

MEETING CALIFORNIA'S E-WASTE CHALLENGE

A Survey of California Local Government Electronics Recycling Programs

Prepared for the
California Integrated Waste Management Board

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Boisson

& Associates

SUMMARY

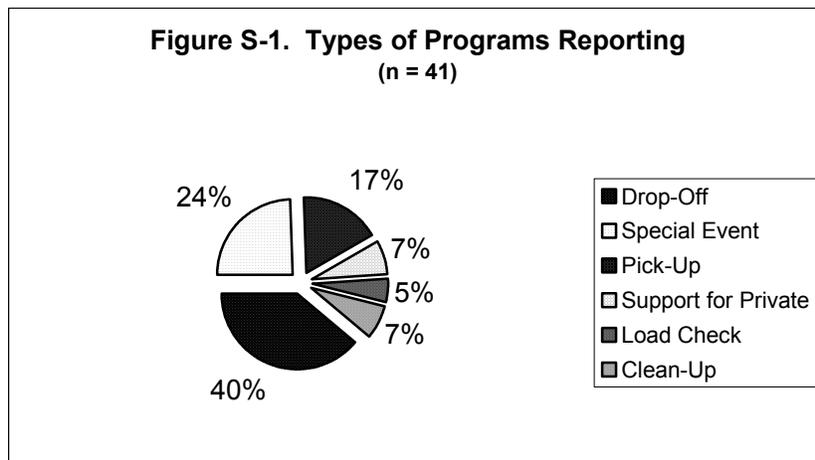
Introduction

This survey of California local government electronics recycling programs was prepared to support the California Integrated Waste Management Board's involvement in the National Electronics Product Stewardship Initiative (NEPSI) and other efforts. Boisson & Associates conducted the survey under contract to the Board as part of the Product Stewardship Support Project.

The survey describes a sample of 41 electronics recycling programs reported by 25 jurisdictions covering 40.6% of the state's population. While not statistically representative, aggregate responses should reflect the mix of circumstances statewide. The responses describe a turbulent year in which jurisdictions, contractors, processors and their partners were scrambling to develop new services for a product type few had previously handled. Consequently, cost and other program characteristics are changing rapidly and projections based on these survey data may not be justified.

Overview of Programs

At least 18.7 million people (54% of statewide population) in 158 jurisdictions have access to some type of electronics recycling services. Local electronics recycling programs can be grouped into six broad categories (see Figure S-1).



Local programs are extremely diverse. Though responsibilities differ markedly, local government staff is usually responsible for administration, while contractors are usually responsible for collection operations. Seventy-eight percent of the programs have started up since April 2001. Nearly half of programs target residential participants only, though most acknowledge some degree of participation by businesses, schools and other organizations. The number of participants in electronics collection programs can vary tremendously, but San Diego's reported 4,000 participants in two special events

illustrates how popular they can be. Most programs accept a wide range of electronics products, and only 30% accept CRTs only. Seventy-six percent of responding jurisdictions took specific steps to ensure collected electronics are handled in an environmentally sound manner.

Program Costs, Effectiveness and Funding

Jurisdictions reporting both cost and collections data serve about 13 million people and reported over \$2 million in costs, dominated by contractor expenses for collection, transportation and processing, and collections of over 4.5 million pounds. The average cost per pound of \$0.45 varied from \$0.29 for mobile/special events (held no more than once a month in various locations), \$0.51 for drop-off programs integrated with existing facilities to \$0.55 for other types of programs. Processing costs for CRTs average \$0.37 per pound or \$18.50 per unit and pricing increased substantially immediately following the DTSC CRT disposal ban announcement. The 0.34 pounds per person served is equivalent to about 29% of the rate for overall household hazardous waste. Many respondents expect significant volume increases since their programs are new and have not yet been aggressively promoted. All programs rely to some degree on existing budgets to fund electronics recycling programs. Only 19.5% charged a participant fee, but there is a clear trend towards initiating and/or increasing such fees.

Table S-1. Summary of Normalized Program Cost and Effectiveness

Type of Program	Number of Programs Reporting Costs and Collection	Total Annualized Cost	Total Normalized, Annualized, Lb.s Collected	Cost/Lb. Collected	Population Covered	Cost per Capita Covered	Lb. per Capita Covered
Integrated Drop-Off Programs	12 responses, 25 facilities	\$1,279,181	2,511,714	\$0.51	6,308,000	\$0.20	0.40
Mobile/Special Programs	8 responses, 24 events	\$377,939	1,319,270	\$0.29	6,980,950	\$0.05	0.19
Other Programs	5 responses, 7 programs	\$377,578	687,093	\$0.55	3,779,050	\$0.10	0.18
All Responses		\$2,034,698	4,518,077	\$0.45	13,305,800	\$0.15	0.34

Note: Based on 30 programs reporting both cost and amount data. Population figures do not add because of overlap in program coverage.

Suggestions for Decision Makers

When asked how NEPSI or government can provide assistance, virtually all respondents cited the need for a front-end funding mechanism, whether assessed at the point of sale or through some other product chain source. Of 26 responses, seven cited the need for producers to be fully responsible for both funding and operating collection programs. The remaining 17 responses cited the need for shared responsibility models that reimburse local governments for all their costs. Two mentioned the potential for local ordinances if state or national initiatives are not undertaken.

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INTRODUCTION

This report summarizes the findings of a survey of California local government electronics recycling programs. The research objective was to characterize the costs and types of programs being developed in response to the Department of Toxic Substances Control's (DTSC's) announcement in Spring 2001 clarifying that products containing cathode ray tubes (CRTs) are hazardous and may not be disposed in California's Class III disposal facilities.

Boisson & Associates conducted the survey under contract to the California Integrated Waste Management Board (CIWMB), as part of the Product Stewardship Support Project. This purpose of this project is to support the CIWMB's involvement in the *National Electronics Product Stewardship Initiative* (NEPSI) and other efforts by documenting the related costs, programs and perspectives of California local governments. Additional information on the project, including the survey form, a summary of local government perspectives documented in two workshops, an overview of product stewardship issues and an Internet resource guide are available at <http://www.ciwmb.ca.gov/Electronics/Stewardship/PSSP/default.htm>.

