize, dealer take-back requirements, which were viewed as costly and unwieldy. While California had about 500 pre-existing recycling centers, these were not deemed adequate to ensure convenient recycling opportunities, as many of these sites did not accept all materials, and/or were in non-convenient industrial locations.

Rather than requiring all dealers to accept empty containers, AB 2020 established redemption centers close to where people shopped. Thus the “convenience zone” was born, which was defined as the area within a one-half mile radius surrounding each supermarket in California with annual sales exceeding \$2 million.<sup>1</sup> Each convenience zone was to contain at least one recycling center that redeemed all types of beverage containers

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<sup>1</sup> This definition is still in place today.

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and was to be open at least 30 hours per week, including at least five off-business hours. If a recycling center was not established within a zone, then all dealers within the zone would be required to take back containers. Through this mechanism, the law created incentives for dealers to ensure that a recycling center was located in their zone.

The intent of AB 2020 was to balance equity, efficiency, and effectiveness in providing recycling opportunities. The convenience zone mandate was established to be equitable, i.e., provide consumers with an easy mechanism to return beverage containers for their redemption value. At the same time, this mechanism was intended to be more efficient and effective than a traditional deposit system.

The convenience zone system is significantly more efficient and cost-effective than in-store dealer take-back. However, conventional wisdom is that recycling in convenience zones on average costs more than recycling at pre-existing recycling centers.

A major issue that has surrounded convenience zones over the program's 29 years is based on the question of how much the state should pay for convenience. As a result, the issue of subsidizing recycling centers in convenience zones has led to frequent legislative adjustments over the history of the program, with the last handling fee adjustment, AB 3056 (Chapter 907, Statutes of 2006), signed into law in September 2006.

Initially, AB 2020 included a "safety net," Convenience Incentive Payments (CIPs), to help pay the cost of recycling centers located in convenience zones. CIPs were paid from unredeemed funds. Only sites that were the sole redemption location in a zone and that realized a net average monthly financial loss were eligible. However, in the early program years, up to two-thirds of new convenience zone redemption centers received CIPs. Realizing that CIPs were becoming the norm rather than the exception, the legislature adopted restrictions on CIP amounts and how they were allocated. The biggest concern with the CIP system was that it was "needs based" and discouraged improvements in operating efficiency.

In 1992, AB 87 (Sher, Chapter 1266, Statutes of 1992) enacted a number of major changes to the still-young AB 2020 program. One of the most significant changes was the elimination of the CIP and the establishment of a "performance-based" 1.7 cent per container handling fee to pay for the cost of convenience at convenience zone sites. AB 87 provided for handling fee payments of up to \$2,300 per month, per site, with priority going to those sites with the highest number of eligible containers per month. To be eligible, sites had to be: (1) the only recycling center in a convenience zone, (2) be located at, or in, the parking lot of the supermarket, and (3) meet specified total monthly redemption containers (initially 45,000 containers per month, increasing to 60,000 containers per month in January 1994). Further, to ensure that sites receiving handling fees were recycling adequate glass and plastic, AB 87 required that glass and plastic must be at least 30 percent of a site's eligible containers. The total amount allocated for handling fees was set at \$18.5 million per year.

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With the exception of changes to the amount of total funding, this basic handling fee system was in place between 1993 and 2008 as a means to help pay for the cost of convenient recycling, with only relatively modest modifications. Until July 1, 2008, handling fee eligibility requirements were as follows:

- Eligible sites included: recycling centers at supermarket sites, nonprofit convenience zone recyclers, or rural regional recyclers.<sup>2</sup>
- Recycling centers must have recycled at least 60,000 containers in the calendar month for which they were paid, or at least an average of 60,000 containers per month during the previous 12 months (a container 24 ounces, or more, counted as two containers).
- The number of containers eligible for handling fees was determined by dividing the site's monthly glass and plastic containers by the total number of containers recycled for the month. If this quotient was equal to at least 10 percent, the total monthly containers of the site were eligible for handling fees. If the quotient was less than 10 percent, the maximum number of eligible containers was determined by dividing the glass and plastic containers by 10 percent. Given high rates of plastic recycling, essentially all recyclers met this eligibility requirement.
- The per container handling fee was 1.8 cents and the monthly handling fee payment per site did not exceed \$2,300.
- If there were not adequate total monthly funds allocated to pay all eligible handling fee sites, then sites with higher monthly eligible containers received priority for payments.
- Handling fee payments were made to only one certified recycling center in a convenience zone. If a dealer was in two zones, only one payment would be made to a recycler located at that dealer. If another recycler was operating in a zone without receiving handling fee payments, the Division did not pay handling fees to a convenience zone recycler in that zone, and the other recycler also did not receive handling fees.
- There were separate eligibility criteria for rural region recyclers, related to hours of operation, operation in more than one zone, and location of other recyclers.

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<sup>2</sup> These categories of recycler are defined in statute: a supermarket site means any certified recycling center which redeems all types of beverage containers in accordance with Section 14572, and which is located within, or outside and immediately adjacent to the entrance of, or at, or within a parking lot or loading area surrounding, a supermarket which is the focal point of a convenience zone, or a dealer that is located within that zone, and which is accessible to motor traffic (Section 14526.5). A nonprofit convenience zone recycler means a recycling center that is operated by an organization established as a 501(c) or 501(d) entity in U.S. Code, is certified by the Department, and is located within a convenience zone, but is not necessarily a supermarket site (Section 14514.7). A rural regional recycler means an operator that is certified by the Department as being in a nonurban area identified using Farmers Home Loan Administration criteria, or is within an area designated by the Department as a rural region with a population of between 10,000 and 50,000 persons (Sections 14525.5.1 and 14571).

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- Total annual handling fee payments in fiscal year 2006/2007 were capped at \$33 million, and for fiscal year 2007/2008, they were capped at \$35 million.

AB 3056 implemented the most significant changes to the handling fee system since 1993. These changes started with the 2006 handling fee cost survey and the new approach to handling fee calculations and payments, as of July 1, 2008. On July 1, 2008, provisions for the maximum annual funding cap were removed (constrained only by available unredeemed funds); the 60,000 minimum containers per month was removed; the \$2,300 maximum per month was removed; the 1.8 cents per container was removed; and counting containers 24 ounces and above as two containers was removed.

AB 3056 requires CalRecycle to conduct a handling fee cost survey every two years, in conjunction with the processing fee cost survey. Section 14585, subdivision (f) was added to the Beverage Container Recycling and Litter Reduction Act on September 30, 2006, as follows:

*(f)(1) On or before January 1, 2008, and every two years thereafter, the department shall conduct a survey of a statistically significant sample of certified recycling centers that receive handling fee payments to determine the actual cost incurred for the redemption of empty beverage containers by those certified recycling centers. The department shall conduct these cost surveys in conjunction with the cost surveys performed by the department pursuant to subdivision (b) of Section 14575 to determine processing payments and processing fees. The department shall include, in determining the actual costs, only those allowable costs contained in regulations adopted pursuant to this division that are used by the department to conduct cost surveys pursuant to subdivision (b) of Section 14575.*

*(2) Using the information obtained pursuant to paragraph (1), the department shall then determine the statewide weighted-average cost incurred for the redemption of empty beverage containers, per empty beverage container, at recycling centers that receive handling fees.*

*(3) On and after July 1, 2008, the department shall determine the amount of the handling fee to be paid for each empty beverage container by subtracting the amount of the statewide weighted-average cost per container to redeem empty beverage containers by recycling centers that do not receive handling fees from the amount of the statewide weighted-average cost per container determined pursuant to paragraph (2).*

*(4) The department shall adjust the statewide average cost determined pursuant to paragraph (2) for each beverage container annually to reflect changes in the cost of living, as measured by the Bureau of Labor Statistics of the United States Department of Labor or a successor agency of the United States government.*

*(5) The cost information collected pursuant to this section at recycling centers that receive handling fees shall not be used in the calculation of the processing payments determined pursuant to Section 14575.*

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The handling fee cost survey described in this report is the fifth of the every-two-year surveys to determine costs per container. This handling fee cost survey was conducted in parallel with the processing fee cost survey, which was used to determine costs per ton for four of the 10 beverage container material types: PET #1, HDPE #2, glass, and aluminum. Results of the processing fee cost survey are described in separate reports.

Together, the processing fee and handling fee cost surveys performed in 2015 and 2016 represented one of the largest cost survey efforts undertaken by CalRecycle. In total, the Crowe team completed 325 recycler cost surveys, comprised of surveys of 222 processing fee recyclers and surveys of 103 handling fee recyclers. In addition, Crowe conducted a processor cost survey of 99 processors. The cost surveys were similar in detail and complexity to prior cost surveys in terms of quantitative information obtained.

### ***B. Handling Fee Cost Survey Objectives***

The objective of the handling fee cost survey was to estimate the California statewide weighted-average 2014 certified recycler cost per container to recycle for handling fee recyclers and processing fee recyclers. Recycler center costs were surveyed in 2015 and 2016 using recycler center calendar year 2014 financial statements. Based on the current approach, beginning July 1, 2016, the per container handling fee payment for eligible supermarket sites, nonprofit convenience zone recyclers, and rural recyclers will be based on the calculated measured difference between the cost per container for these two populations (i.e., handling fee recycler cost per container minus processing fee recycler cost per container).

The recycler costs per container presented in this report presents the culmination of 12 months (May 2015 through April 2016) of research, development, and implementation efforts for a primary data economic cost survey of California certified recycling centers. The actual handling fee cost survey fieldwork was performed over a six-month time period from July 20, 2015 through January 11, 2016.

### ***C. Handling Fee Cost Survey Results***

The statewide weighted-average recycler cost per container for handling fee recyclers and processing fee recyclers are presented in **Exhibit ES-1**, below. The statewide weighted-average cost to recycle for handling fee recyclers in 2014 was 2.198 cents per container, 73 percent higher than the statewide weighted-average cost to recycle for processing fee recyclers in 2014, at 1.274 cents per container.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit ES-1 Statewide Recycler Costs per Container (2014)

Recycler Type	2014 Statewide Weighted-Average Cost per Container	Percentage Change (PF to HF Cost per Container)	Error Rate at 90 % Confidence Interval
1. Handling Fee Recycler	2.198 Cents	+73%	4.90%
2. Processing Fee Recycler	1.274 Cents	n/a	7.03%
3. Handling Fee Recycler Cost per Container Minus Processing Fee Recycler Cost per Container	0.924 Cents	n/a	n/a

Exhibit ES-1 includes the new handling fee payment calculation, 0.924 cents per recycled container, equal to the difference between the handling fee recycler statewide weighted-average cost per container to recycle, and the processing fee recycler statewide weighted-average cost per container to recycle, as specified in Section 14585 (f)(3), of the Beverage Container Recycling and Litter Reduction Act. The Department is scheduled to implement this new handling fee payment of just over one-cent per container starting July 1, 2016. CalRecycle may add a cost of living adjustment (COLA) to the handling fee.

The sample sizes used to determine the costs per container were estimated to achieve a 90 percent confidence interval. This standard was higher than the statistical requirements in regulations for handling fee survey cost per container calculations, which specify an 85 percent confidence interval. The cost per container results for both handling fee recyclers and processing fee recyclers presented in this report exceeded this target, with low error rates at the 90 percent confidence level of 4.90 percent and 7.03 percent, respectively.

### ***D. Handling Fee Cost Survey Tasks***

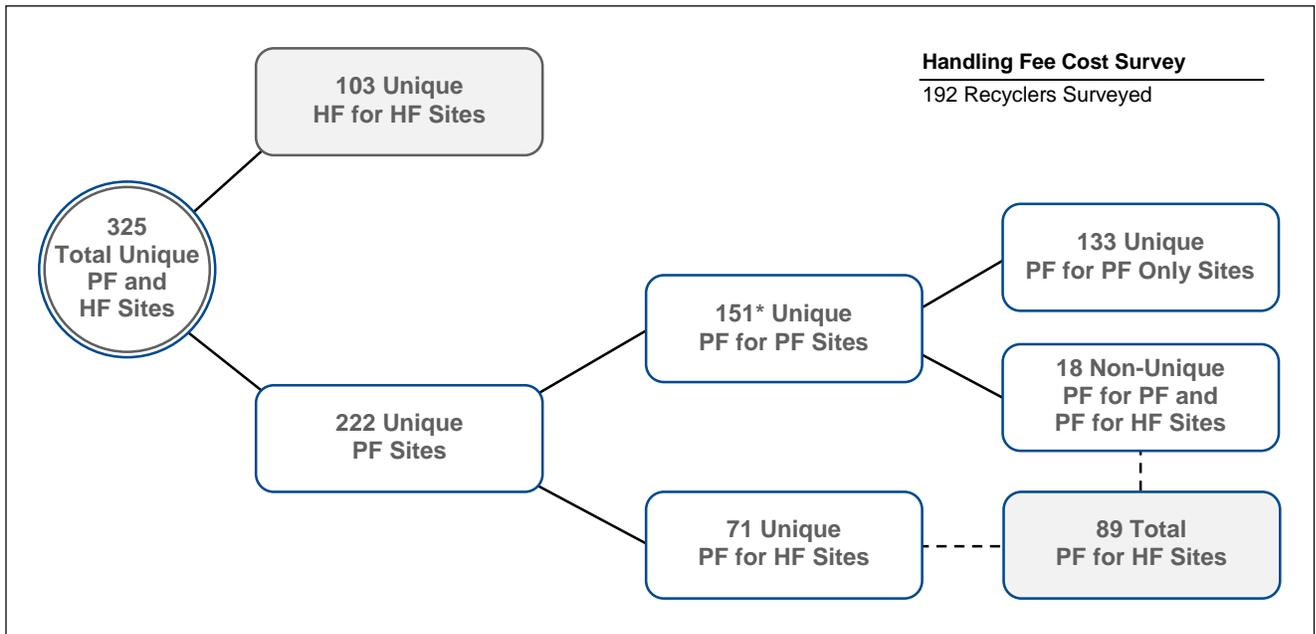
Below, we summarize eight of the major tasks that the Crowe team conducted to complete this handling fee cost survey. The processing fee cost survey and handling fee cost survey were conducted in parallel. Several of these tasks were the same for both surveys, for example updating the cost model, training, and quality control. The cost survey procedures, field methodology, and quality control steps were identical for both processing fee recyclers and handling fee recyclers.

- Developed and documented a sample survey design framework and selected recycling centers for the cost survey.** The requirement to calculate the statewide weighted-average cost to recycle beverage containers for both processing fee and handling fee recyclers necessitated evaluating and defining survey sample strata based on the number of containers. Consistent with the prior four handling fee cost surveys, Crowe utilized a strata definition that resulted in approximately the same total number of containers recycled within each strata population of handling fee recycling centers (slightly less than 1.4 billion containers in each of the three survey

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strata). We selected a set of parallel strata definitions for processing fee recyclers, also resulting in approximately the same total number of containers recycled within each stratum's population of processing fee recycling centers (approximately 3.1 billion containers in each of the three survey strata). Following the sample design and analyses, Crowe identified and selected a stratified random sample of 89 processing fee recycling centers and a stratified random sample of 103 handling fee recycling centers to participate in the handling fee cost survey.

**Exhibit ES-2**  
**Processing Fee and Handling Fee Cost Survey Sample**  
**(2014)**



\*18 PF sites within the 151 also were within the handling fee cost survey PF for HF sites, for a total 89 (71+18) PF sites used for the cost per container calculation.

- Monitored site completion characteristics to sample design for both handling fee recyclers and processing fee recyclers.** In total, Crowe surveyed 222 processing fee recyclers and 103 handling fee recyclers to calculate recycler costs for specific components of the processing fee and handling fee cost surveys. **Exhibit ES-2**, above, illustrates the total number of processing fee and handling fee recyclers surveyed and the number of recyclers in the handling fee survey.
- Updated and calibrated the Labor Allocation Cost Survey Model.** The cost survey model is a 14-worksheet, Microsoft Excel-based computer model Crowe used to allocate recycling center costs to beverage container material types based on labor allocations. Crowe updated the cost model to reflect

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2014 container per pound and California Refund Value (CRV) payment information, as well as other required procedural changes to the cost survey.

- **Revised and updated the Cost Survey Training Manual.** Crowe evaluated the entire 700-page training manual used in prior years, removing outdated and duplicative information. We identified 17 training modules for revision, developing learning objectives and interactive exercises for each. The new training manual focuses on key areas of learning necessary to successfully conduct cost surveys. In addition, Crowe developed 17 Prezi presentations covering topics in the training manual and including videos of a cost survey site visit. Crowe created numerous new work assignments and interactive exercises as part of its training update. The updated training modules reflected the change to the file assembly and review process from a manual, paper-based process to a secure, online, SharePoint-based process.
- **Revised and conducted cost survey training.** Training consisted of an initial three days of interactive training sessions, training site visits, and a follow-up classroom session. Activities during these first three days included conducting cost survey interview role-playing activities, mentoring from experienced survey team members, and completing a site visit cost model and associated documentation. Following the three days of classroom training, each new survey team member conducted five cost survey site visits with an experienced team member. The experienced survey team member guided the new team member, with increasing levels of responsibility for the on-site and post-site visit procedures over the course of the five visits. The entire survey team reconvened for an additional day of classroom training after the training site visits to present and discuss the site visits.
- **Scheduled, conducted, and completed 89 processing fee recycler site visits and 103 handling fee recycler site visits.** The site visits occurred during the six months between July 20, 2015, and January 11, 2016, using the statistical sample frame developed by Crowe. Throughout the scheduling and site visits, the Crowe team built on the working relationships established in prior surveys with the program's recyclers. These on-site working relationships were important to the success of this cost survey and should carry over into future cost surveys. Cost surveys were conducted by a team of two auditors, including either accountants and/or business analysts. It typically took one to four hours to complete each on-site survey. In addition to the on-site time, usually up to eight hours of additional time was required after the site visits to analyze data and to follow up with each recycler to obtain complete financial and labor information.
- **Developed and implemented an intensive quality control procedure.** The quality control procedure included 13 hours and five different levels of review (site team review, initial review, independent manager review, CPA partner review, and project director review) for each site file. This review took place

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before the site files were released for data processing. These quality assurance steps ensured that each site file was complete and accurate and that all results from the labor allocation model and the indirect cost allocation sub-models were accurate. In total, more than 30 hours were generally spent on each completed processing fee site, and more than 25 hours were generally spent on each completed handling fee site, for the site team and quality control efforts.

- **Determined the final cost per container for processing fee and handling fee recyclers.** Using an automated process, Crowe extracted results from each of the 192 (89 plus 103) completed cost models. Crowe developed two Microsoft Excel workbooks, one for handling fee recyclers and one for processing fee recyclers, to calculate costs per container. We based the calculations for the processing fee recycler and handling fee recycler costs per container on a weighted average by stratum approach. Using defined and documented statistical procedures, Crowe calculated error rates at a 90 percent confidence interval for these two cost per container calculations.

### ***E. Handling Fee Cost Analyses***

During the course of the handling fee cost survey, Crowe conducted a series of analysis tasks for CalRecycle. Below, we briefly describe these analyses.

