City of Alameda zero waste implementation plan

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TABLE OF CONTENTS

TABLE OF FIGURES

List of Acronyms, Abbreviations and Definitions

AB 32	The Global Warming Solutions Act of 2006
AB 939	The California Integrated Waste Management Act of 1989 Public Resources Code, Section 40000 et seq.
AUSD	Alameda Unified School District
CalRecycle	California Department of Resources Recycling and Recovery, the successor agency to the CIWMB
CASA	Community Action for a Sustainable Alameda
C&D	Construction and demolition debris
CHaRM	Center for Hard to Recycle Materials
City	"City" refers to the government agency of the City of Alameda; "city" refers to the geographical area of the City of Alameda.
CIWMB	California Integrated Waste Management Board
CRV	California Redemption Value
DOC	California Department of Conservation
EPA	Environmental Protection Agency
GHG	Greenhouse Gas
HHW	Household Hazardous Waste
Measure D	The Alameda County Source Reduction and Recycling Initiative of 1990
MRF	Material Recovery Facility
MSW	Municipal solid waste
MTCE	Metric tons of carbon equivalent
$MTCO_2E$	Metric tons of carbon dioxide equivalent
Organics	The term used by the City of Alameda's Integrated Waste Program to broadly describe the materials collected from residential, commercial or industrial sources before they are delivered to the commercial composting facility. The waste types defined within "organics" are "leaves and grasses", "pruning and trimmings", "branches", "discarded food scraps", and "food soiled paper." This includes plant materials from the maintenance of residents, offices, commercial or industrial properties or agricultural sources and food material resulting from the processing, storage, preparation, cooking, handling or consumption of food.
Residual waste	The term used for solid waste remaining in the gray cart for disposal

Solid waste	The term used for all discarded materials, as set forth in the California Public Resources Code, Section 40191
State	State of California
Stopwaste.org	Alameda County Waste Management Authority and Source Reduction and Recycling Board
U.S. (or US)	United States
WARM	WAste Reduction Model

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Executive Summary

What is zero waste?

Zero waste is a philosophy and design framework that promotes not only reuse, recycling, and conservation programs, but also, and more importantly, emphasizes sustainability by considering the entire life-cycle of products, processes, and systems.

This comprehensive systems-approach promotes waste prevention by:

- Having products and packaging designed for the environment,
- Reducing the materials used in products and packaging,
- Using less toxic, more benign materials in production and manufacturing,
- Providing longer product lives by developing more durable products, and
- Having products that are repairable and easily disassembled at the end of their useful life.

Why this plan?

In spring 2009, the City of Alameda began a planning process to identify the policies, programs, and facilities that will be needed to achieve zero waste. The Zero Waste Implementation Plan is the beginning of a long-term systematic effort to:

- Reduce the overall solid waste generated within the city
- Reduce the quantity of solid waste generated per person within the city
- Increase the quantity of recyclable and compostable materials diverted from landfills
- Support state and federal efforts to build the environmental and social costs into the price of products and packaging and require manufacturers to take back products at the end of their useful life.

A driving force behind the development of the plan is the City's Local Action Plan for Climate Protection, which was accepted by the City Council in February, 2008. The Local Action Plan listed zero waste initiatives, including the development of this plan, as top priorities for reaching the City's goals to reduce the citywide greenhouse gas emissions to 25 percent below 2005 levels by the year 2020.

The city has already met and exceeded the State's ambitious 50 percent recycling goal and achieved 67 percent diversion in 2008. The city is now poised to move beyond "waste management" to envisioning a world without waste.

Who participated in the development of this plan?

The plan was prepared by the City of Alameda Public Works Department with input from:

- **The City Green Team** – formed to oversee the implementation of the City's greenhouse gas emissions reduction strategies identified in the Local Action Plan;
- **Community Action for a Sustainable Alameda** – formed as a community-wide coalition to raise awareness, mobilize community action, and help implement programs to achieve the goals of the Local Action Plan; and
- **Business representatives**, **school representatives, and community members,** all identified as stakeholders in the planning process, who participated in the City's zero waste workshops held in 2009 on:
  - March 12th
  - April 25th
  - June 11th
  - August 19th

What does the plan do?

This plan describes the policies and programs that could be implemented to achieve the City's goal of zero waste, with an interim step of 75 percent diversion[1].

To understand the effectiveness of the zero waste policies and programs identified by the stakeholders, the City estimated the diversion potential of the following key initiatives.

- Add materials to the recycling (blue) and organics[2] (green) carts--targeting residential and commercial generators
- Undertake a social marketing[3] campaign--targeting all generator sectors
- Advocate for producer responsibility at the state level and work with local retailers to increase take-back programs--targeting all generator sectors
- Increase commercial technical assistance--targeting commercial generators
- Increase construction and demolition debris (C&D) ordinance requirements and increase C&D technical assistance--targeting roll-off and self-haul generators

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[1] In 1990, the voters of Alameda County passed the Alameda County Source Reduction and Recycling Initiative which set a goal of 75 percent diversion from landfills. The Alameda City Council adopted the 75 percent goal in May 2008.

[2] The term used by the City of Alameda's Integrated Waste Program to broadly describe the materials collected from residential, commercial or industrial sources before they are delivered to the commercial composting facility.

[3] "Social marketing" is a community-based approach for raising awareness to encourage behavior change using stakeholder or social groups to test, pilot, improve, and implement new programs.

- Support disposal bans--targeting roll-off[4] and self-haul generators
- Process residual waste - MRF first[5]--targeting all generators

What do we generate?

"Generation" is the sum of tons diverted plus tons disposed, and is used to determine the diversion rate.