The following two sections discuss the methodology and degree of confidence in results. The subsequent six sections present the survey findings on: the number and types of programs, costs, funding, results, analysis of cost-effectiveness and suggestions to decision makers. Appendix A lists the jurisdictions responding to the survey and their respective electronics recycling programs.

METHODOLOGY

This survey illustrates the beginning stages of California local government efforts to respond to what amounts to a new mandate to collect and recycle CRTs. The methodology was developed after reviewing several similar surveys.¹ The survey form was distributed by email to local government officials throughout the state in May 2002 and information covering the previous 12-month period was requested. (The survey form is available at <http://www.ciwmb.ca.gov/Electronics/Stewardship/PSSP/Survey.htm>.) Thirty responses were received, with 25 of these describing at least one type of electronics collection program, and five stating they had no program in place. Surveys were submitted by fax or email and were followed up at least once by phone or email. Except where noted, all results are derived from these survey responses. Limited additional information was compiled from two other surveys (conducted by Sonoma and Fresno Counties), from CIWMB's list of grants involving electronics recycling services, from CIWMB's annual survey of household hazardous waste programs and from a review of select local government web sites.

DEGREE OF CONFIDENCE IN RESULTS

These survey results describe the characteristics of a sample of 41 electronics recycling programs reported by 25 jurisdictions covering 40.6% of the state's population. Because the sample was not randomly selected (i.e., those choosing to respond may have been motivated by similar factors), the results cannot be said to truly be statistically representative. However, qualitatively, the sample appears to be reasonably representative of the state as a whole, since it includes urban/rural/suburban, north/south, and remote/metropolitan jurisdictions and programs in all stage of development. Therefore, notwithstanding several sources of potential error (discussed below), aggregated responses should be expected with reasonable confidence to reflect the mix of circumstances statewide as perceived and reported by local government representatives. Compiled aggregate statistics should be viewed as describing the mix of experience statewide, not the typical characteristics of an average jurisdiction or program type.

The survey covers a turbulent period in which jurisdictions, contractors, processors and their partners were scrambling to understand and implement changing state policies, and to develop a brand new recycling infrastructure for a product type few had previously handled. Consequently, cost and other data reflect programs in their infancy and are changing rapidly. In general, broader results (e.g., total costs for all programs) can be viewed as more accurate than specific cost items (e.g., operations or contractor) since some respondents may have misidentified certain information. Costs may be somewhat underestimated since some respondents were unable to estimate certain items, especially where electronics services are integrated with pre-existing services targeting other product types.

Potential Sources of Error

- Inconsistently defined cost categories and “programs” (e.g., some respondents may not have listed load check, clean up or other programs even though they target CRTs).
- Failure to allocate a portion of costs and revenue from pre-existing activities (e.g., promotion and operating costs for drop-off programs that target a wide range of materials in addition to electronics).
- Guesswork by respondents in providing information that may not be easily accessible.
- Compiling data during a period in which activities and costs were changing rapidly.
- Misinterpreting responses while compiling and analyzing results.

Steps to Minimize Error

- Most responses were followed up at least once via telephone, email and/or fax.
- Programs were carefully redefined in consistent terms based on respondents' overall description of services provided.

- Analysis of cost and amount collected is limited to those programs for which both cost and amount data were reported. These data were normalized to allow “apples-to-apples” comparisons by: a) annualizing data for facilities that started up during the study year; and b) converting all amount collected data to pounds using standard conversion factors.²

Factors Likely to Cause Significant Changes in Electronics Programs

- Volumes will increase and cost structures will change as local programs continue to develop and mature, while being more aggressively promoted.
- Changing state and federal policies, including the potential that additional products may be designated as hazardous, and the 2006 sunset of the exclusion of universal waste products from hazardous waste regulations.
- Changing competitive dynamics in markets for collection and processing services, including the uncertain impact of low-cost prison labor processing programs.
- The potential for state or federal legislation and/or a national voluntary agreement through the National Electronics Product Stewardship Initiative.

Suggestions for Future Research

- These findings should ideally be updated after local programs are more fully developed and after greater experience is gained.
- CIWMB grant recipients should be required to provide data on their programs through a standardized form. (The form used in this project can serve as a starting point.)
- The Form 303 used annually to gather data on local household hazardous waste management programs should be revised to specifically gather information on electronics.

NUMBER AND TYPES OF PROGRAMS

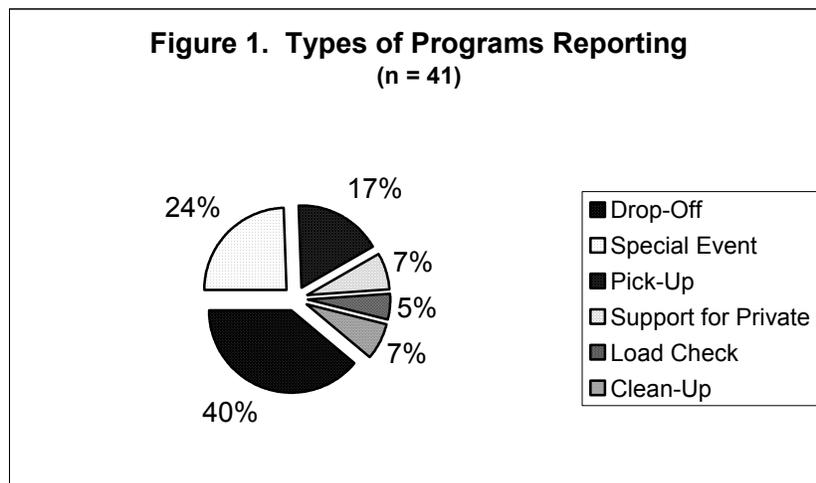
At least 18.7 million people (54% of statewide population) in 158 jurisdictions have access to some type of electronics recycling services.