- **Compared historical cost per container results.** Crowe compared the statewide weighted-average cost per container for processing fee recyclers and handling fee recyclers from the 2006 to 2014 handling fee cost surveys. The cost per container decreased for both types of recyclers in 2014, following the increase between 2010 and 2012. **Exhibit ES-3**, on the next page, provides handling fee and processing fee cost per container results since 2006. **Exhibit ES-4**, following Exhibit ES-3, illustrates the calculated handling fee resulting from each cost survey.
- **Analyzed likely reasons behind the handling fee recycler cost per container decrease.** Crowe evaluated several possible reasons for the 11 percent decrease in the handling fee recycler cost per container, including the importance of the number of containers recycled and comparisons between handling fee and processing fee recycler survey results.
- **Evaluated changes in number of recyclers, costs, and recycled containers.** Crowe evaluated historical trends in population number of recyclers and the relative population CRV costs and containers recycled by processing fee and handling fee recyclers.
- **Evaluated changes in recycling center productivity and costs.** Crowe evaluated changes in the number of recyclers and the number of containers recycled between 2012 and 2014. The average number of containers handled

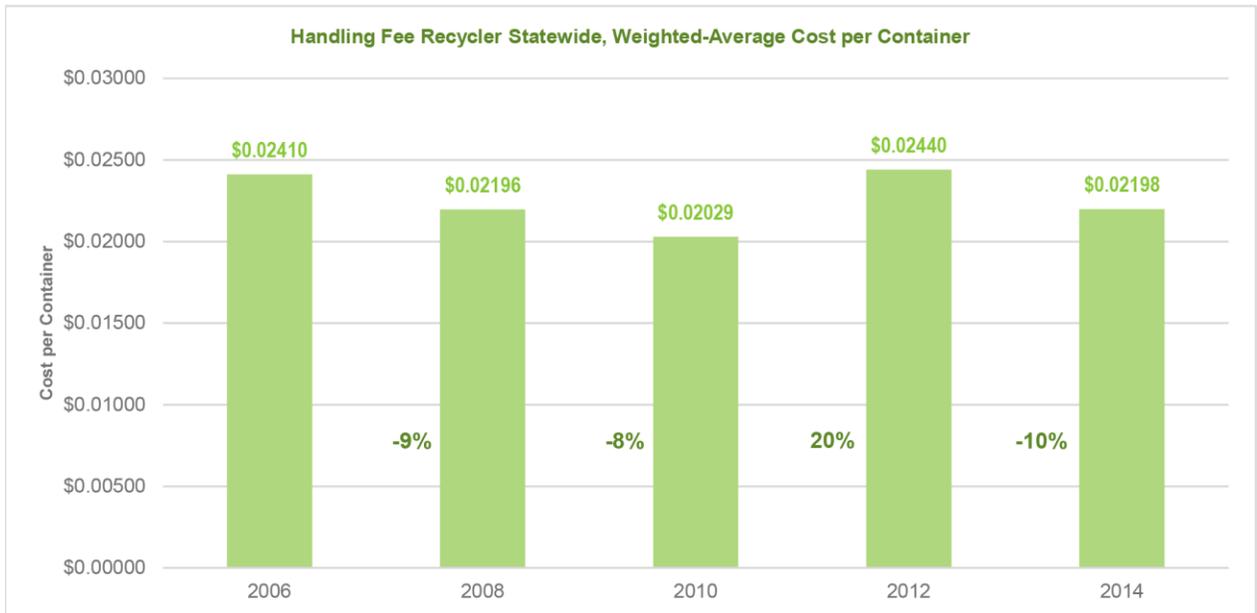
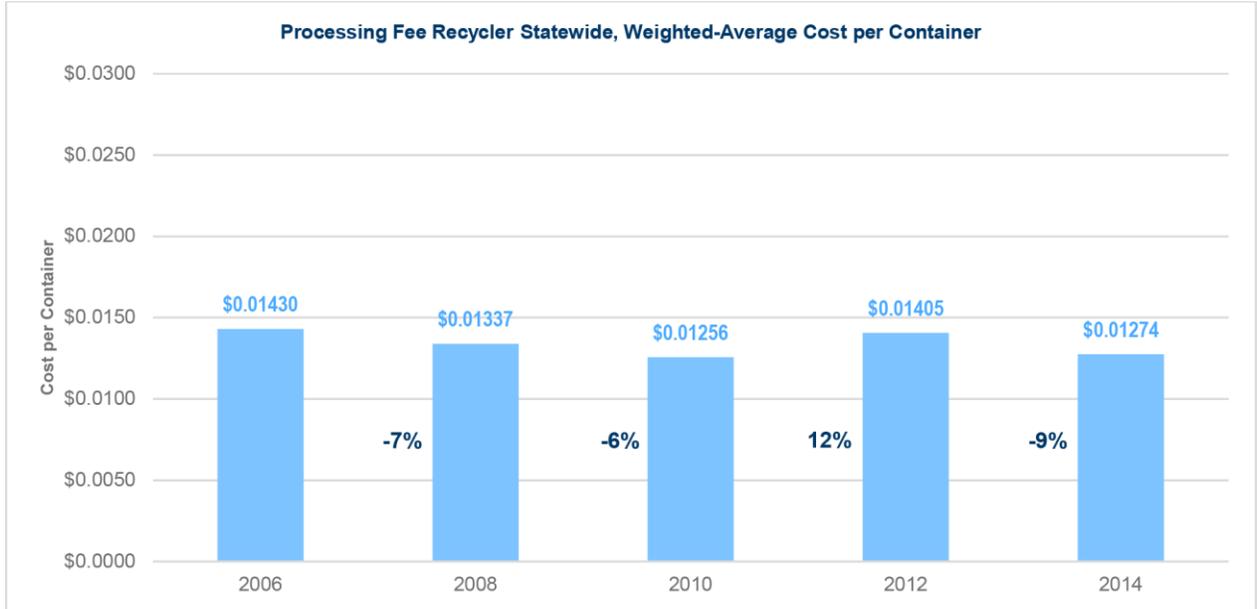
## 2015 Processing Fee and Handling Fee Cost Surveys

per recycling center increased in 2014 as compared to 2012 levels. More productive recycling centers that recycle more material generally have lower costs than less productive recycling centers that recycle less material.

- **Analyzed annual handling fee payments and alternatives.** Crowe compared the total handling fee payments over the last several years and estimated future handling fee payments under several different scenarios.
- **Compared recyclers, containers recycled, and cost per container by strata.** Crowe analyzed the distribution of recyclers, costs, and recycling by strata. We also compared the average cost per container by stratum and the statewide average cost per container for both handling fee and processing fee recyclers. We also analyzed the total number of recyclers and containers recycled by stratum.

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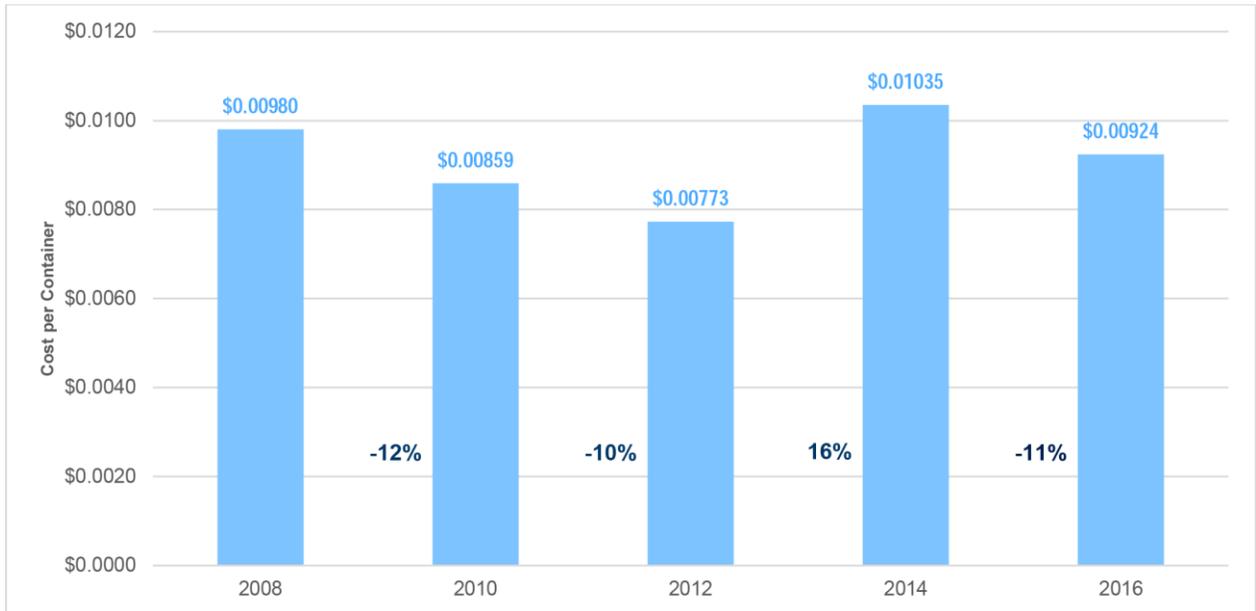
**Exhibit ES-3**  
**Statewide Processing Fee and Handling Fee**  
**Recycler Cost per Container<sup>a</sup> (2006–2014)**



<sup>a</sup> Statewide weighted-average cost per container recycled

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**Exhibit ES-4**  
**Handling Fee Cost Survey Calculated Handling Fee Payments (Effective July 1 of Each Year)**  
**(2008–2016)**



# 1. Handling Fee Cost Survey Methodologies

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This section describes Crowe's cost survey methodologies, from establishing the survey sample frame to the quality control procedures, and all the supporting tasks in between. Crowe followed processing fee and handling fee cost survey procedures consistent with the six prior cost surveys. While Crowe introduced several new features for this 2015 cost survey, including electronic file review and a revised training approach, the fundamentals of conducting the cost survey remain consistent.

There are nine key tasks described in this section:

- A. *Survey Design*
- B. *Survey Scheduling, Logistics, and Confidentiality*
- C. *Training Manual Updates*
- D. *Surveyor Training*
- E. *Cost Model Updates*
- F. *Calibration of the Indirect Cost Allocation Sub-Models*
- G. *Site and Survey Tracking*
- H. *Cost Survey Procedures*
- I. *Quality Control and Confidentiality Procedures*

## **A. Survey Design**

This 2015 survey was the fifth time that CalRecycle conducted a handling fee survey to determine the cost per container of recycling beverage containers. Crowe also developed the survey design for the first four handling fee cost surveys and for the six most recent processing fee cost surveys. We utilized the same handling fee cost survey design methodology that we developed for the previous handling fee cost surveys.

The purpose of the survey design was to identify the specific recycling centers surveyed to estimate California statewide weighted-average 2014 certified recycler center cost per container to recycle for handling fee (HF) recyclers and processing fee (PF) recyclers. Recycler center costs were surveyed in 2015-2016 using recycler center calendar year 2014 financial statements. Recycler center costs measured by the cost survey will be used for the handling fee payment calculation, effective July 1, 2016.

The population of handling fee recycling centers eligible for the handling fee cost survey was defined as all recyclers: (1) receiving at least one handling fee payment for any of the months between January 2014 and December 2014, and (2) certified operational on or before March 1, 2014, (3) reporting redemption value between January 2014 and December 2014, and (4) not subsidized by the Department of Rehabilitation. There were 920 recycling centers in this total handling fee recycling center survey population (11 were removed from the full population due to being under investigation by CalRecycle).

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The population of processing fee recycling centers eligible for the handling fee cost survey was defined as all recyclers: (1) certified operational on or before March 1, 2014, (2) reporting redemption value between January 2014 and December 2014, and (3) not subsidized by the Department of Rehabilitation. This is the same population of recyclers as was used for the processing fee cost survey. There were 955 recycling centers in this total handling fee recycling center survey population (42 were removed from the full population due to their being under investigation by CalRecycle).

This overall 2014 handling fee cost survey had a similar sample size as the previous handling fee cost survey (for 2012 we surveyed 96 PF recyclers and 102 HF recyclers). The Crowe team completed 89 PF and 103 HF recycler cost surveys during six months of fieldwork (July 20, 2015 to January 11, 2016) to obtain these cost survey results. This handling fee cost survey was consistent with prior cost surveys in terms of quantitative information obtained for each recycling site.

To measure calendar year 2014 costs, the survey design consisted of two stratified random samples:

- A statistically defensible, stratified random sample of 103 sites, drawn from the 920 qualifying handling fee recycling centers. Three strata were defined by the total annual containers handled by a site. This stratified random sample was used to measure the costs of recycling CRV containers for handling fee recycling centers. Handling fee recycler strata definitions are provided in **Exhibit 1-1**, below.
- A statistically defensible, stratified random sample of 89 sites, drawn from the 955 qualifying processing fee recycling centers. Three strata were defined by the total annual containers handled by a site. This stratified random sample was used to measure the costs of recycling California Redemption Value (CRV) containers for processing fee recycling centers. Processing fee recycler strata definitions are provided in **Exhibit 1-2**, on the next page.

### Exhibit 1-1 Handling Fee Recycler Container Stratum Definitions (2014)

Stratum	2014 Number of Containers Recycled
1	Greater than, or equal to, 8.05 million containers
2	Greater than, or equal to, 4.35 million containers, up to less than 8.05 million containers
3	Less than 4.35 million containers

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### Exhibit 1-2 Processing Fee Recycler Container Stratum Definitions (2014)

Stratum	2014 Number of Containers Recycled
1	Greater than, or equal to, 21.9 million containers
2	Greater than, or equal to, 10.8 million containers, up to less than 21.9 million containers
3	Less than 10.8 million containers

Crowe treated the above two survey components equivalently, in terms of scheduling, site visits, and quality control. It was only in the final calculations that Crowe made a distinction between the two groups.

Because of these parallel strata definitions for handling fee and processing fee recyclers, we were able to directly compare cost per container results for the two populations. Furthermore, as a result of this survey design, the cost survey conducted for 2014 costs per container treated the two recycler populations with equal statistical rigor.

CalRecycle regulations require that the cost per container be estimated at an 85 percent confidence interval, and CalRecycle policy further specifies a 10 percent error rate. Similar to the processing fee cost survey, the sampling plan (for the two stratified random samples) was based on a more accurate and statistically conventional and accepted 90 percent confidence interval. However, rather than use a more standard 10 percent error rate in determining sample size, Crowe utilized a 6 percent error rate. This lower 6 percent error rate resulted in a more conservative sample size, necessary to maintain the overall accuracy of the survey.

### Sample Design Results

**Exhibit 1-3**, on the next page, provides a summary of the completed handling fee recycler survey sites. Crowe scheduled, conducted, and completed 103 handling fee recycler site visits and cost analyses for the handling fee cost survey.

**Exhibit 1-4**, on the next page, provides a summary of the completed processing fee recycler survey sites. Crowe scheduled, conducted, and completed 89 processing fee recycler site visits and cost analyses for the handling fee cost survey. Crowe surveyed a total of 18 sites, shown in Exhibit 1-4, for both the handling fee and processing fee cost surveys.

**Exhibit 1-5**, on the next page, provides a comparison of the error rates, population size, sample size, and sample method for the two recycler populations in the handling fee cost survey. With error rates of 4.90 percent (HF) and 7.03 percent (PF), this handling fee cost survey exceeded the conventional statistical accuracy of 10 percent at the 90 percent confidence level for both handling fee and processing fee recyclers.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 1-3 Handling Fee (HF) Recycler Site Visits (2014)

Handling Fee Recycler Site Category	Number of HF Site Visits
HF Container Stratum 1	24
HF Container Stratum 2	27
HF Container Stratum 3	52
<b>Total HF Completed Sites</b>	<b>103</b>

### Exhibit 1-4 Processing Fee (PF) Recycler Site Visits (2014)

Processing Fee Recycler Site Category	Total Number of PF Site Visits for HF Survey	Number Visited for HF Survey Only <sup>a</sup>	Number Visited for Both PF and HF Surveys <sup>b</sup>
PF Container Stratum 1	23	12	11
PF Container Stratum 2	25	20	5
PF Container Stratum 3	41	39	2
<b>Total PF Completed Sites</b>	<b>89</b>	<b>71</b>	<b>18</b>

<sup>a</sup> These 71 of 89 sites were selected only for the cost per container calculation for processing fee sites for the handling fee cost survey.

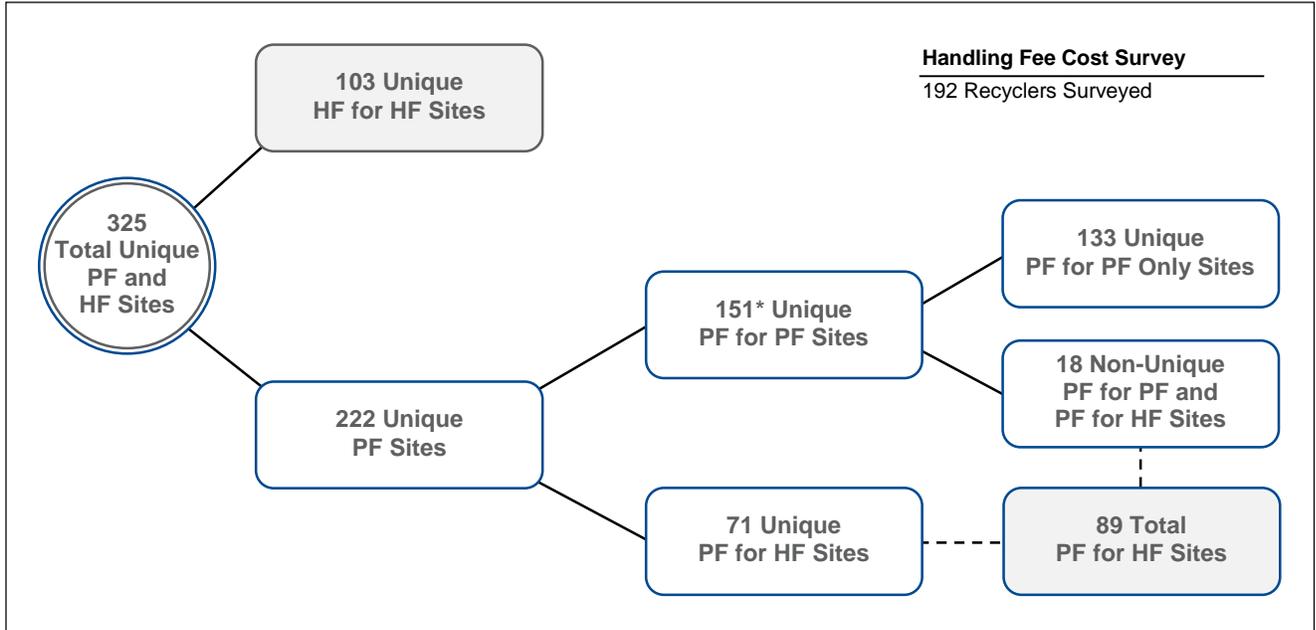
<sup>b</sup> These 18 of 89 sites were selected for the cost per container calculation for the handling fee cost survey, and for the cost per ton calculation for the processing fee cost survey.

### Exhibit 1-5 Error Rates, Population Sizes, Sample Sizes, and Method by Recycler Type (2014)

Recycler Type	Error Rate (90% CI)	Population Size	Sample Size	Sample Method
1. Handling Fee Recyclers	4.90%	920	103	Container Stratified Random Sample
2. Processing Fee Recyclers	7.03%	955	89	Container Stratified Random Sample

## 2015 Processing Fee and Handling Fee Cost Surveys

**Exhibit 1-6**  
**Processing Fee and Handling Fee Cost Survey Sample**  
**(2014)**



\*18 PF sites within the 151 also were within the handling fee cost survey PF for HF sites, for a total 89 (71+18) PF sites used for the cost per container calculation.

### Sample Selection

This handling fee cost survey was part of a broader combined processing fee and handling fee cost survey that included 222 PF and 103 HF recyclers. The final 222 PF recyclers included 89 processing fee sites for the handling fee cost survey (PF for HF). **Exhibit 1-6**, above, illustrates the total number of PF and HF recyclers surveyed and the number of recyclers for the handling fee cost survey.