Generation = Disposal + Diversion

In 2008, the city generated over 146,000 tons of materials that were either diverted or disposed. Over 48,000 tons were disposed in landfills and 98,000 tons were diverted from disposal through waste prevention, recycling, and composting[6].

What is waste?

To plan for zero waste, we first need to understand what we throw away. Figure 1 shows the composition of the city's disposed waste based on the results of the 2008 Alameda County Waste Characterization Study conducted by Stopwaste.org. Seventy-nine percent of what is currently disposed could be recycled or composted. Twenty-one percent of what is currently disposed can't be recycled or composted.

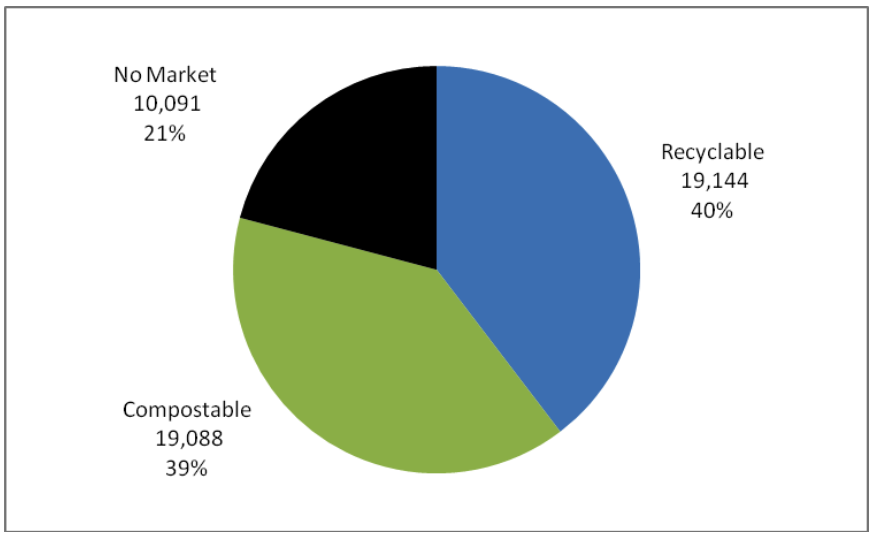
Recyclable materials include: paper, plastic, metals, glass, and construction and demolition materials.
Compostable materials include: food scraps, yard trimmings, and compostable paper.
No market materials (those that can't be recycled) include: treated wood, composite materials and diapers.

[4] "Roll-off generators" are generators of large amounts of materials, such as construction debris, that are collected in large 20 to 40 cubic yard debris boxes and serviced by a roll-off truck (the debris box is rolled onto and off of the truck for disposal).

[5] "MRF" stands for Material Recovery Facility, a facility that processes materials and separates recyclable and compostable materials from solid waste.

[6] "Composting" is the controlled biological decomposition of organic material.

Figure 1 2008 Alameda Citywide Disposed Waste (in tons and percent)[7]



Recommended Programs

Stakeholders at the zero waste workshops supported a phased approach where increased outreach and technical assistance would be provided prior to mandatory requirements. Figure 2 describes the diversion results based on three scenarios that build upon each other:

- **Increasing voluntary programs**--adding materials to the blue and green carts, undertaking social marketing, advocating for producer responsibility, increasing commercial technical assistance, and streamlining implementation of the City's existing C&D ordinance
- **Implementing mandatory requirements**--including mandatory recycling, product bans, (for hard-to-recycle materials like plastic bags) and disposal bans (for recyclable materials like cardboard)
- **Processing residual waste**--processing all solid waste (placed in the gray cart) prior to landfilling.

[7] "Recyclable" materials include: paper, plastic, metals, glass, and construction and demolition materials. "Compostable" materials include: food scraps, yard trimmings, and compostable paper. "No market" materials (those that can't be recycled) include: treated wood, composite materials and diapers.

Figure 2 Diversion Estimates by Scenario[8]

	Baseline (existing programs)	Increasing voluntary programs	Adding mandatory requirements	Add residual waste processing[9]
Diversion (tons)	98,108	112,199	122,054	130,260
Disposal (tons)	48,323	34,231	24,376	16,170
Diversion rate	67%	77%	83%	89%

The diversion rates are presented as a snap shot in time assuming the programs are fully implemented. In reality, policies and programs will be developed over time through additional research, testing, and pilot programs before the programs are fully implemented. Several policies will require new ordinances and regulations which will require City Council action and time to implement. Based on this analysis, the city can achieve 89 percent diversion, a very high rate of diversion, by implementing the policies and programs identified by the stakeholders.

Based on these diversion rates, the project team calculated the greenhouse gas reduction potential of the scenarios using the U.S. EPA WAste Reduction Model (WARM) to estimate greenhouse gas reduction based on material types and amounts diverted. The potential greenhouse gas reduction estimates are presented in Figure 3.

Figure 3 Greenhouse Gas Reduction Estimates by Scenario

	Increasing voluntary programs	Adding mandatory requirements	Add residual waste processing
$MTCO_2E$[1]	(24,120)	(38,374)	(44,424)
Equivalent number of cars removed from the road	4,418	7,028	8,137

[1]Metric Tons of Carbon Dioxide Equivalent

Greenhouse gas emissions are presented using metric tons of carbon dioxide equivalent, because carbon dioxide is the most common greenhouse gas. The programs and policies identified in this plan will also reduce the emissions of other greenhouse gases, such as methane and nitrous oxide[10].

[8] Assumptions by program and material type are included in Appendix D.