Twenty-five survey responses were received describing programs covering 114 cities and unincorporated county areas, and serving approximately 14.1 million people (40.6% of the state’s total population of 34.8 million). (These programs are listed in Appendix A.) Additionally, programs covering 44 other jurisdictions serving at least 4.5 million people (13.4% of the statewide population) were also identified. Additional California electronics recycling programs certainly exist that were not documented. For example, disposal facilities statewide have or are beginning to implement load-checking programs for CRTs at Class III disposal facilities, yet only two such programs are included in the above numbers.

Local electronics recycling programs can be grouped into six broad categories.

The 41 different electronics programs reported by 25 responding jurisdictions can be categorized as follows (see Figure One):

- Sixteen (39.0%) are **drop-off programs** integrated with existing facilities and offering service at least 2 days a week (and most offering service 5 days a week). Some programs involve more than one facility, and a total of 30 facilities were reported. Of these, four specifically noted they are integrated with facilities handling HHW, with the remainder affiliated with recycling centers, transfer stations and/or disposal facilities.
- Ten (24.4%) are **mobile/special event programs** held in varying locations no more than once per month. Most jurisdictions reported holding one or two events, while one jurisdiction (the City of Los Angeles) reported 11 separate events. A total of 28 different events were reported.
- Eight (17.0%) are some type of **pick-up program**. Of these, one is a regular curbside program providing CRT pick-up twice per month along with other recyclables, one offers CRT pick-up through a regular curbside program three times per year, two offer on-call pick-up up once per year per residence and three accept CRTs along with regular bulky-item pick-up services.
- Three (7.3%) are **support programs for privately operated services**. Of these, San Francisco supports at least 15 such sites and Santa Cruz County supports eight.
- Three (7.3%) are **clean up programs** that specifically target CRTs. Of these, two are illegal dumping clean up programs and one, in San Jose, is a neighborhood clean up program targeting approximately one different neighborhood per week.
- Two (4.9%) are **load check programs** at disposal facilities (additional jurisdictions are likely engaged in these programs but did not report them).

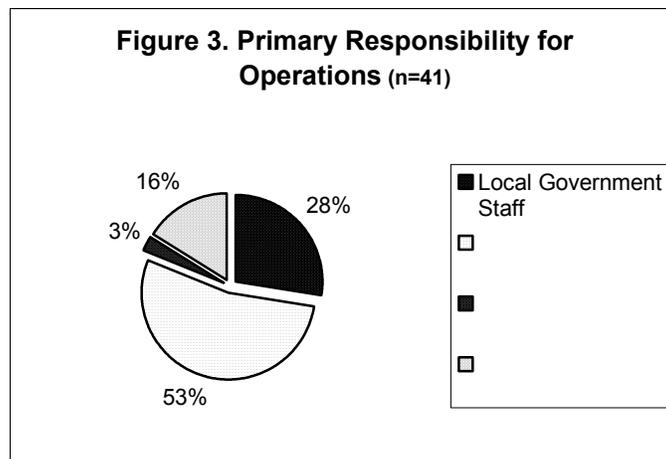
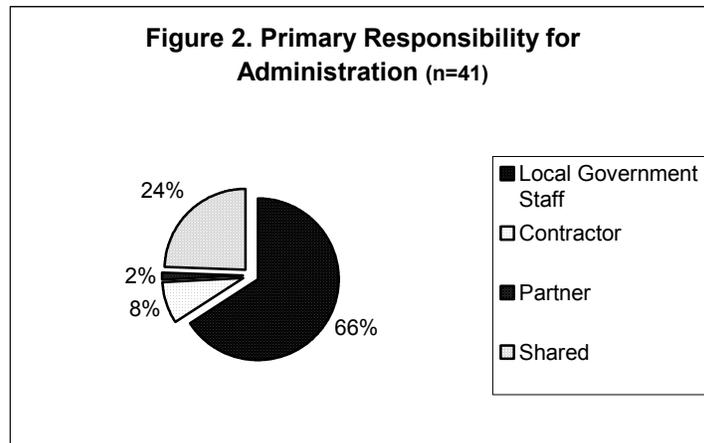


Electronics recycling programs are extremely diverse, and no two are exactly alike.

In addition to the six different program types defined above, electronics recycling services vary in the types of products accepted, who is allowed to participate, how responsibilities are divided among local government, contractors and partners, whether and how participants are charged and other factors. These differences are discussed in the remainder of this report.

Though responsibilities differ markedly, local government staff is usually responsible for administration, while contractors are usually responsible for operations.

As shown in Figure Two, local governments have primary responsibility for administration in 66% of programs, and share it (usually with a contractor) in an additional 24% of programs. Only rarely do contractors or partners have primary administrative responsibility. Administration includes planning, project management, promotion and tracking. As shown in Figure Three, contractors have primary responsibility for operations in 53% of programs and share it with local government and/or partners in an additional 16%. In 28% of programs, local government staff is primarily responsible for operations. Operations are defined to include site management and set-up, customer service, handling materials and operating collection equipment.

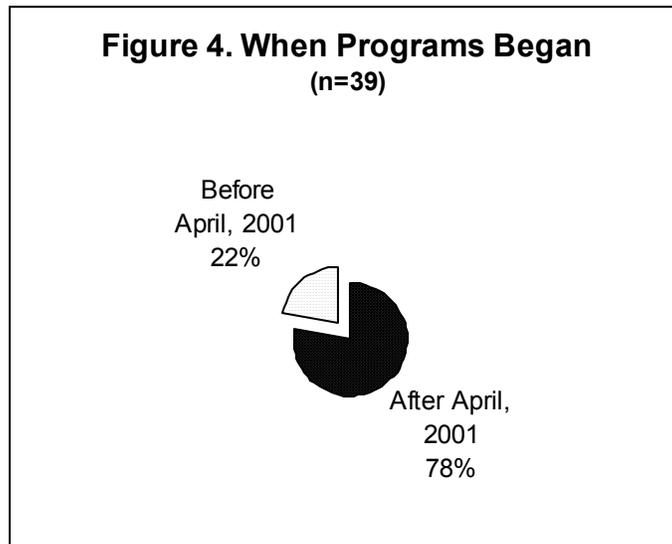


There is a trend towards full service contracting and away from partnering with charities for reuse services.