PF and HF recyclers were grouped separately by strata and then sorted according to randomly generated numbers. Sites were selected by sorting from low to high based on the random numbers, and counting down the list to achieve the required number of sites by strata. When necessary, alternates were selected from the same randomly ordered list of sites.

### ***B. Survey Scheduling, Logistics, and Confidentiality***

A significant component of the cost survey involved scheduling site visits and communicating with recyclers chosen from the sample frame. Two staff members at Crowe were employed during the project start-up and survey months (July through February) to coordinate scheduling and communicate with recyclers.

## 2015 Processing Fee and Handling Fee Cost Surveys

Because conducting a cost survey fundamentally entails the collection of proprietary financial information, sensitivity to stakeholder relations is important. Without willing and active cooperation from the selected recycling center operators, determining the real costs of beverage container recycling would be exceptionally difficult, and the results would be hard to support. Our approach was to communicate with site operators and managers from the start of the process to help them understand what the cost survey entailed, what information we were seeking to obtain, and, perhaps most importantly, to correct misunderstandings about the purpose of the cost survey.

The first stage of recycler communication was a letter on CalRecycle letterhead informing the recycler that they were selected to participate in the processing fee and handling fee cost survey. The letter also identified the expectations of the recycler and introduced Crowe as CalRecycle's cost survey contractor. Introduction letters were sent to all selected recyclers starting in June 2015. In the second stage of communication, a Crowe scheduling coordinator established telephone contact with the recyclers to schedule site visits.

The survey team contacted the recycler directly approximately one week before the site visit for final visit confirmation. Site visits were generally conducted by a team of two surveyors, including accountants and/or business analysts. Each survey team included at least one member with cost survey experience. Survey teams made their own travel arrangements.

The scheduling coordinators conducted many behind-the-scenes tasks to ensure overall success of the project. For example, to reduce travel expenses, the coordinators used mapping software to efficiently schedule consecutive site visits, first within regions and then within nearby locations. Scheduling coordinators also sent additional letters and emails to many recyclers to confirm site visit logistics.

The coordinators also were tasked to optimize site visit efficiency, matching the varying schedules of 21 site survey team personnel, diverse geographic locations, and availability of the recycling centers. During any given week, up to four different survey teams were simultaneously in the field. In most cases, one site visit, with some telephone follow-up, was sufficient to obtain all the information needed to complete the survey of each site. A few sites required repeated telephone follow-up or initial "drive-by" visits to confirm that the site was operating and make direct contact with the site owner/manager.

The coordinators also implemented and maintained a secure Microsoft SharePoint site for the transfer and storage of all cost survey recycling center site files. The site allowed our cost survey team members to securely access files in the field, facilitated the efficient review of sites via a check-out workflow, and tracked the status of each site. The secure SharePoint site was backed up automatically on a daily basis by Crowe's IT systems.

To ensure confidentiality of recyclers' proprietary information, every Crowe and subcontractor employee that worked on the processing fee and handling fee cost survey contract signed individual Confidentiality Agreements warranting that they would not disclose any information made available by each certified recycler. Also, each company

## 2015 Processing Fee and Handling Fee Cost Surveys

contractor—Crowe Horwath LLP (Prime Contractor); Richardson & Company (Subcontractor); Geiss Consulting (Subcontractor); Encina Advisors, LLC (Subcontractor); Boisson Consulting (Subcontractor), Vforce Consulting (Disabled Veteran Business Enterprise Subcontractor) and Leon E. Tuttle, CPA (Disabled Veteran Business Enterprise Subcontractor)—also signed company confidentiality agreements.

### **C. Training Manual Updates**

The first *Processing Fee Cost Survey Training Participant Manual* was prepared by NewPoint Group in 1995 to support the cost survey training provided to (then) Division of Recycling (DOR) staff. This manual contained hundreds of example case studies, problem sets, quizzes, sample financial documents, handouts, reading assignments, and procedures to develop skills needed to conduct successful processing fee cost surveys. Because the training manual was originally prepared in 1995, it required extensive revisions and adjustments.

For the current cost survey, Crowe evaluated the entire 700-page training manual used in prior years, removing outdated and duplicative information. We identified 17 training modules for revision, developing learning objectives and interactive exercises for each. The new training manual focuses on key areas of learning necessary to successfully conduct cost surveys. In addition, Crowe developed 17 Prezi presentations covering topics in the training manual.

Crowe created numerous new work assignments and interactive exercises as part of its training update. The updated training modules reflected the change to the file assembly and review process from a manual, paper-based process to a secure online, SharePoint-based process.

The updated training manual consisted of two volumes:

- *Participant Manual, Volume 1* (the primary training manual)
- *Field Manual, Volume 2* (a summary version of the site visit procedures)

After completion of the training program, Crowe made further revisions to the training manual volumes to reflect actual classroom experience, discussions, and questions. The training manuals, to be provided to CalRecycle as one of the project hard copy reports, will reflect these updates.

### **D. Surveyor Training**

Successfully completing the processing fee and handling fee cost survey site visits required knowledge of recycling, recycling practices, the beverage container recycling program, the specific procedures of site visits, auditing, and financial cost-accounting. The Crowe-trained surveyor team consisted primarily of accountants and business analysts.

## 2015 Processing Fee and Handling Fee Cost Surveys

Five of the individuals who conducted site visits for this survey had experience in the previous processing fee and handling fee cost surveys (every other year beginning in 2002), had completed the training sessions, and in some cases also completed one or more 24-hour refresher trainings in prior years. These surveyors already had extensive experience in auditing and financial accounting procedures, as well as practical site-visit and recycling program experience. These returning team members still completed another 16-hour in-house refresher course in 2015. The new survey team members, and some returning survey team members, completed the full in-house 32-hour training program in 2015.

The first phase of classroom training consisted of 24 hours of in-class lectures, group work, reading materials, study exercises, and problem solving. The classroom training was held at the Crowe offices. Training for new surveyors took place over three days; experienced surveyors attended the third day.

The second component of training consisted of five actual site visits at a recycling center that had been randomly selected for the cost survey. Each new surveyor was paired with a highly experienced surveyor. Each team went into the field to conduct five “training” site visits. The highly experienced team member conducted the cost survey, with the new surveyor observing and asking questions. The experienced survey team member guided the new team member, with increasing levels of responsibility for the on-site and post-site visit procedures over the course of the five visits. This field training provided new team members with valuable on-site experience and provided a refresher for those who had previously conducted site visits. Once each team had completed their five site visits, Crowe held one additional follow-up day of classroom training during which teams presented the results of their visits and shared their experiences.

For the classroom component of the training, Crowe prepared and presented Prezi presentations for each of 17 modules in the training manual. A significant segment of both the full and refresher training sessions were spent on hands-on activities and preparing an actual site file from information and videos obtained from a site visit conducted prior to the training class. The training allowed team members to better understand the many variations of financial information and other complicating issues they would likely face in the field. The training session included extensive role-playing interviews. The classroom training was led by the Crowe team.

### ***E. Cost Model Updates***

The labor allocation cost model is a Microsoft Excel workbook consisting of 14 worksheets. The model was first developed to improve the methodology of the 1995 cost surveys. Since that time, it has been updated and revised to accommodate legislative and regulatory changes, as well as upgrades of Excel. In 2000, the survey team and the DOR conducted a significant model revision to add plastic resins #2 to #7 to the model, and to upgrade to Excel 1997, which replaced old Excel macros with Visual Basic programming.

## 2015 Processing Fee and Handling Fee Cost Surveys

The current version of the cost model represents several legacy generations (and layers) of modifications and updates, including a significant number of improvements that were made immediately following the 2002–2012 cost surveys. Prior to conducting the current cost survey, Crowe reviewed and updated the cost model to reflect 2014 container per pound and CRV payment information, as well as procedural changes to the cost survey.

### ***F. Calibration of the Indirect Cost Allocation Sub-Models***

As a result of the introduction of new containers to the Beverage Container Recycling Program in 2000, the 2002 to 2008 cost surveys (conducted every two years) including calculating the cost per ton for 10 different material types: six plastic resins, PET #1, glass, aluminum, and bimetal. For this 2014 cost survey, we applied this same indirect cost allocation sub-model procedure to determine costs per ton for the minority material types that was developed in 2002, and used again in subsequent cost surveys. While the sub-models were not used specifically for the cost per container calculations, the sub-models are an integral part of the cost model, and thus are integral to the cost surveys.

The purpose of the two sub-models, the Indirect Cost Allocation Sub-Model for All Plastics and the Indirect Cost Allocation Sub-Model for Aluminum/Bimetal, was to separate the individual majority and minority material costs from the larger indirect cost categories, all plastics and aluminum/bimetal. Using operational and material handling factors, the sub-models provide a consistent, site-specific, and sub-material specific approach, for determining the costs per ton for both the high-tons majority materials, and low-tons minority materials.

Four operational/material handling factors (weight, number of containers, volume [size] of containers, and commingled rate), along with a weighting allocation across these factors, formed the basis of the indirect cost allocation sub-models for the two majority and seven minority materials (glass does not require a sub-model). The sub-models were integrated into the Labor Allocation Cost Model for each site.

### ***G. Site and Survey Tracking***

For this cost survey, Crowe completed and tracked the survey process via a secure online SharePoint site instead of the former hard-copy system. All site files were electronically uploaded to the secure portal where reviewers could access them conveniently. The use of the SharePoint site increased security and efficiency. The SharePoint tracking list, augmented by an Access database, incorporated all previous information associated with the prior reporting system, including a row of descriptive information on each processing fee and handling fee recycling site.

At any point in time during the surveys, the Crowe business analyst could quickly identify how many sites were in each of nine status completion states, and where each individual site was in the site completion process. Crowe also used the site status reporting systems to help prepare monthly progress reports for CalRecycle.

## 2015 Processing Fee and Handling Fee Cost Surveys

### ***H. Cost Survey Procedures***

There were three phases of an individual cost survey:

- **Pre-site visit** – model population, data review, and travel logistics
- **On-site visit** – site tour, cost survey, and labor interviews
- **Post-site visit** - data entry, analysis, and follow-up.

#### Pre-Site Visit

Before conducting the on-site cost survey, the survey team obtained all available information about that site. Crowe entered recycling volumes for 2014 into the cost model Excel file for each site. The survey team evaluated the beverage container tons information to identify the approximate size and scope of the survey. Much of the pre-site visit time was spent on travel logistics and mapping.

#### On-Site Visit

Each site visit typically lasted from one to two hours, depending on the size and complexity of the site. The primary data-gathering effort took place during the site visit. Survey teams carefully followed procedures outlined in the training manual. The survey team first toured the site with site management to view and inquire about the site's operations, such as materials handled, equipment, recycling procedures, and material shipping.

Another key on-site task was reviewing the financial information with site management, or a financial officer, to identify and categorize allowable and non-allowable costs for calculating processing fees, direct and indirect costs, and beverage container indirect and all materials indirect costs. The next key task was conducting structured labor allocation interviews to determine the allocation of each employee's time first to recycler, processor, or other business, then to direct yard labor or all other labor, and finally by CRV material type or other non-CRV material type. The cost model used this labor allocation information to allocate indirect costs and wages.

#### Post-Site Visit

After the site visit, the survey team spent from four to 10 or more hours further compiling the site data, entering information into the cost model, completing the site memorandum and site file, and reviewing the site file. In many cases, site managers did not have all the necessary information available at the site visit, and the survey team had to telephone the recycler to request additional information, or to ask specific questions about the data.

Following the site visit, the team entered the labor information for each employee, as well as the cost summary and direct cost information, into the cost model. Once the data were entered into the cost model, the model calculated costs per ton for each of the CRV material categories recycled at the site. The survey team then compiled and checked all work papers and conducted a reasonableness check of survey results before uploading the files to the secure SharePoint site for review by a manager.

## 2015 Processing Fee and Handling Fee Cost Surveys

### ***I. Quality Control and Confidentiality Procedures***

Data quality control was a primary focus of the cost survey project. Quality control procedures included five separate levels of review and totaled an average of 13 hours per site. These data procedures were essential to ensure that the cost survey results were fair, equitable, accurate, reasonable, justifiable, and defensible.

This extensive quality control process, with six different individuals or staff teams, determined that each site file was complete and accurate before it was released for data processing and data analysis. Site files that did not meet all the quality control criteria were returned to the original survey team for corrections, if appropriate. Crowe approved data for the final cost per container calculations after this extensive series of quality control reviews was complete.

Confidentiality was important for the cost survey, as described previously. The data from each recycling site were not to be disclosed, as release of the data could potentially be compromising to a recycling business. Hard copy records from each site were maintained securely, and after they were completed financial printouts and worksheet drafts with site-specific information were shredded. The final site electronic site files will be delivered to CalRecycle for their secure record retention. Computers were protected against unauthorized access through use of security software that requires a password. All electronic files related to site visits were stored on the secure SharePoint site within Crowe's domain, accessible by password only, to survey team members.

## 2. Processing Fee Cost Calculations and Results

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This section describes the calculations used and the final results for the statewide weighted-average cost per container to recycle for processing fee recyclers and handling fee recyclers. This section is organized as follows:

- A. *Cost Calculations*
- B. *Cost Results*

### A. Cost Calculations

This handling fee cost survey was the fifth time that CalRecycle calculated cost per container at the statewide level. This section discusses various methodological issues related to this calculation.

The statewide statistical methodology (stratified weighted-average cost, simple weighted-average cost, or population weighted-average cost) used for either cost per ton calculations or cost per container calculations, were pre-determined by sample design.<sup>3</sup> We utilized a stratified random sample for the handling fee cost survey.

For our stratified random samples, we used a weighted average by strata calculation to determine cost per container. This calculation is similar to the approach for aluminum, glass, PET #1, and HDPE #2 cost per ton for the processing fee cost survey. **Exhibit 2-1**, on the next page, illustrates the weighted average by strata calculation approach for calculating cost per container.

The handling fee cost survey consisted of two stratified random samples, one for handling fee recyclers, and one for processing fee recyclers. Within each population, recyclers were grouped into one of three strata based on the annual number of containers recycled. While the specific definitions for handling fee container strata and processing fee container strata were different, the overall structures of the two sets of strata were similar. That is, both the handling fee and processing fee container strata were constructed so that the recyclers within each stratum handled approximately one-third of the total number of population containers recycled. This was important because it allowed us to directly compare results of the two cost-per-container calculations.

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<sup>3</sup> The Beverage Container Recycling Act specifies that cost per ton and cost per container calculations be based on a statewide weighted average. The Act eliminated the calculation of a simple average (taking the average of each site, and dividing by the total number of sites).

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 2-1 Cost per Container Calculation (2014)

$\frac{\text{Container Stratum 1 Sample Costs}}{\text{Container Stratum 1 Sample Containers}}$	X	$\text{Container Stratum 1 Population Containers}$	=	$\text{Container Stratum 1 Total Population Costs}$
+				
$\frac{\text{Container Stratum 2 Sample Costs}}{\text{Container Stratum 2 Sample Containers}}$	X	$\text{Container Stratum 2 Population Containers}$	=	$\text{Container Stratum 2 Total Population Costs}$
+				
$\frac{\text{Container Stratum 3 Sample Costs}}{\text{Container Stratum 3 Sample Containers}}$	X	$\text{Container Stratum 3 Population Containers}$	=	$\text{Container Stratum 3 Total Population Costs}$
				$\frac{\text{Total Population Costs}}{\text{Total Population Containers}}$
				$= \text{Statewide Stratified Weighted-Average Cost Per Container}$

The first step in calculating cost per container was to aggregate the individual material cost results from the completed labor allocation cost model for each site. For each recycling site, we calculated total California Redemption Value (CRV) costs by summing CRV costs for each of the 10 material types, as determined by the labor allocation cost model and sub-models.

Next, we converted tons of each CRV material to number of containers. The number of CRV containers for a given material type was equal to: tons redeemed in 2014 × 2,000 × CPP, where CPP was the 2014 statewide average number of containers per pound for each material type, as determined by CalRecycle. We determined the total CRV containers by calculating the number of CRV containers for each material type and summing across all 10 material types. For example, for a recycler with 100 tons of aluminum redeemed, the number of aluminum containers was equal to:

$$(100 \text{ tons}) \times (2,000 \text{ pounds/ton}) \times (29.60 \text{ containers/pound}) = 5,920,000 \text{ containers}$$

Once we had determined individual site CRV costs and CRV containers, we were able to determine statewide weighted-average costs per container. For the weighted average by stratum calculation for cost per container, we first determined an average sample cost per container for each stratum by dividing total sample CRV costs for the stratum by total sample CRV containers in the stratum. We then multiplied that stratum average cost per container by total containers in the stratum population. We then summed total CRV costs for the three strata, and divided by total containers in the population. This calculation is illustrated in Exhibit 2-1.

## 2015 Processing Fee and Handling Fee Cost Surveys

**Exhibit 2-2**  
**Weighted Average by Strata Calculation Example**  
**Handling Fee Recycler Cost per Container**  
**(2014)**

	Sample CRV Costs	Sample CRV Containers	Sample Cost per Container	
Stratum 1 →	\$3,915,270.43	264,069,654	\$0.01483	1. Simple weighted-average cost per container for each sample stratum
Stratum 2 →	3,140,541.67	159,684,323	0.01967	
Stratum 3 →	3,604,066.16	114,439,299	0.03149	

	Population CRV Costs	Population CRV Containers	Population Cost per Container	
	\$20,602,347.09	1,389,547,610		3. A statewide, weighted-average result of \$0.02198 calculated by dividing total population CRV costs by total population CRV containers
	27,262,936.66	1,386,214,240		
	43,503,863.82	1,381,370,779		
	\$91,369,147.57	4,157,132,629	<b>\$0.02198</b>	

2. Total costs for each population stratum, calculated by multiplying cost per container from above, by total CRV containers, summed for entire population

**Exhibit 2-2**, above, provides the weighted-average by strata sample calculation for handling fee recycler cost per container.

### **B. Cost Results**

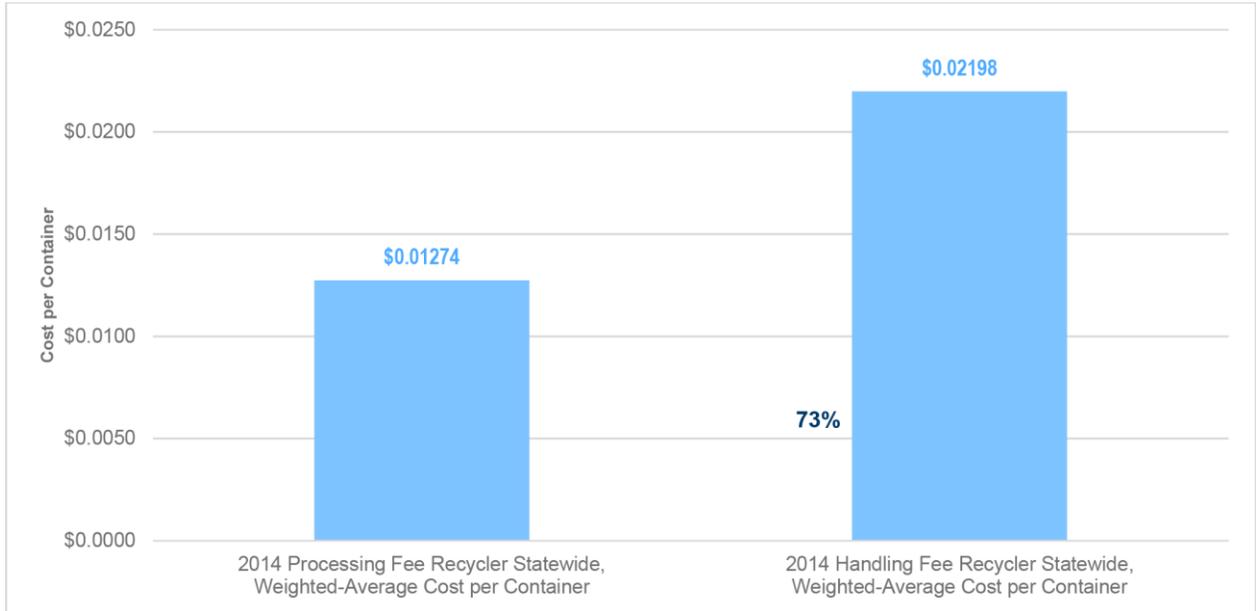
The statewide weighted-average recycler cost per container for handling fee recyclers and processing fee recyclers are presented in **Exhibit 2-3**, on the next page. The statewide weighted-average cost to recycle for handling fee recyclers in 2014 was 2.198 cents per container, 73 percent higher than the statewide weighted-average cost to recycle for processing fee recyclers in 2014, at 1.274 cents per container.