[9] "Residual waste processing" means separating recyclable and compostable materials from solid waste at a mixed waste material recovery facility prior to landfilling.

[10] Methane is created in landfills when materials decompose in the absence of oxygen. Nitrous oxide is created when materials or gas is burned for energy. Methane has 25 times (and nitrous oxide has 296 times) the global warming potential of carbon dioxide, meaning

The Local Action Plan estimated that the city could achieve a reduction of 44,114 metric tons of carbon dioxide equivalent ($MTCO_2E$) by implementing zero waste initiatives. This is very close to the estimates made using the assumptions and calculations included in this plan. Based on this analysis, the city can achieve a reduction of 44,424 $MTCO_2E$, by implementing all of the policies and programs identified by the stakeholders.

What will these policies and programs cost?

Many of the policies and programs recommended in this plan can be implemented by the City without increasing staff resources. However, new staff or contractor resources will be needed to provide zero waste outreach; technical assistance to commercial businesses, multi-family complexes, and City departments; organics technical assistance; and the development of zero waste policy initiatives.

This plan assumes additional processing capacity would be developed at existing solid waste facilities, such as the regional transfer station and material recovery facilities. For planning purposes an incremental increase of $50 per ton[11] for processing the residual waste is assumed. Figure 4 summarizes the estimated costs for implementing zero waste programs.

Figure 4 Zero Waste Program Cost Estimates (2010 $)

Program	Annual Cost	Cost per household or business establishment per month
New materials[1]	$80,000	$0.19
Social Marketing	$85,000	$0.20
Producer Responsibility	$5,000	$0.01
Commercial Technical Assistance[2]	$85,000	$0.20
Total costs for voluntary programs	**$255,000**	**$0.60[5]**
C&D Ordinance	$0	$0
Mandatory Requirements[3]	$0	$0
Total costs including voluntary and mandatory programs	**$255,000**	**$0.60[5]**
Residual Waste Processing[4]	$1,000,000	$2.40
Total costs at full implementation of programs and facilities	**$1,255,000**	**$3.00[6]**

[1]Assumes $3.15 per ton increase in green cart processing and transportation costs for 25,000 tons per year. No net new costs for handling more plastics are assumed.

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that it has 25 times the impact of carbon dioxide in the atmosphere. Source: Intergovernmental Panel on Climate Change, Fourth Assessment Report, 2007, http://www.ipcc.ch/ (accessed February 10, 2010).

[11] Based on an industry average tipping fee of $120 per ton for processing at a mixed waste MRF and subtracting the $70 per ton that the City currently pays for disposal.

[2]Assumes one additional part-time staff person hired by the City or ACI.
[3]Assumes current levels of City and ACI staff to address compliance issues.
[4]Assumes $50 per ton increase in gray cart processing costs for 20,000 tons per year.
[5]This represents a 2% increase for standard residential 32-gallon service.
[6]This represents a 10% increase for standard residential 32-gallon service.

What else does the plan cover?

The plan is organized as follows:

Section 1 Introduction and Background – Provides the planning context for the plan and describes the relationship between the zero waste plan and the Local Action Plan for Climate Protection.

Section 2 Existing Programs and Infrastructure – Describes the existing waste prevention, recycling, and composting programs and the facilities that are used to manage materials generated in the city.

Section 3 Stakeholder Outreach and Input – Describes the process that the City undertook to solicit input from stakeholders in the city and lists the policies and programs discussed by the stakeholders.

Section 4 Policy and Program Analysis – Discusses the policies and programs analyzed for the plan, the City Department diversion opportunities, and the Alameda Unified School District Green Schools Challenge.

Section 5 Facility and Technology Options – Discusses community scale and regional scale facilities and technology options.

Section 6 Diversion Results and Greenhouse Gas Reduction Potential – Provides the results of the analysis of the diversion potential and greenhouse gas reduction potential of the zero waste policies and programs.

Section 7 Cost Estimates for Implementating Zero Waste Programs – Presents the cost estimates for implementing the zero waste policies and programs.

Section 8 Implementation Plan – Includes the tasks necessary to undertake the Zero Waste Implementation Plan, including the action steps, and an implementation schedule.

Appendix A Community Survey Results – Compilation of the results of the surveys distributed at community events to obtain input on the Zero Waste Implementation Plan.

Appendix B Model Ordinances, Draft Code Amendments, and Contract Amendments – Sample ordinances and draft code amendments and contract amendments that may be needed to implement the zero waste plan.

Appendix C Community and Regional Scale Facilities – Description of local community scale facilities, regional recycling and composting facilities, and mixed waste processing technologies.

Appendix D Diversion and Greenhouse Gas Calculations – Calculations and assumptions for the diversion and greenhouse gas emissions reduction estimates.

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Section 1 Introduction and Background

Why this plan?

In spring 2009, the City of Alameda began a planning process to identify the new policies, programs, and facilities needed to achieve zero waste.

The City of Alameda has been a leader in implementing innovative recycling and organics diversion programs. For example, Alameda became:

Eco-Fact: Alamedans dispose of about 3.8 pounds of waste per person per day compared to the statewide average of 5.1 pounds per person per day.
--CIWMB, 2008

- The **first** city in Alameda County to implement single-stream recycling in 1997
- The **first** city in Alameda County to implement food scrap recycling in 2002
- One of the **first** cities in Alameda County to implement a comprehensive construction and demolition debris diversion program in 2002
- One of the **first** cities in California to adopt a Climate Protection Local Action Plan in 2008.