At least seven programs (17.1%) involved non-profit organizations as partners to identify and resell reusable products. At least three noted that they had, or planned to, stop working with charities as costs (to both partners and local governments) were proving prohibitive. Many programs are moving to a single contractor to handle all electronics processing and often collection and transportation responsibilities. At least two programs (in San Francisco and Santa Cruz) have programs that specifically target reuse by a range of partnering organizations.

California's local government electronics recycling programs are in their infancy and are evolving rapidly.

As shown in Figure Four, 32 (78%) of 41 programs reporting were begun since April 2001 (the beginning of the twelve month survey period). Many respondents commented that their programs were still developing, that they may expand significantly in the coming year, that they had not yet engaged in extensive education and outreach, and/or that they were still planning long-term programs. For these reasons, many cautioned against generalizing conclusions about cost and performance based on the limited experience to date.

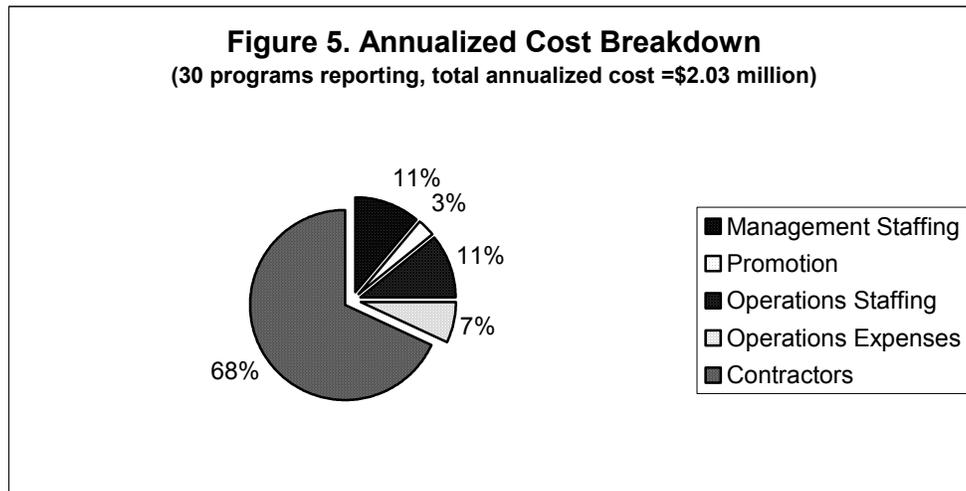


PROGRAM COSTS

Survey responses documented over \$2 million in costs, dominated by contractor expenses for collection, transportation and processing services.

Figure Five illustrates the breakdown of costs for 30 programs reporting both cost and amount recycled data (others were excluded from the analysis for consistency). These programs included 12 integrated drop-off programs (involving 25 facilities), eight mobile/special event programs (involving 24 events in total) and seven other types of programs. In aggregate, contractor costs account for 68% of total reported costs. This is

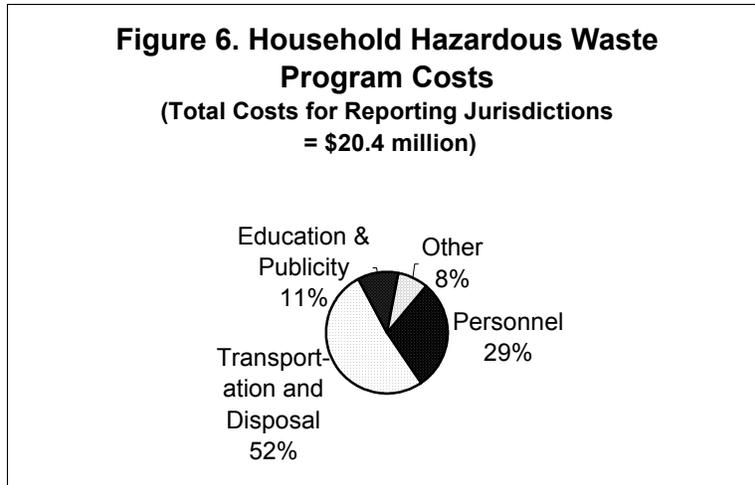
to be expected since virtually all programs were required to pay processors to accept collected products for recycling (see discussion of processing costs below). In addition, most programs involved substantial contractor responsibilities in operating collection programs and transportation. Only eight programs relied primarily on local government staff for the operating collection programs; for most other programs operations staffing costs were negligible. Only eleven programs listed promotional costs. Most respondents estimated management costs by estimating the amount of staff time involved during the course of planning and operating the program. Costs are likely underestimated, for example, since some respondents noted the difficulty of “guesstimating” many costs and several said they could not apportion costs of existing activities.



Notes: 1) Based on 30 programs for which both cost and amount collected data were reported. 2) Cost data for programs that operated for partial year were annualized.

The breakdown of costs for electronics is roughly similar to overall household hazardous waste management.

As seen in Figure Six, transportation and disposal makes up 52% of overall household hazardous waste (HHW) costs. These costs are a major part of the 68% contracting costs shown for electronics in Figure Five. Personnel for HHW, at 29%, is somewhat higher than the combined management and operations staffing for electronics, of 18%. Electronics promotion at 3% is lower than the 11% reported for overall HHW, but this may be due to some respondents not apportioning costs to electronics for that line item.



Note: Based on data submitted on Annual Form 303 reports in 2002 to the CIWMB, 113 local government agencies reporting.

Processing costs for CRTs average \$0.37 per pound or \$18.50 per unit.