**Exhibit 2-4**, on the next page, includes the new handling fee payment calculation, 0.924 cents per recycled container, equal to the difference between the handling fee recycler statewide weighted-average cost per container to recycle, and the processing fee recycler statewide weighted-average cost per container to recycle, as specified in Section 14585 (f)(3). Under existing law, the Department is scheduled to implement this new handling fee payment starting July 1, 2016.

The sample sizes used to determine the costs per container were estimated to achieve a 90 percent confidence interval. This standard was higher than the statistical requirements in regulations for handling fee survey cost per container calculations, which specify an 85 percent confidence interval. The 2014 cost per container results for both handling fee recyclers and processing fee recyclers exceeded this target, with low error rates at the 90 percent confidence level of 4.90 percent and 7.03 percent respectively.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 2-3 Handling Fee and Processing Fee Recycler Cost per Container<sup>a</sup> – 2014



<sup>a</sup> Statewide weighted-average cost per container recycled

### Exhibit 2-4 Statewide Recycler Costs per Container (2014)

Recycler Type	Statewide Weighted-Average Cost per Container	Percentage Change (PF to HF Cost per Container)	Error Rate at 90% Confidence Interval
1. Handling Fee Recycler	2.198 Cents	+73%	4.90%
2. Processing Fee Recycler	1.274 Cents		7.03%
3. Handling Fee Recycler Cost per Container Minus Processing Fee Recycler Cost per Container	0.924 Cents		

**Exhibit 2-5**, on the next page, compares total number of containers recycled, sample population size, and sample size for handling fee and processing fee recyclers. **Exhibit 2-6**, following Exhibit 2-5, illustrates the cost per container calculations for the two populations of recyclers.

The new handling fee payment, as of July 1, 2016, will be paid on all eligible containers recycled by supermarket sites, nonprofit convenience zone recyclers, and rural region recyclers. The new, calculated, per container handling fee payment of 0.924 cents is 11 percent less than the handling fee payment determined in the 2012 handling fee cost survey of 1.035 cents per container.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 2-5

#### Handling Fee and Processing Fee Recyclers

#### Number of Containers Recycled, Reduced Population Sizes, and Sample Sizes (2014)

Recycler Type	Total Number of Containers Recycled	Sample Population Size (sites)	Sample Size (sites)
1. Handling Fee Recyclers	4.16 billion	920	103
2. Processing Fee Recyclers	9.31 billion	955	89

### Exhibit 2-6

#### Strata and Population Costs and Volumes

#### (2014)

Container Stratum	Sample CRV Costs	Sample CRV Containers	Cost per Container	Population CRV Costs	Population CRV Containers
<b>Handling Fee Recyclers</b>					
1	\$3,915,270.43	264,069,654	\$0.01483	\$20,602,347.09	1,389,547,610
2	3,140,541.67	159,684,323	\$0.01967	27,262,936.66	1,386,214,240
3	3,604,066.16	114,439,299	\$0.03149	43,503,863.82	1,381,370,779
Total				\$91,369,147.57	4,157,132,629
Handling Fee Recycler Statewide Weighted-Average Cost per Container					\$0.02198
<b>Processing Fee Recyclers</b>					
1	\$6,986,840.08	725,546,813	\$0.00963	\$30,066,518.09	3,122,250,709
2	\$4,711,459.44	383,483,913	\$0.01229	37,889,684.58	3,083,988,029
3	\$3,436,059.51	210,478,847	\$0.01632	50,621,174.23	3,100,844,546
Total				\$118,577,376.90	9,307,083,284
Processing Fee Recycler Statewide Weighted-Average Cost per Container					\$0.01274

### 3. Handling Fee Cost Survey Analyses

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This section provides analyses of the cost per container results for the handling fee cost survey. The section is organized as follows:

- A. *Comparison Cost per Container, 2006 to 2014*
- B. *Handling Fee Recycler Cost per Container Decrease*
- C. *Changes in Number of Recyclers, Costs, and Recycled Containers*
- D. *Changes in Recycling Center Productivity and Costs*
- E. *Distribution of Sample Recycling Centers*
- F. *Annual Handling Fee Payments and Alternatives*
- G. *Comparison of Population Size, Containers Recycled, and Costs by Stratum*
- H. *Summary of Handling Fee Cost Survey Analyses*

#### **A. Comparison of Cost per Container, 2006 to 2014**

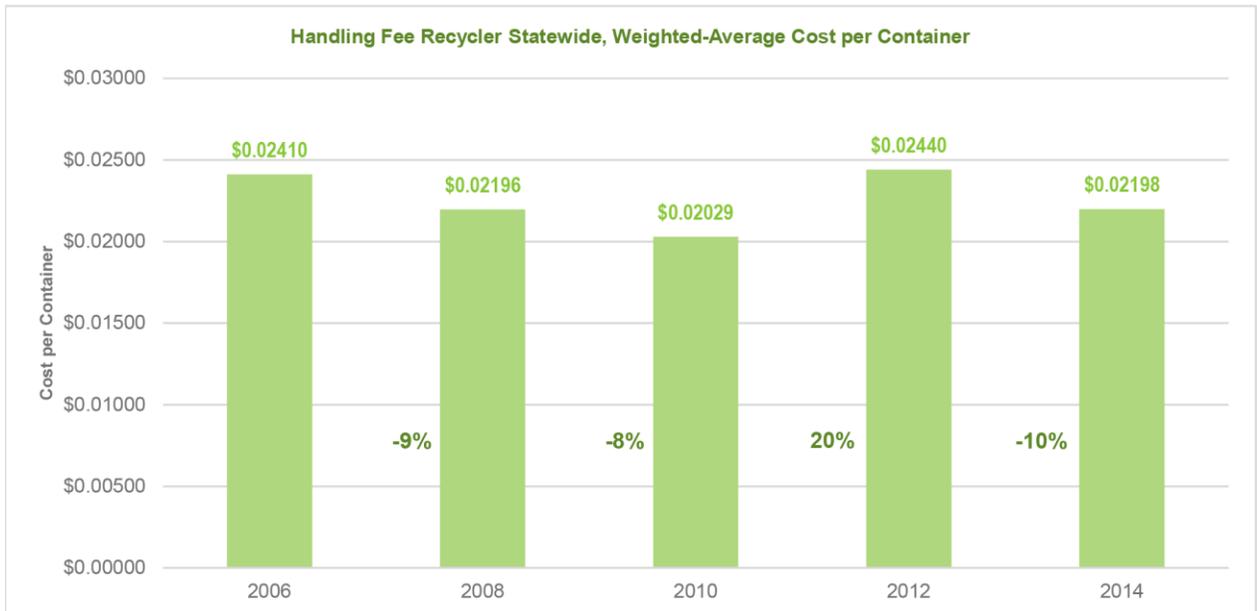
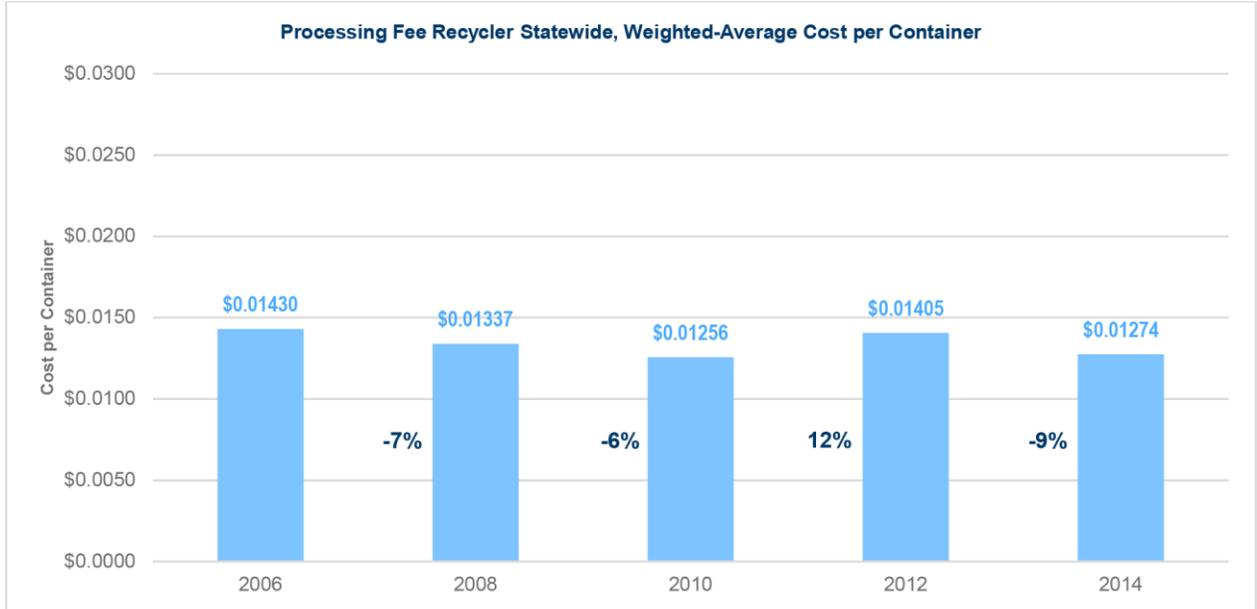
**Exhibit 3-1**, on the next page, compares the statewide weighted-average cost per container for processing fee and handling fee recyclers from the five handling fee cost surveys (even years, 2006 to 2014). As compared to 2012, when both the handling fee recycler cost per container and the processing fee recycler cost per container increased, in 2014 both the handling fee recycler cost per container and the processing fee recycler cost per container decreased. The decrease resumes the pattern of decreasing cost per container in 2006, 2008, and 2010 for both handling fee and processing fee recyclers. The number of containers recycled by handling fee recyclers also increased between 2012 and 2014, which was one reason for the lower cost per container. The processing fee recycler decrease in cost per container between 2012 and 2014 reflects the processing fee cost survey result in which aluminum cost per ton decreased 12 percent, glass cost per ton increased by 5 percent, and PET #1 cost per ton decreased 7 percent.

Between 2006 and 2008, the processing fee recycler cost per container decreased 7 percent, while the handling fee recycler cost per container decreased 9 percent. Between 2008 and 2010, the processing fee recycler cost per container decreased 6 percent, while the handling fee recycler cost per container decreased 8 percent. For both surveys, these decreases are consistent with the processing fee cost survey cost per ton results.

Between 2010 and 2012, the processing fee recycler cost per container increased 12 percent, while the handling fee recycler cost per container increased 20 percent. This trend was reversed between 2012 and 2014, which saw a decrease of 9 percent in the processing fee recycler cost per container and a decrease of 10 percent in the handling fee recycler cost per container. After a spike in costs in 2012, the costs per container seem now to have settled back to the mid-2000s level.

## 2015 Processing Fee and Handling Fee Cost Surveys

**Exhibit 3-1**  
**Processing Fee and Handling Fee**  
**Recycler Cost per Container<sup>a</sup> (2006–2014)**



<sup>a</sup> Statewide weighted-average cost per container recycled

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 3-2

#### Statewide Handling Fee and Processing Fee Recycler Costs per Container and Handling Fee (2006–2014)

Recycler Type	Statewide Weighted-Average Cost per Container					Percentage Change			
	2014	2012	2010	2008	2006	2012 to 2014	2010 to 2012	2008 to 2010	2006 to 2008
1. Handling Fee Recycler	2.198 Cents	2.440 Cents	2.029 Cents	2.196 Cents	2.410 Cents	-10%	20%	-8%	-9%
2. Processing Fee Recycler	1.274 Cents	1.405 Cents	1.256 Cents	1.337 Cents	1.430 Cents	-9%	12%	-6%	-7%
3. Handling Fee Recycler Cost per Container Minus Processing Fee Recycler Cost per Container	0.924 Cents	1.035 Cents	0.773 Cents	0.859 Cents	0.980 Cents	-11%	34%	-10%	-12%

### Exhibit 3-3

#### Statewide Handling Fee and Processing Fee Recycler Cost Survey Error Rates (2006–2014)

Recycler Type	Error Rate at 90% Confidence Interval				
	2014	2012	2010	2008	2006
1. Handling Fee Recycler	4.09%	4.37%	5.62%	5.17%	6.31%
2. Processing Fee Recycler	7.03%	6.30%	5.79%	7.10%	6.16%

The decrease in the HF recycler cost per container between 2012 and 2014 is due to the interrelationship between several factors: recycler center productivity, labor hours, and costs. From 2012 to 2014, productivity levels, measured as containers recycled per recycling center, increased by 17 percent while labor hours per 1,000 containers recycled decreased by 21 percent. Recycling center productivity increased at a much faster rate than did average costs per recycling center, resulting in a decrease in cost per container. The decrease in labor hours per 1,000 containers and the increase in productivity levels had a significant impact on the 2014 decrease in cost per container.

For processing fee recyclers, the overall number of containers recycled by processing fee recyclers (based on the full population of recyclers in both years) was essentially flat—increasing by less than 1 percent between 2012 and 2014. However, because of a drop in the total number of PF recycling centers, the number of containers recycled per PF recycling increased by 4 percent. Within our sample, PF recyclers had higher productivity, recycling 17 percent more containers per 1,000 hours in 2014 than in 2012. These productivity improvements are consistent with the decreased PF recycler cost per container between 2012 and 2014.

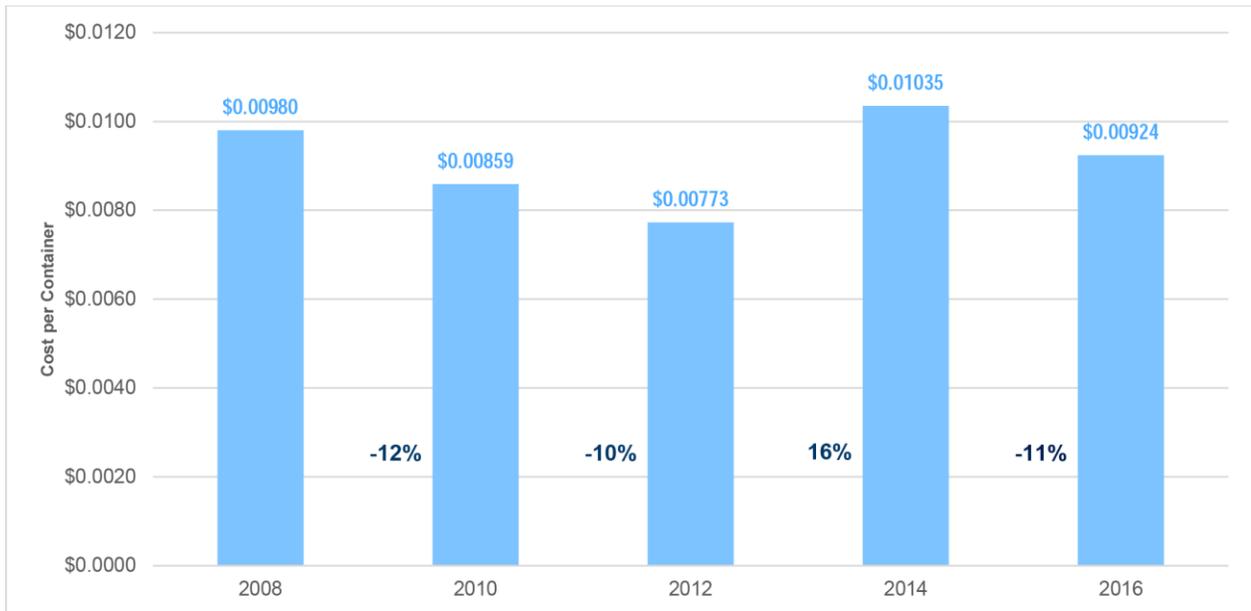
**Exhibit 3-2** and **Exhibit 3-3**, above, provides a comparison of the results for the last five handling fee cost surveys. The handling fee payment, as of July 1, 2016, will result in a decrease of 11 percent in the per container handling fee payments, as compared to

## 2015 Processing Fee and Handling Fee Cost Surveys

the calculated handling fee payment from the 2012 cost survey. The error rates for the 2014 handling fee cost survey were slightly higher for processing fee recyclers and lower for handling fee recyclers than the error rates for the 2012 handling fee cost survey. Both error rates, calculated at the 90 percent confidence level, were well below 10 percent.

**Exhibit 3-4**, below, illustrates the five per container handling fees, as measured by the five cost surveys. The measured handling fee for a given year becomes effective on July 1, two years after the survey cost year. For example, the costs calculated for 2006 determined the handling fee effective on July 1, 2008. The measured handling fee per container dropped by 12 percent between July 2008 and July 2010, from 0.980 to 0.859 cents per container. The measured handling fee dropped another 10 percent between July 2010 and July 2012, to 0.773 cents. CalRecycle made an administrative decision to maintain the prior \$0.0089 cent per container handling fee (the calculated rate plus a cost of living increase) for July 2012. The measured handling fee increased 34 percent between July 2012 and July 2014. The handling fee decreased 11 percent between July 2014 and the new payment (effective July 1, 2016).

**Exhibit 3-4**  
**Handling Fee Cost Survey Calculated Handling Fee Payments (Effective July 1 of Each Year)**  
**(2008–2016)**



## 2015 Processing Fee and Handling Fee Cost Surveys

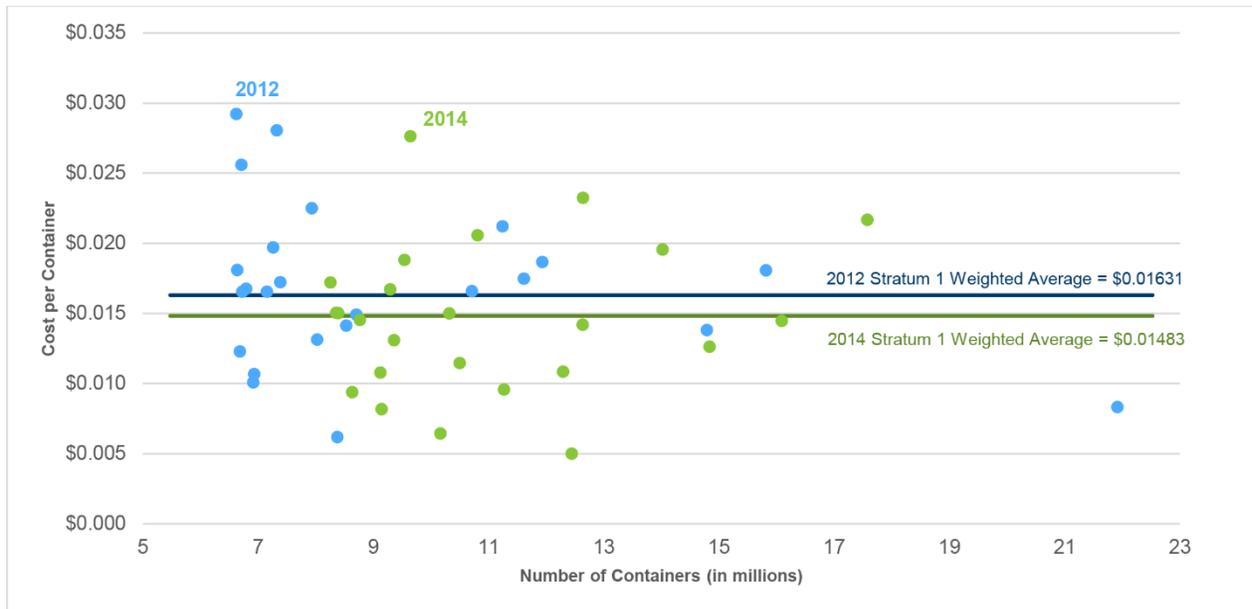
### **B. Handling Fee Recycler Cost per Container Decrease**

The handling fee cost per container decreased by 10 percent between 2012 and 2014. This represents a reversal from the last survey, as the cost per container increased between 2010 and 2012. However, with the exception of the 2010 to 2012 increase, the HF cost per container had decreased every survey year since the 2006 handling fee cost survey. With this 2014 decrease, the handling fee cost per container appears to have stabilized following the 2012 high and the 2010 low. At \$0.00924 per container, the 2014 cost is closer to the 2006 and 2008 handling fee costs per container than it is to the 2010 and 2012 cost per container.