Several policy drivers have motivated the City toward diverting waste from landfills:

- Assembly Bill 939, The California Integrated Waste Management Act of 1989 (AB 939)[12] required cities and counties to reach 25 percent diversion from landfills by 1995 and 50 percent by 2000. The City has met and exceeded these ambitious goals achieving 48 percent diversion in 1995 and 65 percent diversion in 2000.
- Measure D, the Alameda County Source Reduction and Recycling Initiative of 1990[13], created a six dollar per ton[14] landfill surcharge to fund recycling programs countywide and set further goals of 75 percent diversion and ultimate sustainability. The Alameda County Recycling Board, part of the Stopwaste.org countywide agency that oversees the implementation of Measure D, has set the goal date of 2010 for reaching 75 percent diversion.

Now there is increased urgency for the City to achieve even higher rates of diversion:

- Assembly Bill 32, The Global Warming Solutions Act of 2006 (AB 32)[15], makes a commitment to reduce the state's greenhouse gas emissions to 1990 levels by 2020, which is a reduction of approximately 25 percent from the expected emissions in the absence of regulation.

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[12] History of AB 939 http://www.ciwmb.ca.gov/Statutes/Legislation/CalHist/1985to1989.htm (accessed October 15, 2009)

[13] Text of Measure D http://www.stopwaste.org/docs/measure-d.pdf (accessed October 15, 2009)

[14]The fee is adjusted for inflation and was set at $8.17 per ton as of January 1, 2010.

[15] Text of AB 32 http://www.arb.ca.gov/cc/docs/ab32text.pdf (accessed October 15, 2009)

- Waste prevention and recycling have been identified as key strategies for reducing greenhouse gas emissions.
- The City's Local Action Plan for Climate Protection[16], prepared in 2008, listed zero waste initiatives, including the development of this plan, as top priorities for reaching the City's goals to reduce the citywide greenhouse gas emissions to 25 percent below 2005 levels by the year 2020.

This Zero Waste Implementation Plan was prepared by the City of Alameda Public Works Department, which is responsible for managing the City's waste prevention, recycling and composting programs. The planning process was initiated in the spring of 2009, with a series of workshops to elicit input from a cross-section of stakeholders within the city to develop goals and objectives, and identify potential policies and programs for achieving zero waste. This plan is the beginning of a long-term systematic effort to:

- Reduce the overall solid waste generated within the city
- Reduce the quantity of solid waste generated per person within the city
- Increase the quantity of recyclable and compostable materials diverted from landfills
- Support state and federal efforts to build the environmental and social costs into the price of products and packaging; and require manufacturers to take back products at the end of their useful life

What is zero waste?

As defined by the Grassroots Recycling Network[17], zero waste is a design principle that goes beyond recycling and focuses first on reducing wastes, reusing and recycling products, and then, composting the rest. Zero waste promotes not only reuse, recycling, and conservation programs, but also, and more importantly, emphasizes sustainability by considering the entire life-cycle of products, processes, and systems. As illustrated in Figure 5, zero waste systems strive to eliminate waste by reducing consumption and getting products and packaging redesigned for reuse and repair, and then recycled back into the marketplace or composted back into soil.

The Zero Waste International Alliance has developed a peer-reviewed, internationally accepted definition:

> Zero waste is a goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. Zero waste means designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury

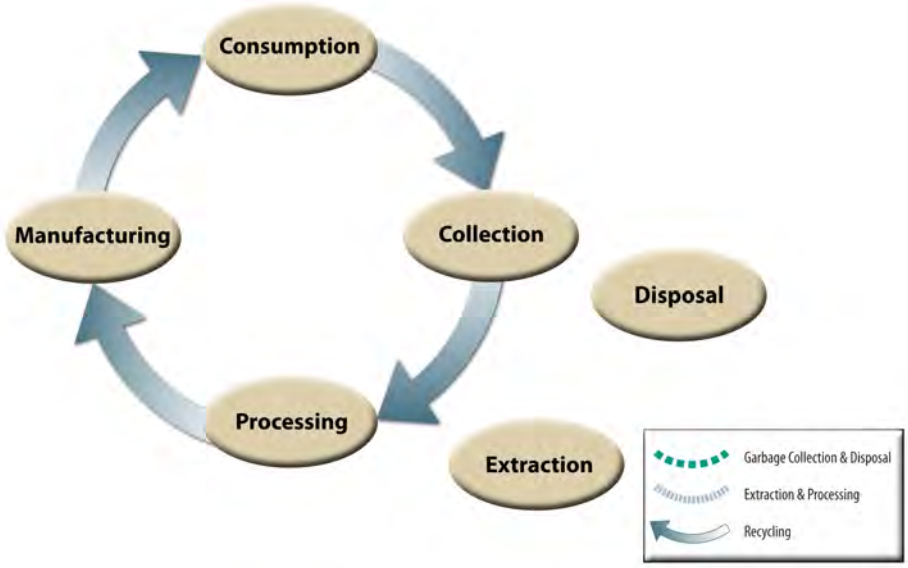
[16] Text of the Local Action Plan http://www.ci.alameda.ca.us/community/climate_protection.html (accessed October 15, 2009)

[17] Grassroots Recycling Network, What is Zero Waste? http://www.grrn.org/zerowaste/zerowaste_faq.html (accessed August 10, 2009)

them. Implementing zero waste will eliminate all discharges to land, water, or air that may be a threat to planetary, human, animal or plant health.[18]

In this report, we will use the term "zero waste" to mean both reducing waste at the source and maximizing diversion from landfills, with the overall goal of striving for zero waste.