As shown in Table One, 14 respondents reported processing costs per pound between \$0.10 and \$0.95, although ten of 13 responses were in the much narrower range of \$0.25 and \$0.38. Four respondents reported per unit processing costs of \$12 to \$25. Pricing varies sometimes by size of CRT and TVs are often charged a higher rate than computer monitors. Console TVs often carry a \$10 surcharge. Contractor pricing structures differ markedly, in part based on the allocation of responsibilities. One typical responder reported a processing cost of \$0.10 per pound, but they were using a collection and transportation contractor that lumped all costs together and charged \$0.25 per pound. Other contracts are structured to include both a fixed price for certain services plus a per unit or per pound charge.

Table 1. Cost of Processing CRTs

	\$ per pound	\$ per unit
Number Reporting	14	4
Average	\$0.37	\$18.50
Range	\$0.10 to \$0.95	\$12 to \$25

CRT processing pricing increased substantially immediately following the DTSC CRT disposal ban announcement.

Seven respondents said they previously had no CRT processing costs, but since the DTSC policy new per unit or per pound fees either had been instituted, or will be upon expiration of their current contract. One program experienced a very high cost of \$0.95 per pound immediately following the new policy announcement, but has since identified a far less expensive processing option. Some special/mobile event programs that have not run a program in several months may not have experienced the new pricing for processing yet.

The total cost of 25 integrated drop-off facilities operated in 12 jurisdictions was \$1.28 million, with an average, annualized cost per site of \$53,299.

Table Two breaks down costs reported by 12 jurisdiction that operate 24 drop-off facilities integrated with existing recycling, disposal, transfer and/or household hazardous waste facilities. The breakdown is similar to the overall cost breakdown presented in Figure Five, although operations staffing is somewhat higher at 15.3% of costs, reflecting the fact that disproportionately more local governments who staff their own programs operate drop-off facilities.

Table 2. Cost Breakdown – Integrated Drop-Off Programs

Cost Category	Total Reported Cost	Percent of Total	Annualized Total Cost	Annualized Percent of Total	Average Annualized Cost per Site
Management Staffing	\$28,225	3.3%	\$55,836	4.4%	\$2,326
Promotion	\$7,030	0.8%	\$15,340	1.2%	\$639
Operations Staffing	\$143,200	16.9%	\$195,791	15.3%	\$8,158
Operations Expenses	\$11,000	1.3%	\$23,000	1.8%	\$958
Contractors	\$657,228	77.6%	\$989,215	77.3%	\$41,217
Total Cost	\$846,683	100.0%	\$1,279,181	100.0%	\$53,299

Notes: 1) Based on 12 reported programs involving 25 different drop-off facilities.

The total cost of 24 mobile/special events operated by eight jurisdictions was \$377,939, averaging \$15,747 per event.

As shown in Table Three, operations staffing costs were lower than the overall average or for drop-off programs, reflecting higher use of contractors. And management and promotion costs were higher. One possible cause of this is that event managers may have had an easier time estimating these costs since they did not need to separate out a portion of costs related to other ongoing programs. Also, the City of Los Angeles reported eleven separate mobile/special events, but had no processing costs for five of these (until their pre-DTSC landfill ban contract expired). This serves to reduce processing costs and lower the average cost.

Table 3. Breakdown of Reported Costs - Mobile/Special Events

Cost Category	Total Reported Cost	Percent of Total	Average Cost Per Event
Management Staffing	\$115,171	30.5%	\$4,799
Promotion	\$47,000	12.4%	\$1,958
Operations Staffing	\$14,780	3.9%	\$616
Operations Expenses	\$103,543	27.4%	\$4,314
Contractors	\$97,445	25.8%	\$4,060
Total Cost	\$377,939	100.0%	\$15,747

Note: Based on eight reported programs involving 24 separate events.

A total of \$132,002 in costs was reported for programs other than drop off and mobile/special events.

Table Four breaks down costs for seven other programs reported by five jurisdictions. These included San Jose’s bulky item pick-up and neighborhood clean up programs; San Diego’s landfill load check and illegal disposal clean up programs, Santa Cruz County’s program to support small nonprofit and retail/repair shop program, and Marin County’s integrated drop off and annual mobile/special event (which could not be separated for data reporting purposes). Because of the diversity of these programs, no generalizations regarding the costs are offered.

Table 4. Cost Breakdown – Other Programs

Cost Category	Total Reported Cost	Percent of Total	Annualized Total Cost	Annualized Percent of Total
Management Staffing	\$18,020	13.7%	\$53,830	14.3%
Promotion	\$0	0.0%	\$0	0.0%
Operations Staffing	\$4,380	3.3%	\$8,520	2.3%
Operations Expenses	\$10,400	7.9%	\$16,280	4.3%
Contractors	\$99,202	75.2%	\$298,948	79.2%
Total Cost	\$132,002	100.0%	\$377,578	100.0%

Note: Based on seven programs reported in five jurisdictions.

PROGRAM FUNDING

All programs rely to some degree on existing solid waste, household hazardous waste and/or recycling budgets to fund electronics recycling programs.

Many commented that last year’s programs were particularly challenging because the new requirement became known well after funds had been budgeted and, in most cases, between opportunities to adjust rates or service contracts. In addition, two programs reported they received CIWMB grant funds. (Starting in 2001 the CIWMB made electronics a priority in its household hazardous waste grants programs and a high percentage of grant requests included electronics services. Although the specific dollar amount earmarked for electronics was not available, some \$9 million was requested with only \$3 million available during the 2002 cycle.