This section discusses several factors that likely contributed to the lower HF cost per container and the resulting lower handling fee payment. We examined several selected factors that may have caused the decrease in cost per container for handling fee recyclers and processing fee recyclers, in order to test the credibility of the full cost survey results.

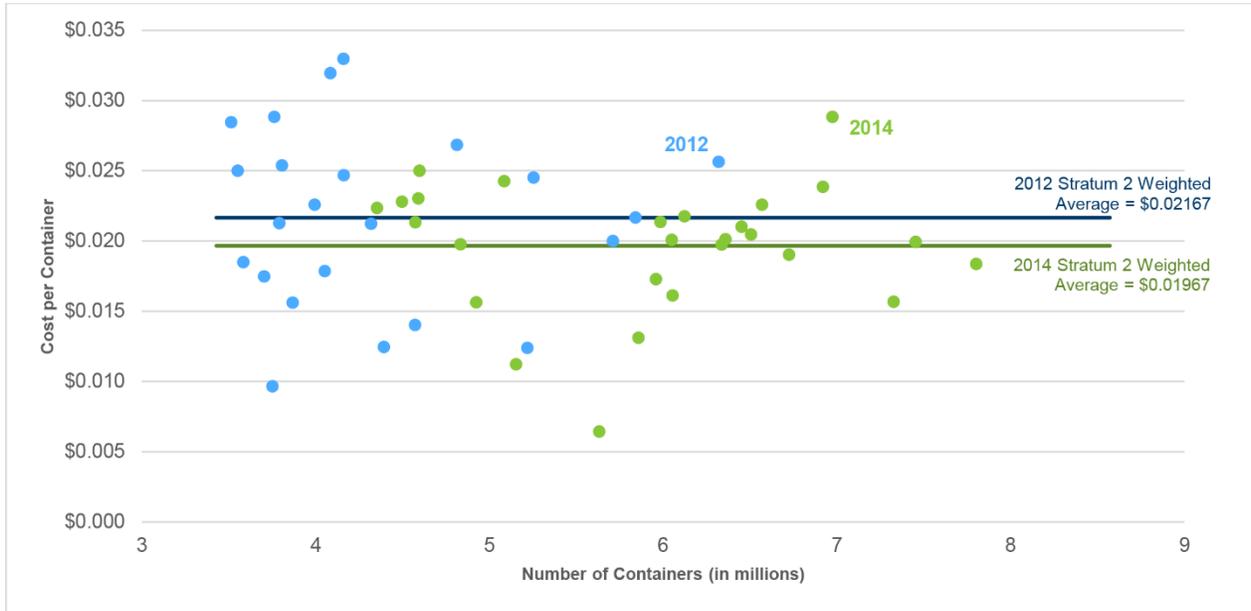
**Exhibits 3-5 to 3-7**, starting below, provide a comparison of the 2012 and 2014 handling fee recycler survey sample results in a scatter diagram form. Each Exhibit compares costs per container and number of containers recycled for the 2012 sample (in blue) and the 2014 sample (in green).

**Exhibit 3-5**  
**Stratum 1 Handling Fee Recyclers, Cost per Container and Number of Containers Recycled (2012–2014)**

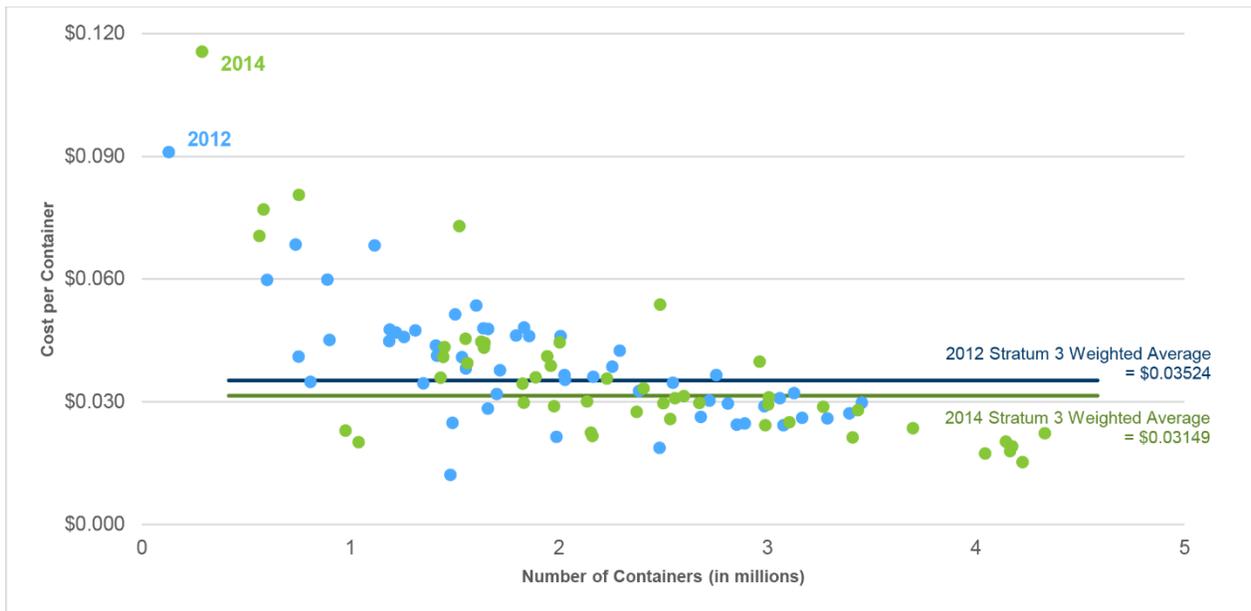


## 2015 Processing Fee and Handling Fee Cost Surveys

**Exhibit 3-6**  
**Stratum 2 Handling Fee Recyclers, Cost per Container and Number of Containers Recycled**  
**(2012–2014)**



**Exhibit 3-7**  
**Stratum 3 Handling Fee Recyclers, Cost per Container and Number of Containers Recycled<sup>b</sup>**  
**(2012–2014)**



<sup>b</sup> Three low-volume, high-cost sites were omitted from the graph. All three were a part of the 2014 data-set: 1) 79,820 containers, \$0.39, 2) 52,458 containers, \$0.60, 3) 45,068 containers, \$0.69. When combined, they account for less than two-tenths of one percent of the total volume for the Stratum 3 sample.

## 2015 Processing Fee and Handling Fee Cost Surveys

In general, there were more containers recycled for all three strata, seen as more green data points to the right of each graph. This shift to higher volumes reflects the overall increase in HF recycler volume between 2012 and 2014, and the change in HF container strata definitions, which were also higher in 2014 to account for the greater overall number of containers recycled.

There is also a general shift to lower cost per container between 2012 and 2014, seen as more green data points in the lower portion, and more blue data points in the upper portion, of the graph. While there are high and low cost per container data points in both survey years, there is a clear trend toward a lower cost per container in 2014. For all three strata, the weighted-average cost per container is lower in 2014 than in 2012. The reduction in cost per container between the two years was similar across strata, ranging from 9 percent to 11 percent.

### Importance of Number of Containers Recycled

The cost per container is highly dependent on the number of containers recycled. **Exhibit 3-8**, below, provides a comparison of the HF recycler cost per container and the number of containers recycled by the HF recycler population for the five handling fee cost surveys. Exhibit 3-8 shows that cost per container decreased between survey years when the number of containers recycled increased, and cost per container increased when containers recycled decreased.

**Exhibit 3-8**  
**Cost per Container Results and Containers Recycled by the Survey Population**  
**Handling Fee Recyclers (2006–2014)**

Survey Year	Cost per Container (cents)	Percent Change in Cost per Container	Population Containers Recycled	Percent Change in Containers Recycled
2006	2.410		3,108,522,318	
2008	2.196	-9%	3,992,318,572	+28%
2010	2.029	-8%	4,562,408,591	+14%
2012	2.440	+20%	3,837,216,107 <sup>c</sup>	-16%
2014	2.198	-10%	4,157,132,629 <sup>c</sup>	+8%

<sup>c</sup> Containers recycled by the full population of 985 HF recycler in 2012 and by the survey population of 920 HF recyclers in 2014.

The importance of the number of containers recycled applies to the overall results, but starts at the individual recycling center level. In determining CRV costs at an individual recycling center, there is sometimes an opportunity to allocate costs between CRV and non-CRV (including other business) categories. However, the majority of handling fee recyclers only handle CRV material. For example, of the 103 HF recyclers surveyed, only 12 had labor allocations of more than 10 percent non-CRV, and 30 recycling centers had labor allocations to non-CRV activities of less than or equal to 1 percent. Thus, the cost per HF container is primarily based on all of the RC's costs, divided by all

## 2015 Processing Fee and Handling Fee Cost Surveys

of its containers. To the extent that many recycling center costs are essentially fixed, the number of containers has a great influence on cost per container. By comparison, of 89 PF for HF sites surveyed, 56 had labor allocations of more than 10 percent non-CRV, and 12 had time allocations to non-CRV activities of less than or equal to 1 percent. For PF recyclers, costs are more often distributed across CRV and non-CRV categories, so cost per container is less dependent on number of containers recycled.

Once the survey team has identified CRV costs at the individual recycling center (RC), the number of containers recycled is the only variable in the cost per container calculation: CRV costs divided by the number of CRV containers. By comparison, the material-specific cost per ton calculations of the processing fee cost survey have an additional variable: the percent of labor spent on aluminum/bimetal, glass, and plastic recycling. For any given recycling center, and for employees there, the percent of labor spent on each of the three categories varies. Thus, cost per ton values are dependent on both tons of material and labor allocations, reducing the dependency on quantity of material recycled.

The importance of the number of containers recycled at the individual level is multiplied at the sample level and then extrapolated to the respective HF and PF recycler populations. HF recycler costs primarily consist of CRV-only costs. PF recycler costs consist of a mix of CRV and non-CRV costs. Changes in the number of containers recycled, upward or downward, are amplified among handling fee recyclers, as compared to processing fee recyclers.

**Exhibit 3-9**, on the next page, provides a comparison of total containers recycled by the PF and HF cost survey populations over the five handling fee cost surveys. Comparing the equivalent full population data, PF containers recycled increased each year from 2006 to 2012 but leveled off in 2014. HF containers recycled increased between 2006 and 2010, decreased in 2012 to levels below that of 2008, and increased in 2014. Thus, at the population level, the increase in containers recycled occurred only among HF recyclers, whose costs are more sensitive to changes in the number of containers recycled.

### **Comparison of PF for HF, and HF for HF, Productivity and Costs**

We describe the potential impacts of changes in recycler productivity and costs in subsection D. For both PF and HF recyclers in our samples, the number of containers recycled increased. However, the costs of recycling for HF recyclers increased at a lesser rate, and the costs of PF recyclers decreased. These differences in productivity and costs are likely a significant contributor to the decrease in costs per container for 2014.

### **Cost Differential between Handling Fee Recyclers and Processing Fee Recyclers**

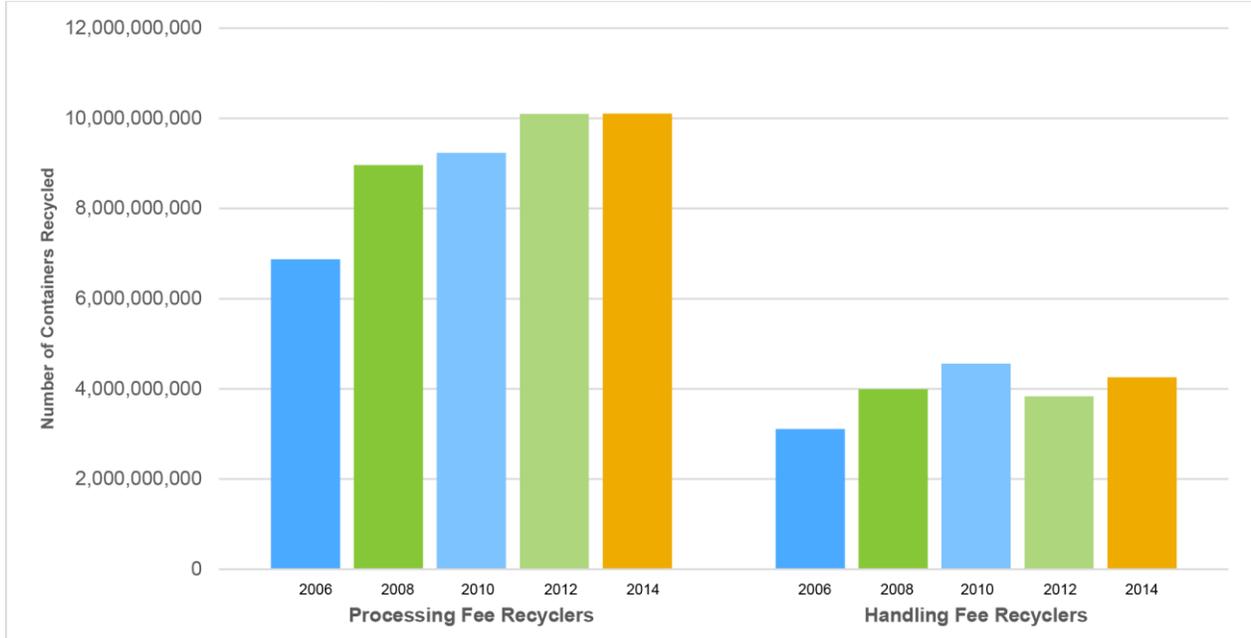
The decrease in HF recycler cost per container clearly has implications on the handling fee payment, as does the decrease in PF recycler cost per container. The handling fee payment is the difference between the cost to recycle for recyclers that receive handling fees (HF recyclers) and the cost to recycle for recyclers that do not receive handling fees (PF recyclers):

## 2015 Processing Fee and Handling Fee Cost Surveys

$$\text{Handling Fee} = \text{HF Cost/Container} - \text{PF Cost/Container}$$

### Exhibit 3-9

#### Number of Containers Recycled by Processing Fee Recyclers and Handling Fee Recyclers (2006–2014 Full Populations)



To determine the handling fee, we compare costs between similar samples of HF and PF recyclers. Both populations are stratified, with approximately one-third of containers recycled within each of the three strata. Because we utilize parallel sample designs, we can be assured that we are making an appropriate comparison, to the extent possible.

The PF recycler cost per container to recycle decreased 9 percent between 2012 and 2014, from 1.405 cents per container to 1.274 cents per container. The 9 percent decrease in the PF recycler cost per container is consistent with the decreases seen in the PF recycler cost per ton results. In the PF cost survey, aluminum cost per ton decreased 12 percent, glass cost per ton increased 5 percent, and PET #1 cost per ton decreased 7 percent.

Because the handling fee payment is a differential between HF and PF costs per container, the relative cost changes in each are amplified. Between 2012 and 2014, HF recycler cost per container decreased by 10 percent, and PF recycler cost per container decreased by 9 percent. The calculated 0.924 centers handling fee payment from this cost survey represents an 11 percent decrease from the 1.035 cents per container calculated in the 2012 HF cost survey.

The impact of the differential can move in both directions. For example, in the 2012 cost survey, the HF recycler cost per container increased 20 percent as compared to 2010, and the PF recycler cost per container increased 12 percent as compared to 2010. The

## 2015 Processing Fee and Handling Fee Cost Surveys

calculated 2012 handling fee payment increased 34 percent as compared to 2010. While there are mathematical cases where the PF and HF differences in costs could result in a smaller change in the handling fee, we have not yet seen this situation in practice. In each of the five HF cost surveys, handling fee recycler costs changed in the same direction, and more than, processing fee recycler costs. The result has been greater changes in the handling fee payment, as compared to the changes for either HF or PF recycler costs per container.

### C. Changes in Number of Recyclers, Costs, and Recycled Containers

#### Introduction

The statewide weighted-average cost per container for the HF for HF RCs, and for the PF for HF RCs, is the quotient determined by dividing the estimated statewide weighted cost of recycling the CRV material, calculated from the handling fee cost survey (numerator), by the number of containers recycled, determined from CalRecycle reporting systems (denominator). Changes in the HF for HF, and PF for HF, cost per container from survey to survey result from increases or decreases in CRV costs and in CRV containers recycled. There is not a direct linear relationship between costs of recycling and containers recycled. In addition, the relative increase or decrease in costs and containers between any two given cost surveys are not necessarily the same. Below, we present a series of graphs that explore the relationship between population CRV costs and containers recycled over time, and how changes in these two variables impact changes in the cost per container over time. In the subsection that follows, we examine the impact of these changes on cost per container results.

#### Historical Trends in Population Number of Recyclers

The population costs and recycled containers are related to some extent to the number of recyclers in the population. In any given survey year, each recycler in the population may recycle more or less CRV material. Generally, recyclers handling a larger number of containers have a lower cost per container than recyclers handling fewer containers.