Figure 4 The Zero Waste Loop



Zero Waste Initiatives

Zero waste is not a literal goal like "100 percent recycling"; there will be some materials that cannot be recycled or designed out of the system. However, the vision of zero waste is to strive for sustainability through the following key initiatives:

- **Whole System Approach**. The concept of "zero waste" takes a whole system approach where producers and consumers consider the ultimate disposal of products and packaging. Products and packaging are reduced in toxicity and volume and designed for recycling or composting.
- **Reducing the Amount of Consumption**. To achieve sustainability, producers and consumers need to reduce the amount of consumption of natural resources. The City can encourage this through outreach, education, and social marketing, where peer groups work together to solve problems and create solutions.

[18] Zero Waste International Alliance, Zero Waste Definition, http://www.zwia.org/standards.html (accessed August 10, 2009)

- **Minimize Waste and Maximize Recycling**. Residents and businesses in the city can achieve zero waste goals by maximizing recycling and minimizing waste generation. The City can encourage this initiative by providing convenient and accessible recycling and composting programs. If voluntary measures are not adequate, the City may need to require residents and businesses to participate in recycling and composting programs.
- **Producer Responsibility**. The City can support state and federal efforts to build the environmental and social costs into the price of products and packaging and then require manufacturers to take back products at the end of their useful life. The City can do this by supporting groups like the California Product Stewardship Council[19]. The mission of the California Product Stewardship Council is to shift California's product waste management system from one focused on government funded and ratepayer financed waste diversion to one that relies on producer responsibility in order to reduce public cost and drive improvements in product design that promote environmental sustainability. One of the initiatives of the California Product Stewardship Council is to implement producer responsibility at the state level.

Greenhouse Gas Reduction Potential

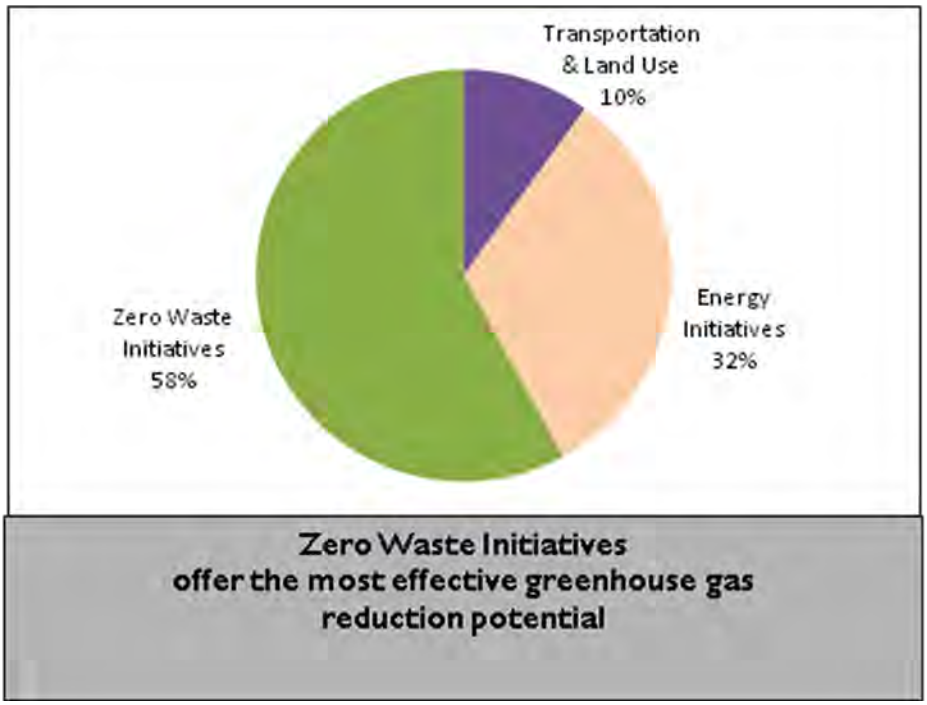
Local Action Plan for Climate Protection

As described in the 2008 Local Action Plan and presented in Figure 6, zero waste initiatives could account for as much as 58 percent of the citywide greenhouse gas reduction potential. Therefore, to meet the City's greenhouse gas emissions reduction targets, achievement of zero waste goals is essential. Zero waste initiatives recommended in the Local Action Plan included:

- A ban on polystyrene foam to-go containers (this was enacted in January 2008).
- A stronger environmental purchasing policy.
- A stronger construction and demolition ordinance.
- Working with the Alameda Unified School District (AUSD) to implement recycling, reuse, and composting at schools (AUSD implemented in 2009).
- Working with the State Department of Conservation (DOC) to develop more locations for bottles and cans with California Redemption Value (CRV) (a new center was opened in February 2008).

[19] Description of CPSC http://www.calpsc.org/ (accessed October 15, 2009)

Figure 5 City of Alameda Greenhouse Gas Reduction Potential by Initiative



Source: City of Alameda Local Action Plan for Climate Protection GHG Emissions Analysis Summary Table

Effective Programs Emphasize Solid Waste Management

The waste management industry has been identified as one of the largest contributors to California's greenhouse gas (GHG) emissions.[20] Methane emissions from landfills alone are estimated to be almost two percent of California's emissions, and the waste sector includes other operations affecting GHG emissions, including collection and hauling vehicles, composting operations, waste combustion, and recycling.[21] This, as well as the consolidation of waste management activities undertaken by a relatively small number of participants, makes the sector a likely and appropriate target for regulation.