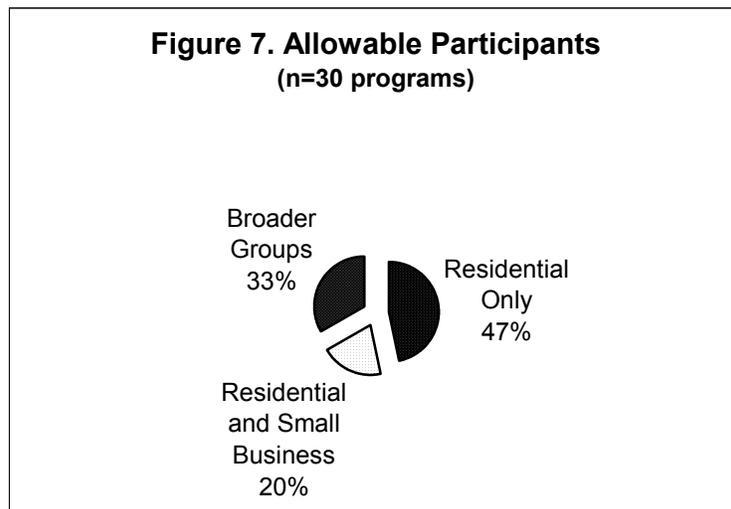
There is a trend towards initiating and/or increasing user fees for participants in electronics recycling services.

Eight programs (19.5%) reported they charged participants a fee to participate. The fee structures were all different. Fees ranged from \$10 to \$30 per CRT. One program allows the first CRT free and another allows two free CRTs before charging the fee. Four programs charge more for TVs than for monitors (and also for size), and one program charges an additional \$10 for console TVs. Several respondents commented that they will increase or begin to charge fees in the coming year.

PROGRAM RESULTS

Nearly half of programs target residential participants only, though most acknowledge some degree of participation by businesses, schools and other organizations.

As shown in Figure Seven, of 30 programs reporting, 14 (47%) are open to residential participants, 6 (20%) are open to individuals and small businesses and 10 (33%) are open to other groups as well, such as schools, non-profits and others. Sixteen programs (53%) specifically said they're open only to residents of the targeted jurisdictions. Several respondents commented that, in practice, these distinctions are not critical as there is a variety of participants and, through pricing structures, businesses can be discouraged.



The number of participants in electronics collection programs can vary tremendously.

Table Five lists the number of participants for the 13 programs reporting this information. The City of San Diego experienced the highest reported number of participants at 3,878 for two special/mobile events, including 2900 at one event. City of Los Angeles has the highest overall number of participants at 5,336 vehicles over eleven events.

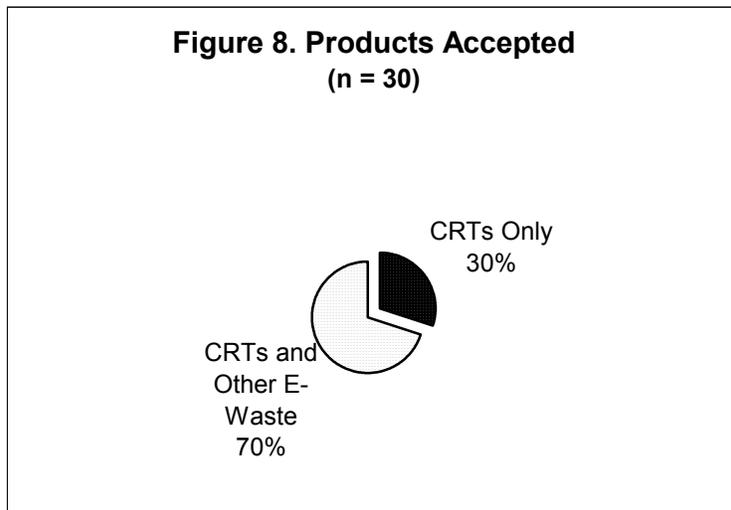
Table 5. Number of Participants Reported

Jurisdiction	Type of Program	Number of Participants Reported
Central Contra Costa Waste Authority	Two mobile drop-off events.	350 vehicles
City of Berkeley	Drop-off at transfer station.	727 vehicles
City of Los Angeles	Eleven special/mobile events.	5336 vehicles
City of Lakewood	Mobile/special event.	161 vehicles
City of Oxnard	Drop-off at transfer station.	4,060 participants (6 months)
City of Torrance	Three mobile/special events.	2330 participants (over 3 years)
City of San Diego	Two mobile/special events.	3878 vehicles
City of Glendale	Curbside and drop-off at recycling center.	About 75 participants per month

City of Novato	Drop-off at HHW/recycling center.	145 participants (8 months)
Del Norte Solid Waste Authority	One mobile/special event.	500 vehicles plus 6 businesses
Tulare County	One mobile/special event.	318 vehicles
Yuba-Sutter Regional Waste Mgt Authority	Drop-off at transfer station.	106 vehicles (5 months)
San Bernadino County	Five mobile/special events.	About 1,000 participants

Most programs accept a wide range of electronics products.

As shown in Figure Eight, of thirty reporting programs, nine (30%) accept only CRTs while 21 (70%) accept other electronics products as well, such as CPUs, computer peripherals and other miscellaneous products.



Programs reported a total of over 1.1 million pounds and 31,000 items collected.

Table Six shows how programs reported amount collected. The reuse statistics for programs reporting in pounds is influenced by the City of Los Angeles, which reported a much higher percentage of reuse than other jurisdictions. In Table Seven these data have been normalized by converting units to pounds and by annualizing figures for programs that operated only part of the year. This estimates that, at the rate all programs were performing, they would have collected a total of over 4.5 million pounds, with over two-thirds being CRTs.