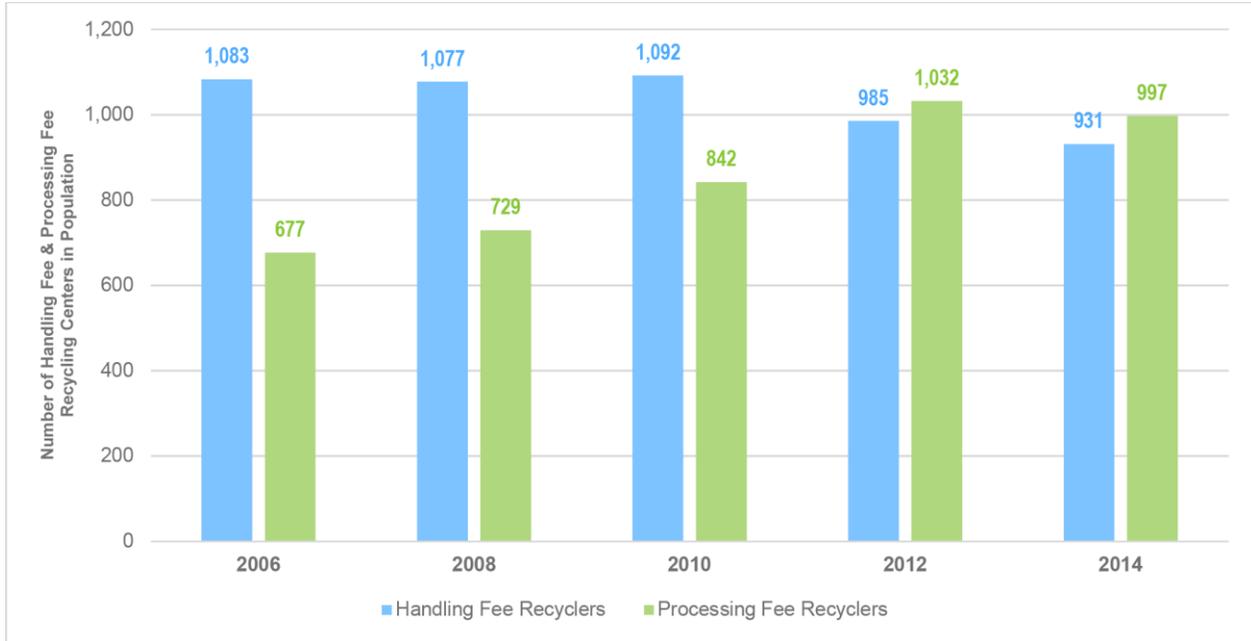
**Exhibit 3-10**, on the next page, provides the number of HF and PF recyclers for each of the four prior and current handling fee cost survey years. The number of HF RCs continued its decline with a decrease of 5 percent between 2012 and 2014. However, the volume of containers recycled by HF RCs increased by 8 percent during the same period. When the number of HF RCs declines and the number of containers recycled increases, the amount of recycled material available to each HF RC, on average, increases.

The number of PF RCs generally has been increasing over time, particularly since 2006. The number of PF RCs peaked in 2012 with 1,032. However, the PF RC population decreased by 3 percent from 2012 to 2014, marking the first decrease in the population observed over the prior four HF cost surveys. The 3 percent decrease in the number of processing fee recyclers between 2012 and the 2014 population coincides with essentially no change in the number of CRV beverage containers recycled by the full population of PF RCs over the same period.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 3-10

#### Number of Population Handling Fee Recycling Centers and Processing Fee Recycling Centers (2006–2014)



### Historical Trends in Population Costs and Population Containers Recycled

As shown earlier in Exhibit 3-9, containers recycled by processing fee RCs increased each cost survey year since 2006 through 2012, but the number leveled off in 2014. Containers recycled by handling fee RCs increased between 2006 and 2010, declined between 2010 and 2012, and again increased in 2014. **Exhibits 3-11** and **3-12**, beginning on the next page, provide historical trends in total population costs and total population containers, beginning with the 2006 handling fee cost survey and extending to the current 2014 handling fee cost survey. Population cost data is estimated from the handling fee cost survey. Population container data is based on CalRecycle reports. For 2012 and 2014, each of the two charts provides the full population containers and the estimated full population costs based on the calculated statewide weighted-average cost per container determined from the sample population.

The statewide weighted-average cost per container result for each year for HF for HF RCs and for PF for HF RCs are essentially equal to the cost data point in each chart (in blue) divided by the containers data point (in green). The change in the relative distance between the costs and containers lines over time provides an indication of change in cost per container from year to year. Examples include the following:

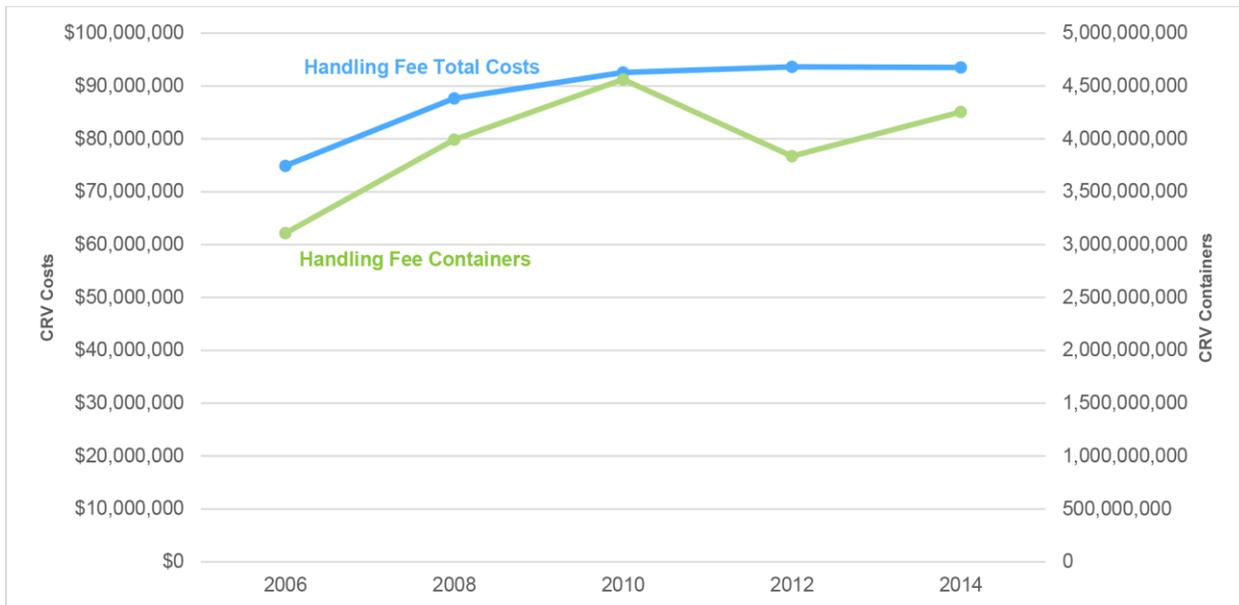
- When the containers line is below the costs line, an increasing distance between the two lines is reflected as an increase in cost per container. In this

## 2015 Processing Fee and Handling Fee Cost Surveys

case, the denominator (containers) is declining relative to the numerator (costs), resulting in a larger quotient. For example, in Exhibit 3-11, the widening of the distance between 2010 and 2012 HF data points represents a 20 percent increase in HF cost per container.

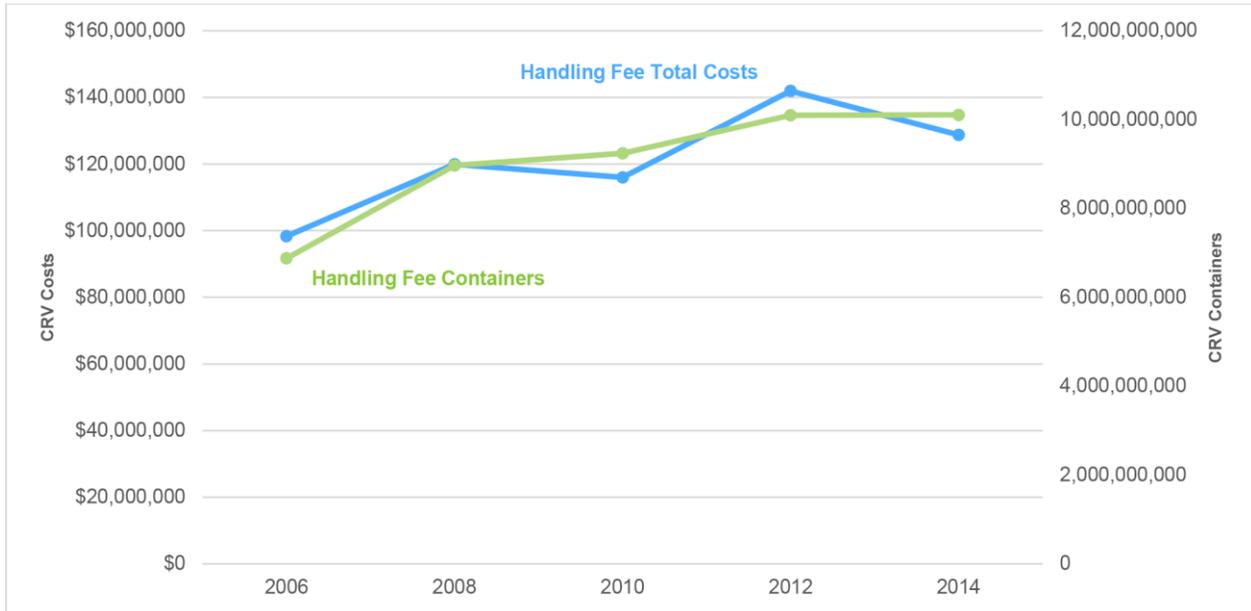
- When the containers line is below the costs line, a decreasing distance between the two lines is reflected as a decrease in cost per container. In this case, the denominator (containers) is increasing relative to the numerator (costs), resulting in a smaller quotient. For example, in Exhibit 3-11, the narrowing of the distance between 2012 and 2014 HF data points represents a 10 percent decrease in HF cost per container.
- When the containers line is above the costs line, an increasing distance between the two points is reflected as a reduction in cost per container. In this case, the denominator (containers) is increasing relative to the numerator (costs), resulting in a smaller quotient. For example, in Exhibit 3-12, the widening of the distance between 2008 and 2010 PF data points represents a 6 percent decrease in cost per container.

**Exhibit 3-11**  
**Population CRV Costs and Containers of Handling Fee Recyclers (2006–2014)**



## 2015 Processing Fee and Handling Fee Cost Surveys

**Exhibit 3-12  
Population CRV Costs and Containers of Processing Fee Recyclers (2006–2014)**



### ***D. Changes in Number of Recyclers and Recycled Tons***

#### **Introduction**

The decrease in cost per container for 2014 is due to the interrelationship between several factors: recycler center productivity, labor hours, and costs. From 2012 to 2014 productivity levels, measured as containers recycled per recycling center, increased and labor hours per 1,000 containers recycled decreased. This represents a reversal from 2010 to 2012, when productivity declined. The 2014 data indicates that essentially less labor time was being spent on more containers. While average costs per RC, including hourly wages, increased in 2014, the costs did not rise in proportion to the rise in productivity. Recycling center productivity increased at a much faster rate than did average costs per RC, resulting in a decrease in cost per container. The decrease in labor hours per 1,000 containers and the increase in productivity levels had a significant impact on the 2014 decrease in cost per container for HF for HF and PF for HF recyclers.

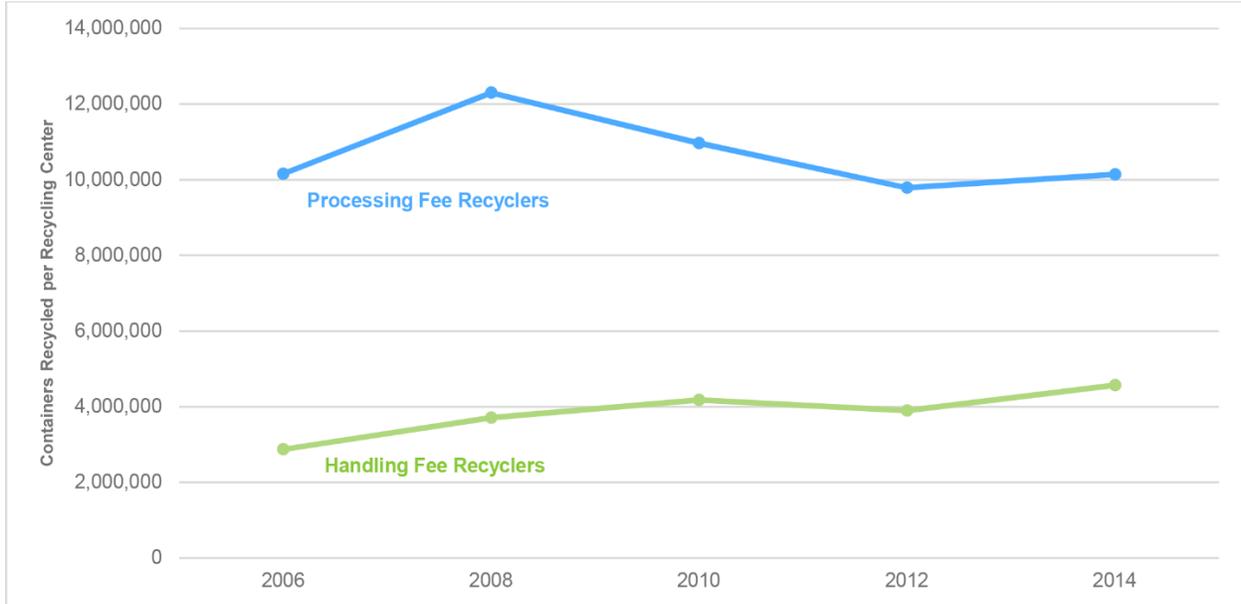
#### **Average Containers Recycled per Recycling Center**

The productivity of HF recycling centers (i.e., the average number of containers recycled per RC) had been increasing between 2006 and 2010 and then declined between 2010 and 2012. There has been a longer-term decline in PF recycling center productivity since 2008. However, from 2012 to 2014, productivity increased for both HF for HF and PF for HF recycling centers.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 3-13

#### Average Containers Recycled per Population Handling Fee Recycler and Processing Fee Recycler (2006–2014)



The number of containers recycled statewide by HF RCs increased from 2006 through 2010, while the number of HF RCs remained somewhat constant. In 2012, both the number of containers and the number of recyclers for the HF population declined, but the number of HF recyclers declined at a higher rate than that of containers. The results was a slight decline in productivity. In 2014, the number of HF recyclers continued to decline; however, the quantity of containers recycled by the full population increased by 11 percent, resulting in an increase in productivity.

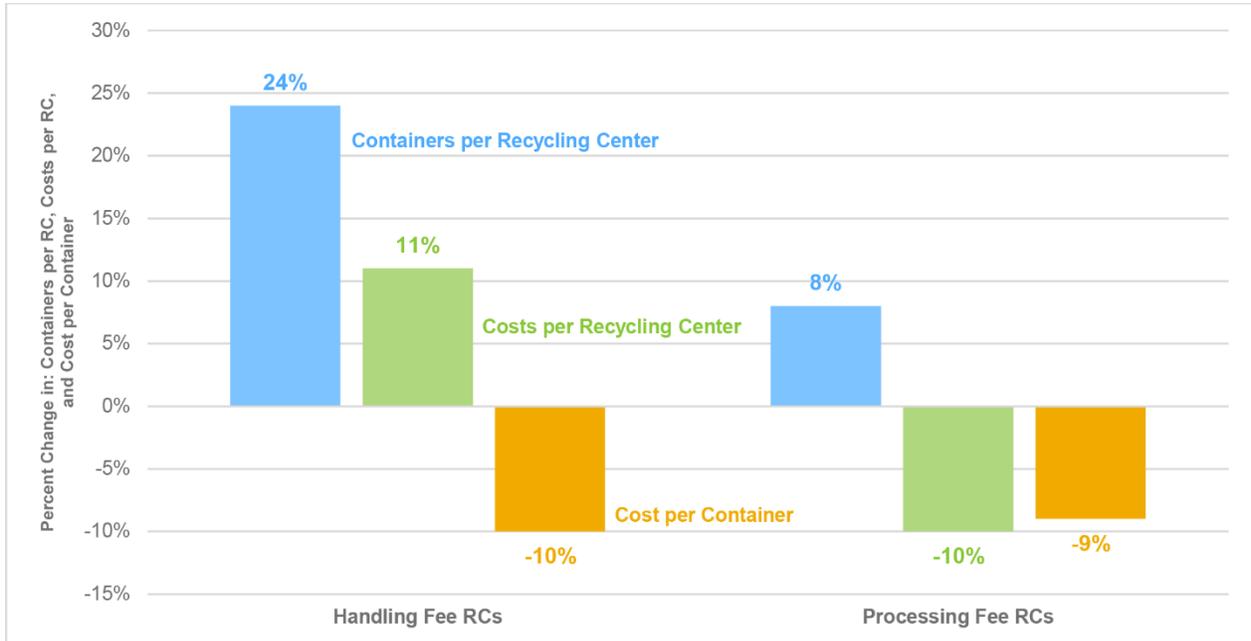
**Exhibit 3-13**, above, provides the average number of containers recycled per recycling center for the cost survey years 2006 through 2014. Each cost survey year's data point is the quotient determined by dividing population containers recycled by the number of recycling centers in the population. The 2014 productivity levels for both HF and PF increased; however, HF productivity increased 17 percent, and PF productivity increased only 4 percent. In contrast, the 2012 productivity levels for full population HF and PF RCs declined from 2010 levels at generally the same rate.

More productive recycling centers that recycle more containers generally have lower costs per container than less productive RCs that recycle less material. As a result, the overall increase in the productivity of recycling centers between 2012 and 2014 is likely a contributing factor to the lower cost-per-container results in 2014, as compared to 2012.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 3-14

#### Comparison of Sampled Handling Fee and Processing Fee Recyclers, Percent Changes in Containers per Recycler, Costs per Recycler, and Statewide Weighted-Average Cost per Container (2012 and 2014)



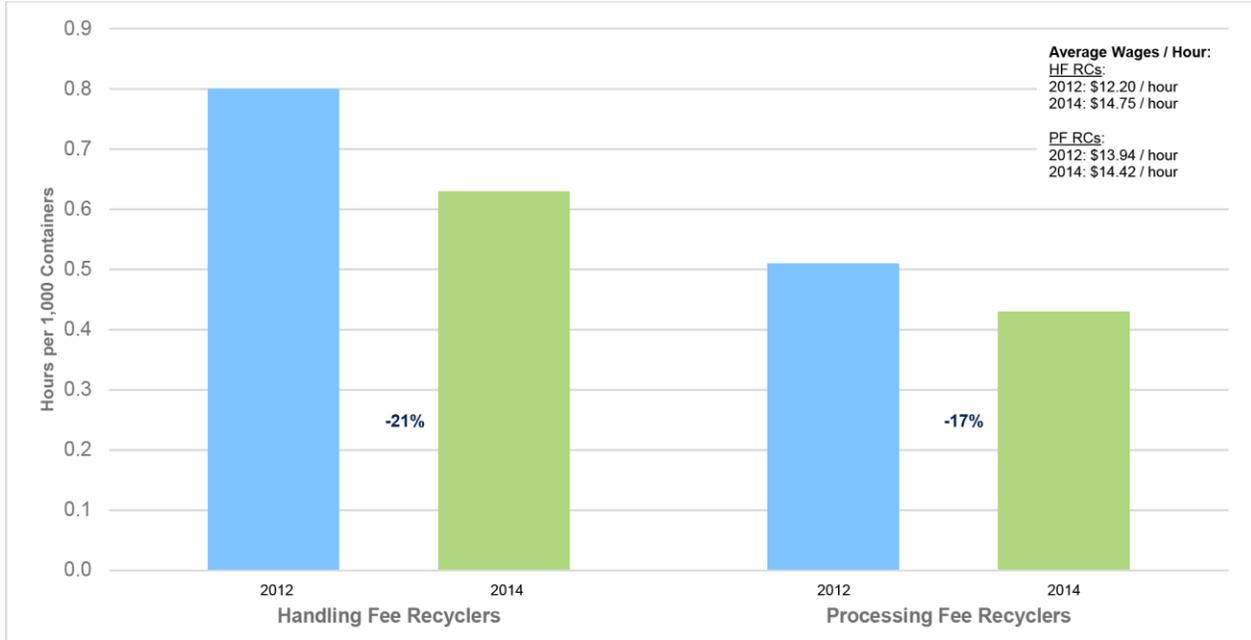
#### Change in Containers per Recycling Center, Costs per Recycling Center, and Cost per Container

The relative changes between 2012 and 2014 in the average number of containers handled per RC and the average costs per RC are primary drivers of the decreases in the 2014 cost per container results. For the HF RCs, average costs per RC for handling CRV containers increased in 2014, but not by nearly as much as the significant increase in average RC productivity (containers recycled per RC) for each material. As a result, the cost per container decreased from 2012 to 2014.