[20] State of California, Office of the Governor, Governor's AB32 Fact Sheet, http://gov.ca.gov/index.php?/fact-sheet/4445/ (accessed September 9, 2009)

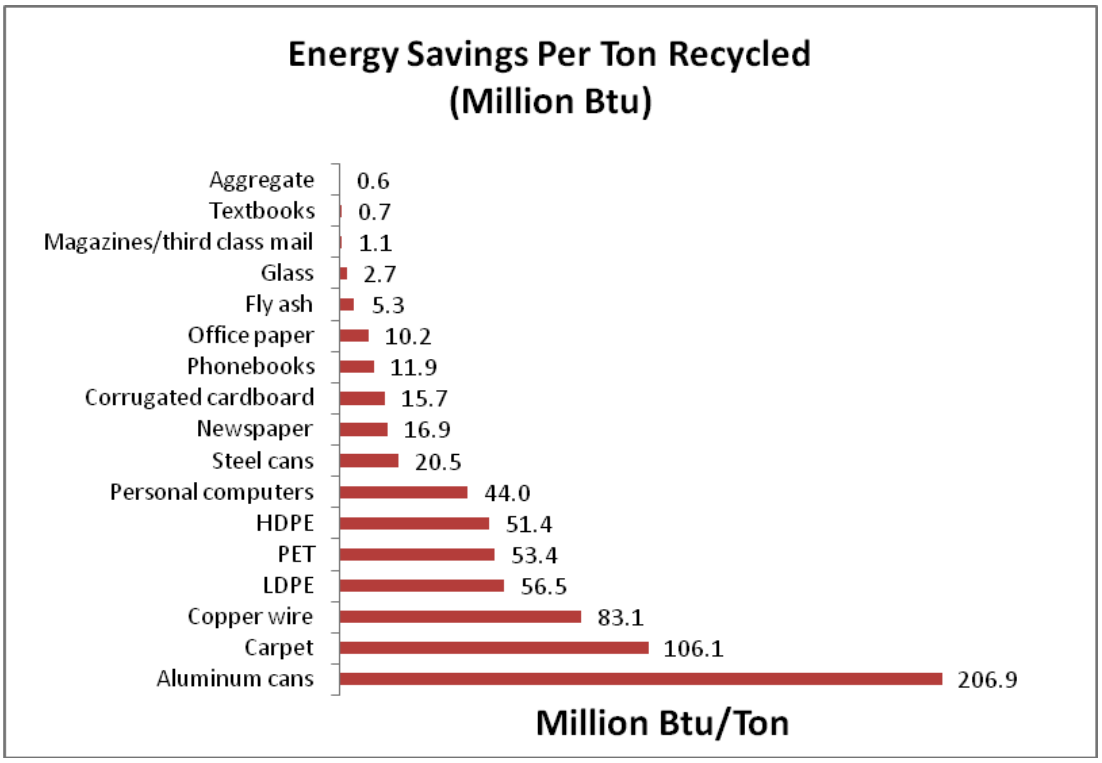
[21] State of California, California Climate Change Portal, Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004, http://www.climatechange.ca.gov/inventory/index.html (accessed September 9, 2009)

Landfills are one of the largest sources of methane, a powerful greenhouse gas which is 25 times more potent than carbon dioxide. As described in the Local Action Plan for Climate Protection,[22] the City can significantly reduce citywide GHG emissions levels through waste reduction and recycling. Recycling can reduce greenhouse gases both by reducing methane generation at landfills and by saving energy through recycling. Figure 7 lists the energy savings per ton of each material recycled.

Eco-Fact: Keeping **one ton** of waste out of landfills keeps **three tons** of carbon dioxide from entering the atmosphere.

--US EPA, 2007

Figure 6 Energy Savings by Material Type



Source: U.S. EPA, Waste Management and Energy Savings by the Numbers, September 4, 2005, page 2.

[22] City of Alameda, Local Action Plan for Climate Protection, http://www.ci.alameda.ca.us/community/climate_protection.html (accessed September 9, 2009)

Local Support - Community Action for a Sustainable Alameda

The Community Action for a Sustainable Alameda (CASA)[23] was formed in September 2008 as a community-wide coalition to raise awareness, mobilize community action, and assist with the implementation of programs to achieve the goals of the City's Local Action Plan for Climate Protection, to reduce Alameda's carbon emissions to 25 percent below 2005 levels by the year 2020 and to increase community sustainability and well-being. The City and members of the City's Climate Acton Task Force, which oversaw the development of the Local Action Plan, recognized that since City government activities account for only three percent of the citywide GHG emissions, City government alone could not achieve the GHG reduction goals of the Local Action Plan. City staff members from the Public Works, Community Development, and Alameda Municipal Power departments serve on the CASA steering committee along with former members of the Climate Action Task Force and other representatives from the business community, school groups, non-profits, environmental groups and other interested individuals.

CASA task force groups, which work to promote local initiatives, include:

- Energy
- Waste and recycling
- Transportation
- Food and water
- Outreach and education

CASA holds quarterly public meetings to educate and raise awareness on strategies for reducing GHG emissions. CASA has supported the development of the City's Zero Waste Implementation Plan by co-sponsoring the zero waste community workshops and promoting the workshops through its outreach networks. CASA members have been active participants in the zero waste workshops and have contributed to the development of the plan.