Table 6. Summary of Reported Amounts Collected

Description of Programs Reporting	Programs Reporting Pounds			Programs Reporting No. Items		
	Recycled	Reused	Total	Recycled	Reused	Total
	7 integrated drop-off programs, 6 special/mobile programs and 2 other programs			8 integrated drop-off programs, 3 mobile/special programs and 3 other programs		
Monitors	215,267	68,959	284,226	14,664	983	15,647
TVs	161,309	43,225	204,534	10,949	99	11,048
Monitors and TVs Reported Together	669,627	805	670,432	4,488	0	4,488
Subtotal, CRTs	1,046,203	112,989	1,159,192	30,101	1,082	31,183
Other Electronics	396,619	113,139	509,758	9,480	394	9,874
Total - All Products	1,442,822	226,128	1,668,950	39,581	1,476	41,057

Table 7. Normalized and Annualized Amount Collected

Product Type as Reported	Normalized Pounds Collected	Normalized and Annualized Pounds Collected
Monitors	758,330	881,109
TVs	756,934	978,439
Monitors and TVs Reported Together	809,168	1,784,144
Total CRTs	2,324,433	3,643,693
Non-CRT E-Waste	808,940	874,385
Total CRTs and E-Waste	3,133,373	4,518,077

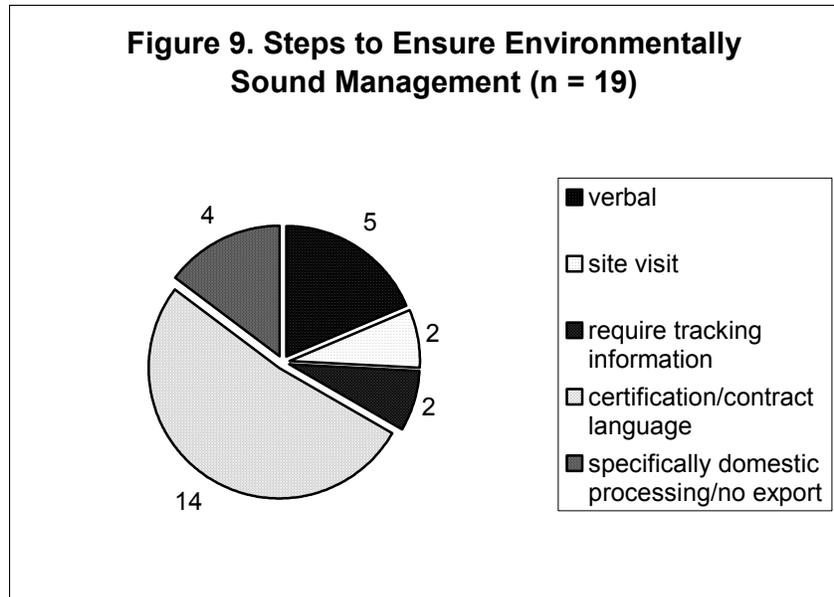
Note: Data from Table 6 have been normalized by, where necessary, annualizing partial year figures and by converting units to pounds using the conversion factors cited in “Selected E-Waste Diversion in California: A Baseline Study,” prepared for the CIWMB, November, 2001, page 6. (TV = 50lb.s, monitors and CPUs = 30.3 lb.s)

Electronics collections have the potential to significantly increase overall household hazardous waste collections.

The 4.5 million pounds per year collected correspond to a covered population of 13.3 million, for a per capita recovery rate of 0.34, 29% of the average collection rate for household hazardous waste as a whole (based on the 2001 Form 303 reports compiled by CIWMB). In the most recent reporting year of 2001, jurisdictions reported collection of “other” HHW types (presumably including electronics) of only 3.2% of total collections. Overall HHW collections have increased 216% since 1994, and electronics collection appears likely to cause an even steeper spike in this trend in 2002 and 2003.

Seventy-six percent of responding jurisdictions took specific steps to ensure collected electronics are handled in an environmentally sound manner.

As shown in Figure Nine, of nineteen respondents who said they took specific steps, fourteen secured some type of written assurance (either in contract language, vendor certification or other), five asked for verbal assurances, four specifically required that processing be done domestically (or conversely, forbade export), two conducted site visits and two required tracking information in writing on where collected products were transported. (The numbers do not add up to 19 because some jurisdictions reported more than one step.)



Note: Figures do not add to 19 since some respondents reported more than one step.

ANALYSIS OF COST EFFECTIVENESS

The overall cost per pound based on last year's performance was \$0.45. As shown in Table Eight, the rates for specific program types varied from \$0.29 for mobile/special to \$0.55 for integrated drop off programs. The overall average cost is in the middle of the range of cost estimates developed by the US Environmental Protection Agency for the NEPSI process of \$0.36 to \$0.68 for monitors and TVs, \$0.46 to \$0.68 for peripherals and \$0.05 to \$0.41 for CPUs.³ The mobile/drop-off cost estimate is below the low end of EPA's estimates.

Table 8. Summary of Normalized Program Cost and Effectiveness

Type of Program	Number of Programs Reporting Costs and Collection	Total Annualized Cost	Total Normalized, Annualized, Lb.s Collected	Cost/Lb. Collected	Population Covered	Cost per Capita Covered	Lb. per Capita Covered
Integrated Drop-Off Programs	12 responses, 25 facilities	\$1,279,181	2,511,714	\$0.51	6,308,000	\$0.20	0.40
Mobile/Special Programs	8 responses, 24 events	\$377,939	1,319,270	\$0.29	6,980,950	\$0.05	0.19
Other Programs	5 responses, 7 programs	\$377,578	687,093	\$0.55	3,779,050	\$0.10	0.18
All Responses		\$2,034,698	4,518,077	\$0.45	13,305,800	\$0.15	0.34

Note: Based on 30 programs reporting both cost and amount data. Population figures do not add because of overlap in program coverage.

In absolute terms, costs per capita covered by the programs are very low at 20 cents or less per year.

This figure may be deceptively low since the programs are assumed to be operating at a small fraction of their potential and, as previously discussed, few have been aggressively promoted or are fully developed.

The programs captured an average of 0.34 pounds per capita covered.

The pounds per capita ranged from 0.18 for the “other” programs category and 0.40 for integrated drop off programs. This compares with an average of 0.39 pounds per capita reported by the Northeast Recycling Council.⁴

SUGGESTIONS TO DECISION MAKERS

Examples of suggestions for local program managers based on lessons learned.

- Using a recycling processor is cheaper than a charity for reuse. Few charities can continue to handle CRTs without support due to increased disposal costs.
- Evaluate participation fees carefully. Some residents will go to great lengths not to pay a fee. Offering curbside service is a good way to reduce illegal dumping.
- Calculate fees based on actual waste stream. Plan for more TVs than monitors (especially by weight rather than number of units) and plan for the extra cost of console TVs.
- Take the time to find the best vendor and the best contractual terms. Use a competitive bid process. Use a single contract rather than separate contracts for different tasks (e.g., collection site, packaging, transportation, processing).
- Work with neighboring communities to reduce costs.