**Exhibit 3-14**, above, summarizes the relationship between RC productivity, costs, and cost per container. The figure shows the percent change in containers per RC, costs per RC, and statewide weighted-average cost per container, between the 2012 and 2014 HF for HF, and PF for HF, recycler samples. Recycling center productivity, measured as containers recycled per RC, increased at a much faster rate than did average costs per RC, resulting in a decrease in cost per container. On average, HF recyclers in the sample recycled 24 percent more containers but reported only an 11 percent increase in cost compared to 2012. On average, PF recyclers in the sample recycled 8 percent more containers but reported a 10 percent decrease in cost compared to 2012. This single trend in overall average recycling center operations is a significant cause for the decrease in 2014 cost per container for both HF for HF recyclers and PF for HF recyclers.

## 2015 Processing Fee and Handling Fee Cost Surveys

**Exhibit 3-15**  
**Sample Handling Fee Recyclers and Processing Fee Recyclers**  
**Average Labor Hours per 1,000 Containers Recycled (2012 and 2014)**



### Labor Hours per 1,000 Containers Recycled

The labor hours required to handle 1,000 CRV beverage containers is another measure of recycling center productivity and is a factor that has a direct impact on cost per container. We calculated and compared the average HF for HF and PF for PF recycler labor hours allocated per 1,000 containers recycled for the 2012 and 2014 surveys.

**Exhibit 3-15**, above, shows the labor hours allocated per 1,000 CRV containers recycled. The labor input required on average to handle 1,000 containers decreased for HF for HF recyclers and PF for PF recyclers from 2012 to 2014. This represents a reversal from 2010 to 2012, which saw labor input increase.

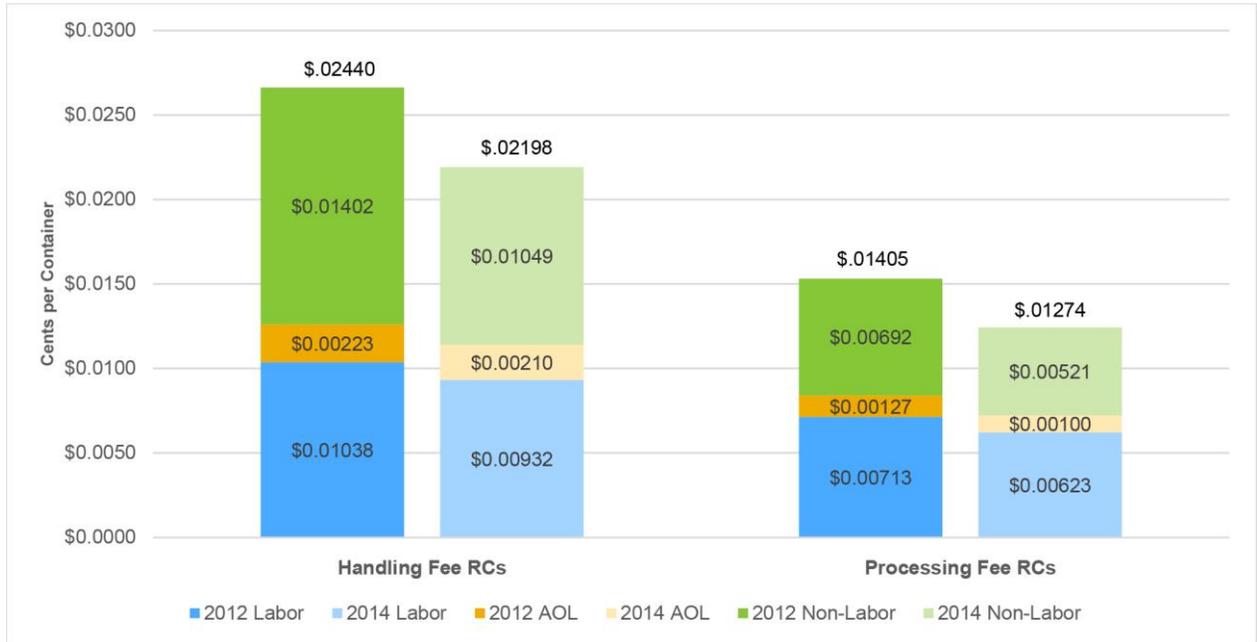
The 21 percent decrease in the average hours that HF RCs required to handle 1,000 containers is a significant factor leading to the 10 percent decrease in 2014 HF cost per container. The 17 percent decrease in the average hours required of PF RCs to handle 1,000 containers also is a significant factor leading to the 9 percent decrease in 2014 PF cost per container.

Recycling centers may be able to reduce labor hours to some extent; however, they still must employ one or more employee on site during all hours of operation. Our cost survey does not capture time spent waiting for CRV customers. All time is allocated to CRV materials, non-CRV materials, or other business. As a result, increases in the number of containers recycled per site will generally result in improved productivity as measured by labor hours per 1,000 containers.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 3-16

#### Sample Handling Fee and Processing Fee Recyclers Labor and Non-Labor Costs per Container (2012 and 2014)



While average labor hours per 1,000 containers decreased, average labor wages per hour increased since the 2012 cost survey. In contrast, from 2010 to 2012, average labor wages per hour declined.

- The average HF for HF recycler wage per hour (including owners, supervisors, and laborers) increased approximately 21 percent between 2012 and 2014, from \$12.20 per hour to \$14.75 per hour.
- The average PF for HF recycler wage per hour (including owners, supervisors, and laborers) increased approximately 3 percent between 2012 and 2014, from \$13.94 per hour to \$14.42 per hour.

### Labor and Non-Labor Costs

We also determined the labor, all other labor (AOL)<sup>4</sup>, and non-labor portions of cost per container for the 2012 and 2014 cost survey and compared how the three cost components changed between the two surveys. **Exhibit 3-16**, above, shows the following:

- Labor accounts for approximately 47 percent of HF for HF cost per container in 2014.

<sup>4</sup> All other labor, or AOL, includes items such as benefits, health insurance, accrued vacation, payroll taxes, unemployment taxes, and workers compensation insurance.

## 2015 Processing Fee and Handling Fee Cost Surveys

- The share of HF for HF labor cost per container rose from 44 percent in the 2012 cost survey to 47 percent in the 2014 cost survey.
- Labor accounts for approximately 54 percent of PF for HF cost per container in 2014.
- The share of PF for HF labor cost per container rose from 52 percent in the 2012 cost survey to 54 percent in the 2014 cost survey, consistent with the increase in HF labor.
- AOL accounts for between 8 percent and 10 percent of costs.
- In 2012, PF for HF and HF for HF recyclers had a similar share of AOL, at 9 percent.
- In 2014, HF recycler's share of AOL rose to 10 percent, while PF for HF recycler's share of AOL declined to 8 percent.

We showed earlier that average hourly wages increased between 2012 and 2014 and that hours per 1,000 containers recycled decreased for both HF for HF and PF for HF recyclers. This is significant as labor makes up approximately half of all recycler costs. Since labor and non-labor costs per container remained relatively stable, the decrease in HF and PF cost per container is due more to the fact that recycling centers are more efficient, spending less time per 1,000 containers of CRV recycled.

The analyses presented above provide considerable confidence in our sample design and cost survey labor allocation methodologies that were the basis of the 2014 cost per container results. The results also demonstrate a consistency in the cost survey labor allocation methodology between the 2012 and 2014 cost surveys.

### ***E. Distribution of Sample Recycling Centers***

**Exhibit 3-17** and **3-18**, on the next page, illustrate an interesting difference between the HF for HF and PF for HF sample results. Exhibits 3-17 and 3-18 are frequency histograms of the cost per container results. The vertical axis is the number of recycling centers, and the horizontal axis is the cost per container. The horizontal axis is in one-half cent increments.

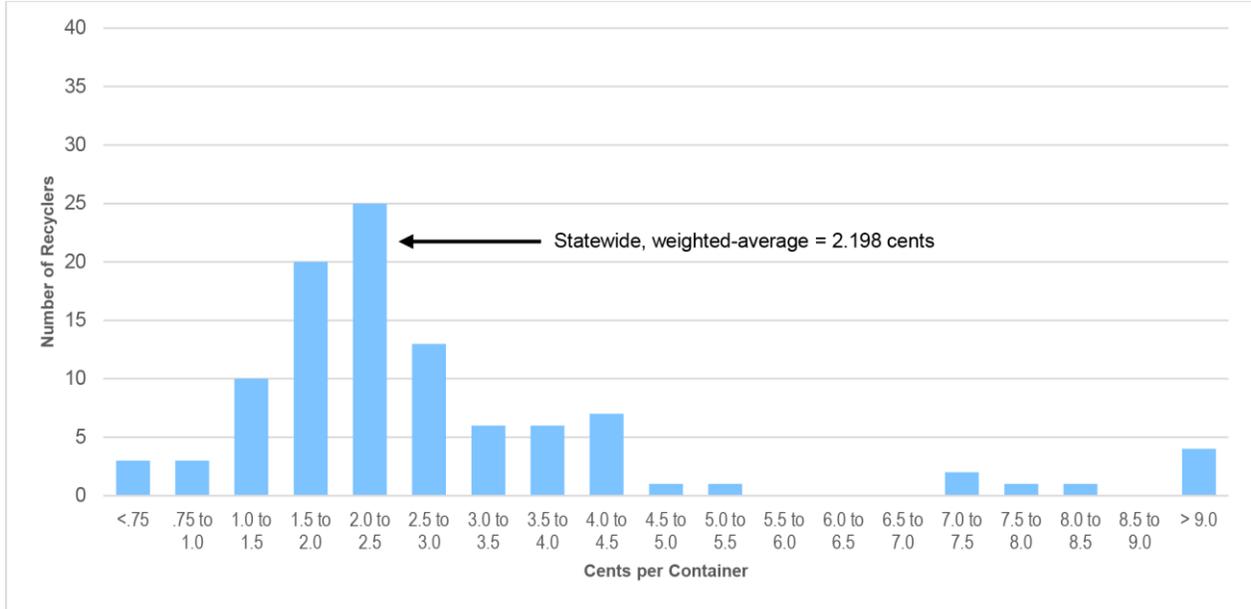
Exhibit 3-17 provides the HF recycler histogram and Exhibit 3-18 provides the PF for HF recycler histogram. Generally, both histograms are "right skewed" normal distributions, as were the PF for PF histograms. However, there are several readily apparent differences between the two figures:

- The HF distribution is significantly wider, starting at less than 1 cent per container but going up to more than 9 cents per container.
- The PF distribution starts at less than 1 cent per container but only reaches 4 cents per container at the high end.

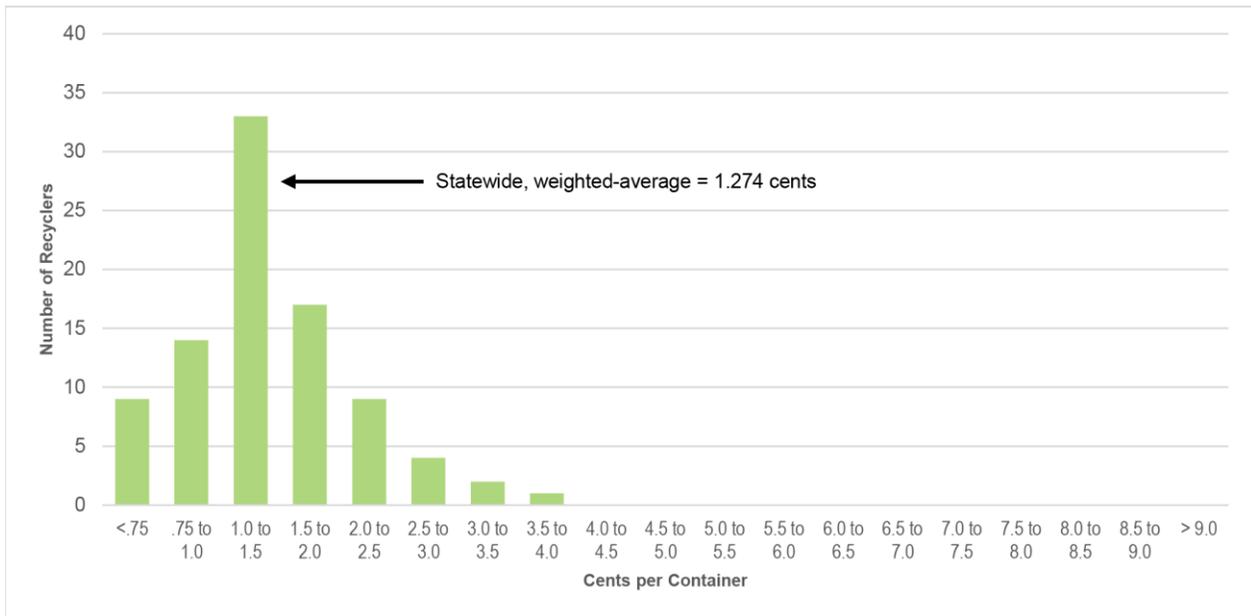
## 2015 Processing Fee and Handling Fee Cost Surveys

- There is more variability among HF recycler cost per container, with fewer recyclers in each cost category, and a wider range of cost per container.

**Exhibit 3-17**  
**Distribution of Cost per Container, Handling Fee Recyclers Sample (2014)**



**Exhibit 3-18**  
**Distribution of Costs per Container, Processing Fee Recyclers (PF for HF) Sample (2014)**



### F. Annual Handling Fee Payments and Alternatives

CalRecycle, beverage container program stakeholders, and the Legislature have been discussing, analyzing, and debating alternatives to the current handling fee payment approach since the 2010 handling fee cost survey results were completed in early 2012. At that time, many handling fee recyclers felt that the cost per container result of \$0.00773 cents per container was low. AB 1933 (Gordon, Chapter 540, Statutes of 2012) stated that CalRecycle “may update the methodology and scrap values<sup>5</sup> used for calculating the handling fee from the most recent cost survey if it finds that the handling fee resulting from the most recent cost survey does not accurately represent the actual cost incurred for the redemption of empty beverage containers by those certified recycling centers.”

To address the concerns raised by AB 1933, Crowe assisted CalRecycle in conducting a workshop in January 2013 to provide stakeholders with a detailed description of the handling fee cost survey methodology. The workshop helped answer stakeholder questions about the accuracy of the survey approach. However, HF recyclers still were concerned that the handling fee payment was too low. CalRecycle made an administrative decision to maintain the prior \$0.0089 cent per container handling fee, later increased by a cost of living adjustment to \$0.0090.

There is general consensus among program stakeholders that there are problems with the current handling fee approach. The fact that handling fees are paid on all containers recycled by eligible HF recyclers results in very high monthly payments to large recyclers, and very low monthly payments to small recyclers. Legislation introduced in 2013 proposed a tiered handling fee payment approach to address these concerns. Ultimately, the legislation was dropped, and there were no legislative changes made to the handling fee during 2013. In a January 9, 2014, budget change proposal, CalRecycle proposed policy changes to the handling fee to address both the pressure on the Beverage Container Recycling Fund and the need to better support convenience. The 2014 BCP also did not move forward.

**Exhibit 3-19**, on the next page, provides total annual handling fee payments between fiscal year 2000/2001 and FY 2014/2015, and estimates for FY 2015/2016 and FY 2016/2017. The 34 percent increase in the handling fee calculated by the 2012 cost survey resulted in a significant increase in overall and per-site handling fee payments. The 11 percent reduction in the handling fee between 2012 and 2014 will reduce overall handling fee payments by approximately \$6 million in FY 2016/2017. The reduction will further amplify the challenges that recyclers are facing due to poor markets for recyclable materials, particularly aluminum and PET.

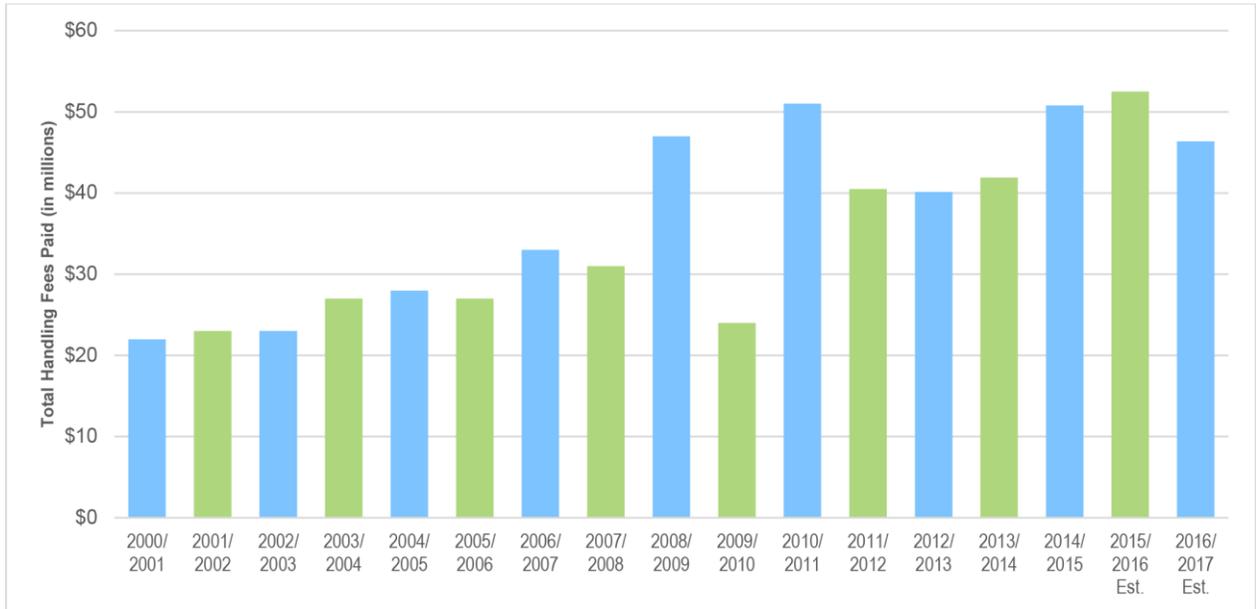
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<sup>5</sup> AB 1933 mistakenly connected the handling fee cost survey and scrap values.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 3-19

#### Total Annual Handling Fee Payments (FY 2000/2001 through FY 2016/2017) (Estimated)



### Handling Fee Payments under Alternative Scenarios

We evaluated average handling fee payment by strata, using the 2014 sample population and volume information (920 sites, 4.15 billion containers) under four different scenarios. The purpose of this analysis was to proactively address concerns about challenges faced by small HF recyclers under the current HF approach and the reduction in per container handling fee payments during the current period of sustained poor recycled material markets. The analysis below compares four different handling fee scenarios:

- 1) Current – based on the current (as of July 1, 2015) HF payment of 1.046 cents per container
- 2) New – based on the new calculated HF payment of 0.924 cents per container
- 3) Strata specific – based on three different HF payments determined from the 2015 handling fee cost survey results by subtracting the PF strata weighted average cost per container from the HF strata weighted average cost per container for each of the three strata (Note: This strata-specific calculation is for purposes of example only because the survey results at the strata level are not calculated to the required statistical standards.)
- 4) Hybrid – based on a per-site annual baseline payment of \$20,000 and a supplemental payment of 0.5 cents per container. This is a simplified version of an alternative handling fee approach that would provide for a base payment to cover minimum operations and a per container incentive payment to increase volumes. Ideally, the base should be calculated as a minimum operational subsidy, and the

## 2015 Processing Fee and Handling Fee Cost Surveys

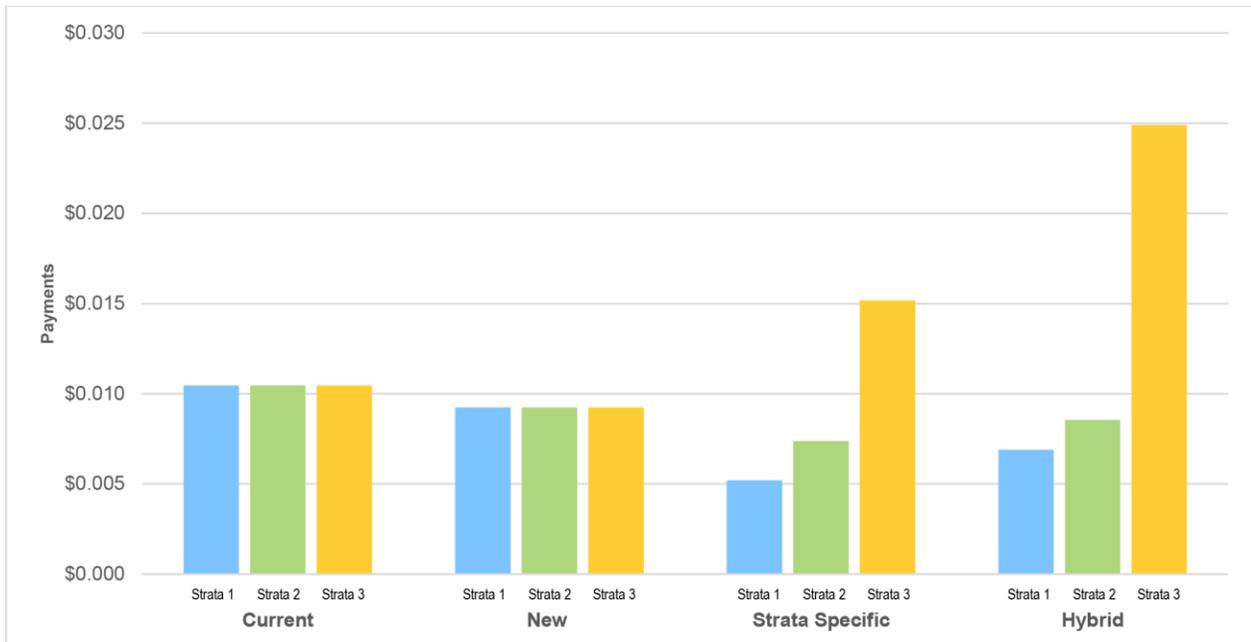
per container amount would be set to allocate the remaining HF funds. For this example, we arbitrarily set the base at \$20,000 per site per year (\$18.4 million for 920 sites) and used \$43.4 million in total HF payments to determine the amount remaining (\$43.3 - \$18.4 = \$25 million). We then divided \$25 million by an estimated 5 billion containers, equal to 0.5 cents per container.