[23] Community Action for a Sustainable Alameda, http://casa-alameda.pbworks.com/ (accessed September 9, 2009)

Section 2 Existing Programs and Infrastructure

System Definition

Existing Programs and Facilities

The City has a comprehensive recycling and composting program available to all residents and businesses. Program features include:

- Single-stream collection of recyclables, available to all customers, and front-load containers, for some commercial and multi-family generators, implemented in 1997.
- Collection of organic materials including; yard trimmings, food scraps, and compostable paper, implemented in 1997; food scraps added in 2002.
- Tiered solid waste collection rates to provide an incentive to collection customers to increase recycling and waste prevention, including a 20-gallon cart for low volume generators.
- Alameda County Industries (ACI) is the City's Franchisee for residential and commercial solid waste, recycling, and organics collection. The City's franchise agreement with ACI began in 2002 and will expire in 2022. ACI also provides commercial recycling collection and construction and demolition debris collection.
- Biagini Waste Reduction Systems, Inc. and Waste Management, Inc. are "grandfathered recyclers" that provide commercial recycling collection to customers they have had since 2001, through an annually renewable permit.
- Construction and demolition debris collection is provided through permitted haulers. Waste Management, Inc. and Sonrise Construction were permitted as C&D haulers in 2008.The permitted haulers must provide the City with documentation that it has diverted 50 percent of all construction and demolition debris generated by building or demolition projects valued at $100,000 or more.
- Facilities used by Alameda generators include:
  - ACI's Direct Transfer Facility in San Leandro for recyclables processing
  - Allied Waste's Newby Island Sanitary Landfill in Milpitas for organics composting
  - Waste Management's Davis Street Transfer Station in San Leandro for franchised solid waste transfer
  - Waste Management's Altamont Landfill near Livermore for franchised solid waste disposal
  - Alameda County's Household Hazardous Waste Facility in Oakland for household hazardous waste from residents and commercial small quantity generators.

Alameda's Materials Tonnage Data

In 2008, the city generated over 146,000 tons of materials. Over 48,000 were disposed in landfills and 98,000 were diverted from disposal through waste prevention, recycling, and composting.[24] The diversion programs provided by the City's service providers and waste prevention and private sector recycling programs all contribute to these diversion rates. Figure 8 lists the tonnages generated, diverted, and disposed by Alameda generators in 2008, including the tons flowing through existing programs and facilities.

Figure 7 Current System Materials Tonnage Flow by Facility/Function 2008

Facility/Function	Generation	Diversion	Disposal
Altamont	41,512	-	41,512
Other Landfills	6,810	-	6,810
Diversion from City Service Providers	26,260	26,260	
Other Waste Prevention and Recycling Programs[25]	71,848	71,848	-
Totals	**146,430**	**98,108**	**48,322**

Sources: City of Alameda 2008 Annual Report to the CIWMB, Franchisee and Permittee annual reports, California Integrated Waste Management Board Disposal Reporting System

Figure 9 summarizes selected demographics and waste disposal characteristics for the city. Single family generators include detached single family homes and multiplex residences up to four units; multi-family generators include complexes with five units or more; commercial generators include all businesses and institutions with cart service or bin service; roll-off generators include customers with large debris boxes or compactors; and self-haul generators are those that bring materials to a landfill or transfer station in their own vehicles.

[24] City of Alameda 2008 Annual Report to the CIWMB.

[25] This figure was estimated by the CIWMB, based on projections of citywide generation, and includes waste prevention and recycling efforts undertaken by individual residents and businesses in the city.

Figure 8 Alameda Waste Disposal Data 2008

Population	75,823
Housing Units	32,527
Number of Business Establishments	2,130
Waste Disposal (tons)	48,322
Single Family	12,717
Multifamily	3,650
Commercial	12,303
Roll-Off	6,046
Self-Haul	13,606
Residential Disposal Rate (lbs/capita/year)	432
Non-Residential Disposal Rate (tons/establishment/year)	15

Sources: Alameda County Waste Characterization Study 2008, Stopwaste.org, Franchisee and Permittee annual reports, California Integrated Waste Management Board Disposal Reporting System

Figure 10 summarizes the diversion and disposal tons collected in 2008 by the City's franchised hauler, ACI, and commercial and C&D recyclers, ACI, Biagini, Sonrise Construction, and Waste Management.

Figure 9 Diversion and Disposal Tons Collected by the City's Service Providers 2008

Service Provider	Diversion	Disposal	Diversion Rate
Residential			
ACI (Franchised Hauler)			
Residential Curbside Solid Waste		11,951	
Residential Curbside Mixed Recycling[1]	10,269		
Residential Curbside Organics[1]	8,215		
Residential Bulky Item Collection	2,305	766	
Total Residential	**20,789**	**12,717**	**62%**
Commercial			
ACI (Franchised Hauler)			
Commercial Side-Load Mixed Recycling (carts)[1]	482		
Commercial Side-Load Organics (carts)[1]	137		
Commercial Front-Load Solid Waste (bins)		15,953	
Commercial Roll-Off Solid Waste (debris boxes)		5,965	
Commercial Front-Load Mixed Recycling (bins)	815		
Commercial Roll-Off Mixed Recycling (debris	1,858		
Commercial Roll-Off Organics (debris boxes)	605		
Biagini (Commercial Recycler)			
Commercial Front-Load Recycling	346		
Sonrise Construction (C&D Hauler)			
C&D Debris Roll-Off	179	81	
Waste Management (Commercial/C&D Hauler)			
Commercial Front-Load Recycling	307		
Commercial Roll-Off Organics	327		
C&D Debris Roll-Off	415		
Total Commercial	**5,471**	**21,999**	**20%**
Total Residential + Commercial	**26,260**	**34,716**	**43%**

Source: ACI, Biagini, Sonrise Construction, and Waste Management annual reports, 2008

[1]Commercial tons calculated based on service levels and subtracted from residential tons

Waste Characterization Study

To identify the types and amounts of materials remaining in Alameda's disposed waste stream, this plan relies on the data from the 2008 Alameda County Waste Characterization Study conducted by Stopwaste.org, dated June 2009.