Examples of barriers to anticipate.

- Virtually every respondent mentioned cost, budgeting limitations and/or lack of available funding mechanisms.
- Lack of collection and processing infrastructure.
- Lack of space for storing at drop-off facilities.
- Poor design-for-recycling that increases disassembly costs.
- Implementing proper disposal procedures.
- Low public awareness that CRTs are hazardous.
- Finding economically feasible, safe and reliable markets.
- No staff, need for staff training.

Some suggestions for the ideal NEPSI outcome.

All 26 responses to this question emphasized the need for a front-end funding mechanism, whether assessed on consumers at point of sale or through some other product chain source. Of these 26 responses, seven emphasized the need for producers to be fully responsible for both funding and operating collection programs. The remaining 17 responses emphasized the need for shared responsibility models that reimburse local governments for all their costs. Two mentioned the potential for local ordinances if state or national initiatives are not undertaken. Here are some examples:

- Take local governments out of the equation. Have consumers pay at point of purchase.
- Local governments should be reimbursed directly for actual program costs, not on a grant basis.
- Initially any agreement would be great. We need a shared approach to funding and to encourage recycling.
- Manufacturers should establish a structure to provide funding for local programs. A program similar to the California beverage container redemption or used oil program programs would be good.
- National deposit system on all electronics that fully internalizes all externalities and has proper incentives. Commitment to solve problem internationally as well.
- At least 50% cooperation.

Suggestions for state and federal decision makers.

Again, the vast majority of responses encouraged adopting a state front-end fee, achieving a similar result through NEPSI and/or otherwise providing funding to local governments. Other examples include:

- Classify e-waste as a universal, not a hazardous waste.
- DTSC should provide electronic version of their required local program registration.
- More engagement between CIWMB and DTSC. Sudden changes cause more problems than they solve. Changes should be phased (like universal wastes).
- Publish a list of appropriate, sound markets.

NOTES

¹ These included surveys of electronics recycling programs conducted by the Northeast Recycling Council, the Minnesota Office of Environmental Assistance, the National Electronics Product Stewardship Initiative, the US Environmental Protection Agency – Region III and the County of Fresno.

² The conversion factors used were 50 lb.s per TV, 30.3 lb.s per computer monitor and 30.3 lb.s per CPU and other peripheral. These are taken from the “Baseline Diversion Study” prepared for the CIWMB by MGT Consulting.

³ Obtained through telephone communication with USEPA staff, September 2002. These cost estimates were derived in part from surveys completed by the Minnesota Office of Environmental Assistance, the Northeast Recycling Council and a survey of recycling processors.

⁴ “Setting Up and Operating an Electronics Recycling and Reuse Program: A Manual for Municipalities and Counties.” Northeast Recycling Council, October, 2001.

**APPENDIX A. LIST OF PROGRAMS DOCUMENTED IN SURVEY
RESPONSES**

Jurisdiction	Program Description	Total Population Served	Date first initiated
Orange County	Four drop-off programs integrated with four existing HHW facilities.	2,925,700	March-02
Central Costa County SW Authority	One drop-off program integrated with a transfer station.		January-02
	On-call services to residences.	167,250	
	Curbside by appointment.		May-00
	Two mobile/special events.		April-01
San Joaquin County	Three drop-off programs integrated with a recycling center, transfer station and a disposal facility.	583,700	June-01
City of San Jose	Curbside (small appliances - no electronics data available).	918,800	July-93
	On-call bulky item pick-up.		January-02
City of Berkeley	54 Neighborhood Clean Up Events.		
	Drop-off integrated with a transfer station.	104,300	May-01
City of Los Angeles	Eleven mobile/special events held in conjunction with HHW.	3,802,700	November-00
City of Santa Monica	Drop-off program integrated at existing recycling center/transfer station.	86,200	November-00
City of Lakewood	Mobile/special event.	81,100	February-02
City of Oxnard	Drop-off program integrated at MRF.	177,700	November-00
Marin County Hazardous and Solid Waste JPA	Drop-off program integrated with existing HHW site.	201,700	August-02
	Annual mobile/special event for rural residents.		
City of Torrance	Mobile/special event.	140,900	April-00
City of Antioch	Curbside.	93,800	January-02
City of San Diego	Mobile/special event.		January-02
City of San Diego	Landfill load check.		December-02
City of San Diego	Illegal dumping clean up.	1,250,700	
City of San Diego	Drop-off program integrated with existing recycling center.		January-02
City of Glendale	Drop-off program integrated with existing recycling center.	199,000	January-02
	Curbside.		
Tuolumne County	Three drop-off programs integrated at existing transfer and disposal sites.	55,200	October-02
Novato Sanitary District	Drop-off program integrated at an existing HHW/recycling center.	48,700	August-01
County of Santa Cruz	Two drop-off programs integrated with a landfill and a transfer station.	157,150	August-02
County of Santa Cruz	Support for drop-off services at community partners (retailers, repair shops, nonprofits).		February-02
Del Norte Solid Waste Mgt Authority	Mobile/special event.	28,100	June-00
San Francisco	Drop-off program integrated with transfer station; bulky item collection; illegal dumping clean up; 2 mobile/special events; support for private drop-off services.	793,700	
Tulare County	Mobile/special event.	377,500	April-02

Yuba Sutter Regional Waste Mgt Authority	Drop off program integrated with transfer station. Load checking at transfer station.	141,700	July-01
Butte County	Drop-off program integrated at HHW facility.	205,800	
County of San Bernadino	Five mobile/special events.	1,132,700	November-02
Sonoma County	6 drop-off programs integrated at disposal/transfer sites	468,800	February-02
Sonoma County	Support for local recyclers.		