**Exhibit 3-20**  
**Four Alternative Handling Fee Payments**

Strata	Current Payment	New Payment	Strata-Specific Payment	Hybrid Payment <sup>h</sup>
Strata 1	\$0.01046	\$0.00924	\$0.00520	\$0.00690
Strata 2	\$0.01046	\$0.00924	\$0.00738	\$0.00855
Strata 3	\$0.01046	\$0.00924	\$0.01517	\$0.02489

<sup>h</sup> The strata-specific (and total) payments under the hybrid alternative are based on the 2014 HF survey population data (sites and volumes), and thus present average per container payments for those 920 sites. Actual amounts would vary by site.

**Exhibit 3-21**  
**Comparison of Per Container HF Payment by Strata for Four Handling Fee Alternatives**

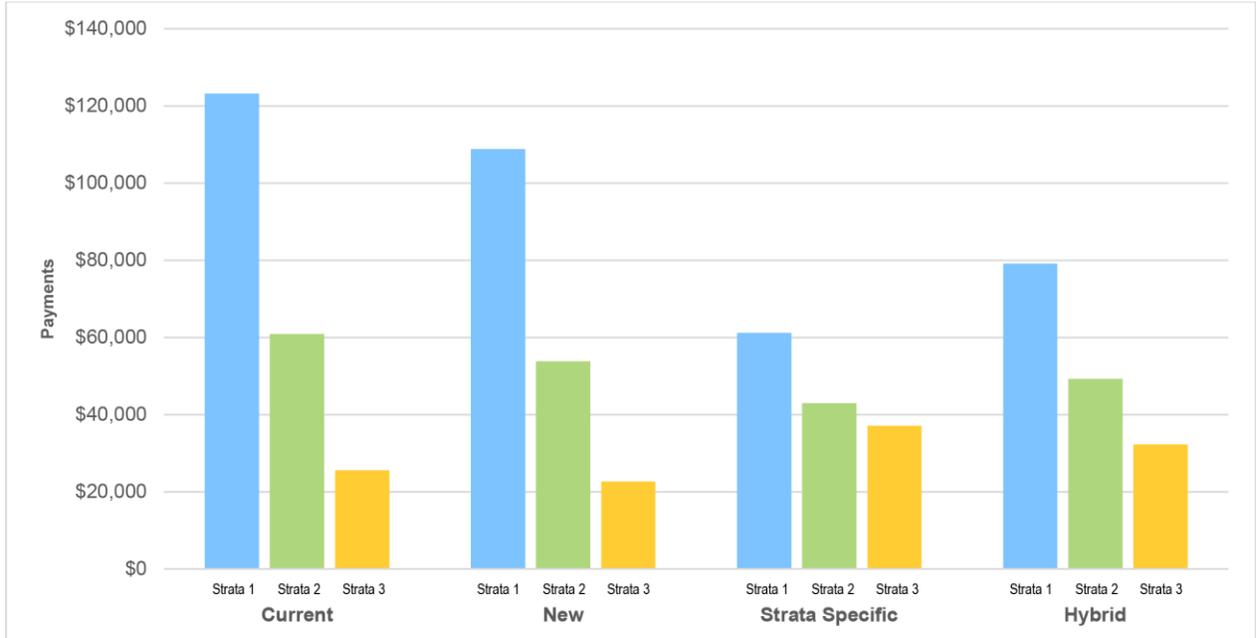


The resulting four alternative handling fee payments by strata are presented in **Exhibit 3-20** and **Exhibit 3-21**, above. Both the current and new approach provide the same per container payment for all three strata of recycling. The strata-specific and hybrid approaches provide lower per container payments for larger volume recyclers and higher payments for the smaller, Stratum 3, recyclers.

## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 3-22

#### Comparison of Annual Average HF Payment by Strata for Four Handling Fee Alternatives



**Exhibit 3-22**, above, provides annual average per site handling fee payments for each strata under each of the four alternatives. Both the strata-specific and hybrid alternatives reduce annual average handling fee payments to Strata 1 recyclers and increase annual average payments to Strata 3 recyclers.

We also estimated total annual handling fee payments under each of the four alternatives based on the 2014 population data. The new payment will result in a \$5 million reduction in total HF payments. The strata-specific and hybrid approaches result in total HF payments similar to the new estimated total. The hybrid approach could be set to achieve a targeted total HF payment amount by adjusting the number of sites to receive payments, the base payment per site, and the per container supplemental payment. For example, the total HF payment could be maintained at the current level of approximately \$50 million per year. Overall annual handling fee payments based on the 2014 data and HF rates provided above are as follows:

- Current – \$43.5 million
- New – \$38.4 million
- Strata-specific – \$38.4 million
- Hybrid – \$39.2 million

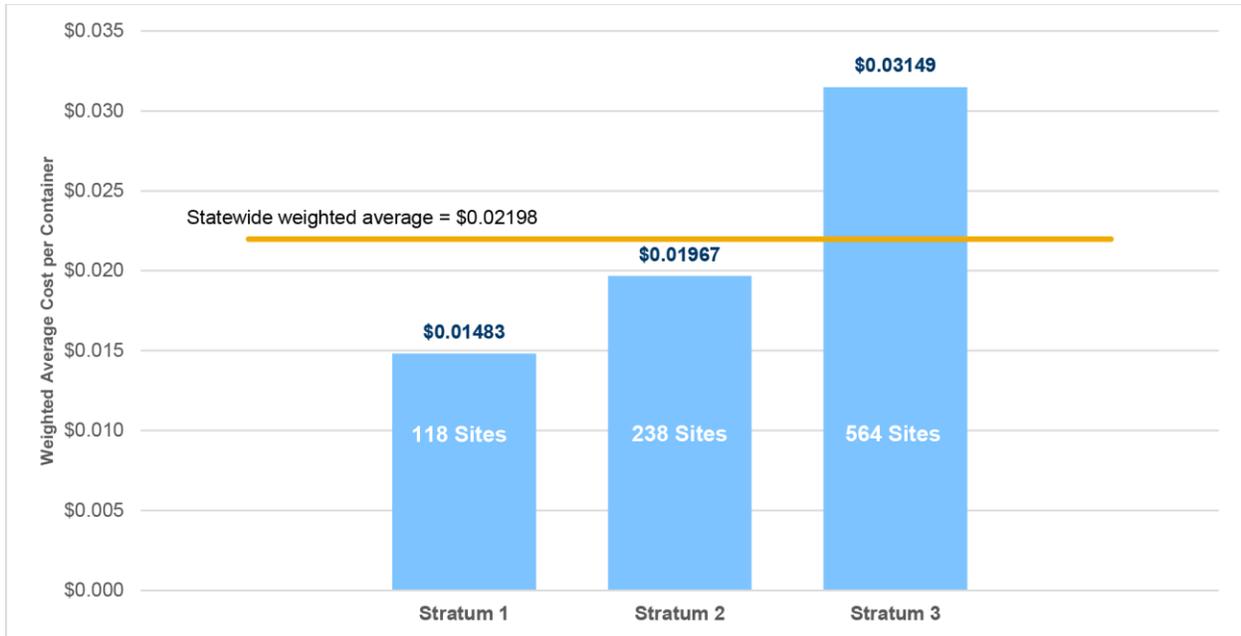
**G. Comparison of Population Size, Containers Recycled, and Costs by Stratum**

**Exhibit 3-23**, below, compares the average cost per container for each of the three handling fee recycler container strata, and the statewide weighted-average cost per container of 2.198 cents. For handling fee recyclers, the average cost per container increases as the size of the recycling center decreases.

While the handling fee is not intended to cover the full cost of recycling for handling fee recyclers, the per container handling fee payment will provide less coverage for Stratum 3 recyclers than for Strata 1 or 2 recyclers. The 0.924 cent handling fee covers 62 percent of the average cost of recycling for Stratum 1 recyclers, 47 percent of the average cost of recycling for Stratum 2 recyclers, and only 29 percent of the average cost of recycling for Stratum 3 recyclers.

**Exhibit 3-24**, on the next page, compares the average cost per container for each of the three processing fee recycler container strata, and the statewide weighted-average cost per container of 1.274 cents. Similar to handling fee recyclers, Stratum 1 recyclers had the lowest average cost per container to recycle, and Stratum 3 recyclers had the highest average cost per container to recycle.

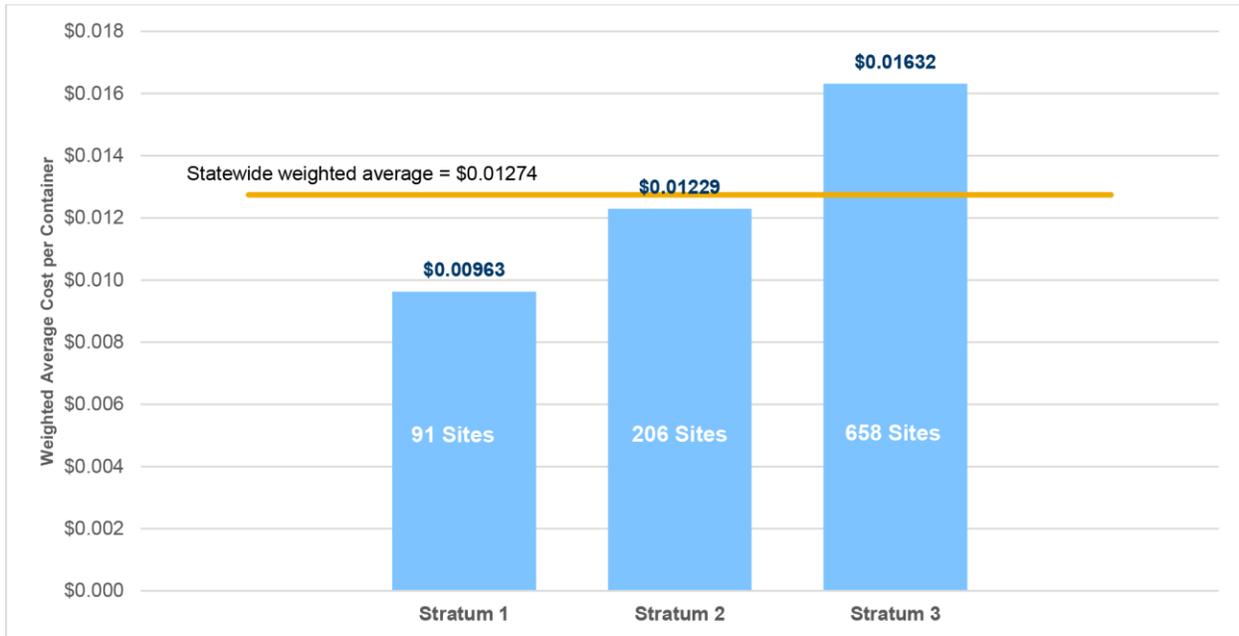
**Exhibit 3-23**  
**Handling Fee Recycler Costs per Container and Population Size, by Strata (2014)**



## 2015 Processing Fee and Handling Fee Cost Surveys

### Exhibit 3-24

#### Processing Fee Recycler Costs per Container and Population Size, by Strata (2014)



**Exhibit 3-25**, on the next page, provides a comparison of population and total containers recycled by strata for handling fee recyclers over the last five handling fee cost surveys. The full population of handling fee recyclers has remained relatively stable over the four years, 2006 to 2010, then declined by 10 percent in 2012 and declined another 5 percent in 2014. The number of containers recycled by HF RCs statewide increased significantly between 2006 and 2010; declined between 2010 and 2012 by 16 percent; and increased by 11 percent between 2012 and 2014. The number of Strata 2 and 3 handling fee recyclers is the lowest it has been across all five surveys, and the number of Stratum 1 recyclers is the second-lowest.

**Exhibit 3-26**, on the next page, provides a similar comparison of the population and total containers recycled by strata for processing fee recyclers over the last five handling fee cost surveys. For the first time, Stratum 3 processing fee recyclers decreased and the Stratum 1 processing fee increased by a significant 17 percent. This departs from previous trends over the last five surveys. Previously, with the exception of a slight decrease in the number of Stratum 1 processing fee recyclers between 2006 and 2008, the number of recyclers in each strata had increased between each survey. The number of containers recycled by strata increased significantly between 2006 and 2008, just slightly between 2008 and 2010, and between 6 and 11 percent between 2010 and 2012. In contrast, the number of containers recycled by strata increased for Stratum 1 but decreased from 2012 to 2014 for Strata 2 and 3. The total number of containers recycled by the full population of PF recyclers was essentially flat between 2012 and 2014, at 10.1 billion.

## 2015 Processing Fee and Handling Fee Cost Surveys

**Exhibit 3-25**  
**Population and Container Detail, by Strata, for Handling Fee Recyclers**  
**(2006–2014)**

Year	Population			Total Population	Containers Recycled			Total Containers
	Stratum 1	Stratum 2	Stratum 3		Stratum 1	Stratum 2	Stratum 3	
2006	145	295	643	1,083	1,068,310,624	1,016,102,754	1,024,108,940	3,108,522,318
2008	136	292	649	1,077	1,325,348,960	1,347,029,614	1,319,939,998	3,992,318,572
2010	125	298	669	1,092	1,518,736,173	1,513,367,002	1,530,305,416	4,562,408,591
2012	115	254	616	985	1,274,311,289	1,277,893,538	1,285,011,280	3,837,216,107
2014	121	243	567	931	1,443,740,805	1,420,326,860	1,389,821,107	4,253,888,772

**Percent Change**

06 to 08	-6%	-1%	1%	-1%	24%	33%	29%	28%
08 to 10	-8%	2%	3%	1%	15%	12%	16%	14%
10 to 12	-8%	-15%	-8%	-10%	-16%	-16%	-16%	-16%
12 to 14	5%	-4%	-8%	-5%	13%	11%	8%	11%

**Exhibit 3-26**  
**Population and Container Detail, by Strata, for Processing Fee Recyclers**  
**(2006–2014)**

Year	Population			Total Population	Containers Recycled			Total Containers
	Stratum 1	Stratum 2	Stratum 3		Stratum 1	Stratum 2	Stratum 3	
2006	63	133	483	679	2,323,206,412	2,251,549,410	2,301,491,919	6,876,247,741
2008	61	144	524	729	2,990,883,260	3,035,367,297	2,940,584,855	8,966,835,412
2010	69	162	611	842	3,044,270,529	3,048,789,601	3,144,984,680	9,238,044,810
2012	88	214	730	1,032	3,357,130,353	3,387,872,789	3,335,801,537	10,100,804,679
2014	103	218	676	997	3,628,846,790	3,267,773,758	3,210,941,420	10,107,561,968

**Percent Change**

06 to 08	-3%	8%	8%	7%	29%	35%	28%	30%
08 to 10	13%	13%	17%	16%	2%	0.4%	7%	3%
10 to 12	28%	32%	19%	23%	10%	11%	6%	9%
12 to 14	17%	2%	-7%	-3%	8%	-4%	-4%	0.1%

## 2015 Processing Fee and Handling Fee Cost Surveys

### ***H. Summary of Handling Fee Cost Survey Analyses***

The cost per container to recycle for both handling fee recyclers and processing fee recyclers dropped between 2012 and 2014. The current cost per container results, and the 0.924 cent handling fee, are within the range of expected results.

- Handling fee recycler costs per container are highly inversely dependent on the number of containers recycled. Between 2012 and 2014, the number of containers recycled by the full population of HF recyclers increased 11 percent, driving cost per container down. This shift of higher container volumes and lower relative costs was consistent across strata.
- The population costs and number of recycled containers are related, to some extent, to the number of recyclers in the population. The number of PF recyclers generally has been increasing over time; the number of HF recyclers has been decreasing over time. However, the number of containers recycled by the full population of PF recyclers increased very slightly, and the number of containers recycled by the full population of HF recyclers increased significantly between 2012 and 2014.
- Between 2012 and 2014, recycling center productivity increased at a much faster rate than did average costs per recycling center, resulting in a decrease in cost per container. The decrease in labor hours per 1,000 containers and the increase in productivity levels had a significant impact on the 2014 decrease in cost per container for HF for HF and PF for HF recyclers.
- The 2014 cost per container methodology and results are valid. Statewide weighted averages for PF and HF recyclers align appropriately to stratum averages, histograms of cost per container show normal, right-skewed distribution, and proportion of labor and non-labor costs per container align to those of 2012 and 2010.
- Overall annual handling fee payments are expected to decline by approximately \$6 million in FY 2016/2017, reflecting the 11 percent reduction in handling fee payment. The reduction will further amplify the challenges that recyclers are facing due to poor markets for recyclable materials, particularly aluminum and PET.
- There are relative differences between processing fee and handling fee recyclers. Over the last five handling fee surveys, handling fee recyclers recycled approximately one-third of the containers, but accounted for just over 40 percent of total CRV costs, and 48 to 62 percent of the total number of recycling sites.