Results for Alameda are summarized in Figure 11. Recyclable materials are highlighted in blue, compostable materials are highlighted in green, and materials that cannot currently be recycled are highlighted in black.

As shown in Figure 12, the following key findings regarding disposal trends and recovery potential for the city overall can be made:

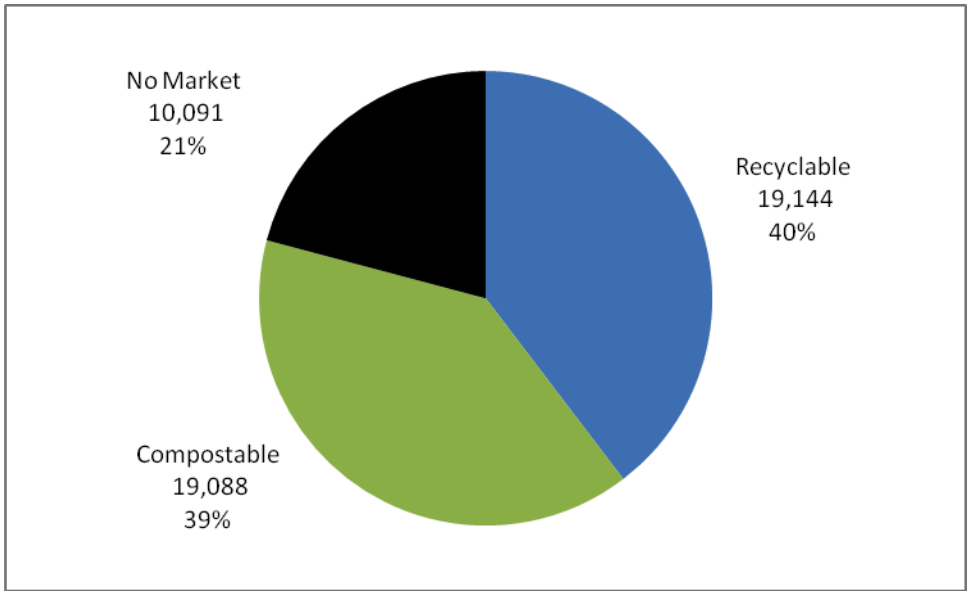
- Nearly 80 percent of the city's waste is reusable, recyclable, or compostable.
- Approximately 39 percent of the city's waste is compostable, including food waste, compostable paper, leaves, grass, chips and branches, stumps, prunings, and trimmings.
- Approximately 40 percent of the city's waste is recyclable, including recyclable paper, plastic, glass, metals, and inerts.
- Approximately 21 percent of the city's waste includes materials for which there is no existing market and cannot be recycled or composted. The three largest categories of these materials, by weight, are: painted wood or wood treated with chemicals, diapers, and composite bulky items, such as furniture or equipment.

Figure 10 2008 Alameda Citywide Disposed Waste Composition by Material Type

Material Group	Material	Total (tons)
Paper		9,110
	1 Uncoated Corrugated Cardboard	1,113
	2 High Grade Paper	288
	3 Newspaper	549
	4 Mixed Recyclable Paper	1,588
	5 Compostable Paper	5,101
	6 Other Paper	471
Plastics		
	7 HDPE Bottles (#2)	166
	8 PETE Bottles (#1)	182
	9 Other Plastic Containers	324
	10 Plastic Bags	554
	11 Other Film	1,631
	12 Expanded Polystyrene Blocks	254
	13 Mixed Rigid Plastics	1,039
	14 Other Plastics	378
Glass		1,612
	15 Recyclable Glass Bottles/Containers	949
	16 Other Glass	663
Metals		2,335
	17 Aluminum	59
	18 Other Non-Ferrous	310
	19 Steel Food and Beverage Cans	312
	20 Other Ferrous	1,561
	21 White Goods	93
Yard Waste		1,152
	22 Leaves/Grass/Chips	599
	23 Branches/Stumps/Prunings/Trimmings	553
Organics		22,477
	24 Food Waste	9,127
	25 Tires	18
	26 Untreated Lumber	2,151
	27 Pallets	675
	28 Treated Wood Waste	4,667
	29 Textiles and Leather	1,326
	30 Carpet	1,238
	31 Diapers	1,596
	32 Manure	882
	33 Other Organics	797
Inerts		5,423
	34 Crushables	2,791
	35 Other Inerts	950
	36 Gypsum Board	385
	37 Asphalt Roofing	1,297
HHW		356
	38 Paint/Adhesives	19
	39 Vehicles & Equipment Fluids	38
	40 Universal Hazardous Waste	20
	41 Medical Waste	31
	42 Medicine	3
	43 Covered E-Waste	9
	44 Other E-Waste	51
	45 Other Hazardous Waste	185
Special		1,329
	46 Brown Goods	167
	47 Composite Bulky Items	1,113
	48 Other Special Waste	49
TOTAL		48,322

Source: 2008 Waste Characterization Study, Stopwaste.org, updated using tons disposed from the City's 2008 Annual Report to the CIWMB.

Figure 11 2008 Alameda Citywide Disposed Waste (in tons and percent)



The waste characterization study also profiled the city's waste based on five generator types:

- **Single family residential** – waste from single family homes and multiplex residences up to four units
- **Multi-family residential** – waste from multi-family generators include complexes with five units or more
- **Commercial** – waste from all businesses and institutions with cart service or bin service
- **Roll-off** – waste from customers with large debris boxes or compactors
- **Self-haul** – waste from those that bring materials to a landfill or transfer station in their own vehicles

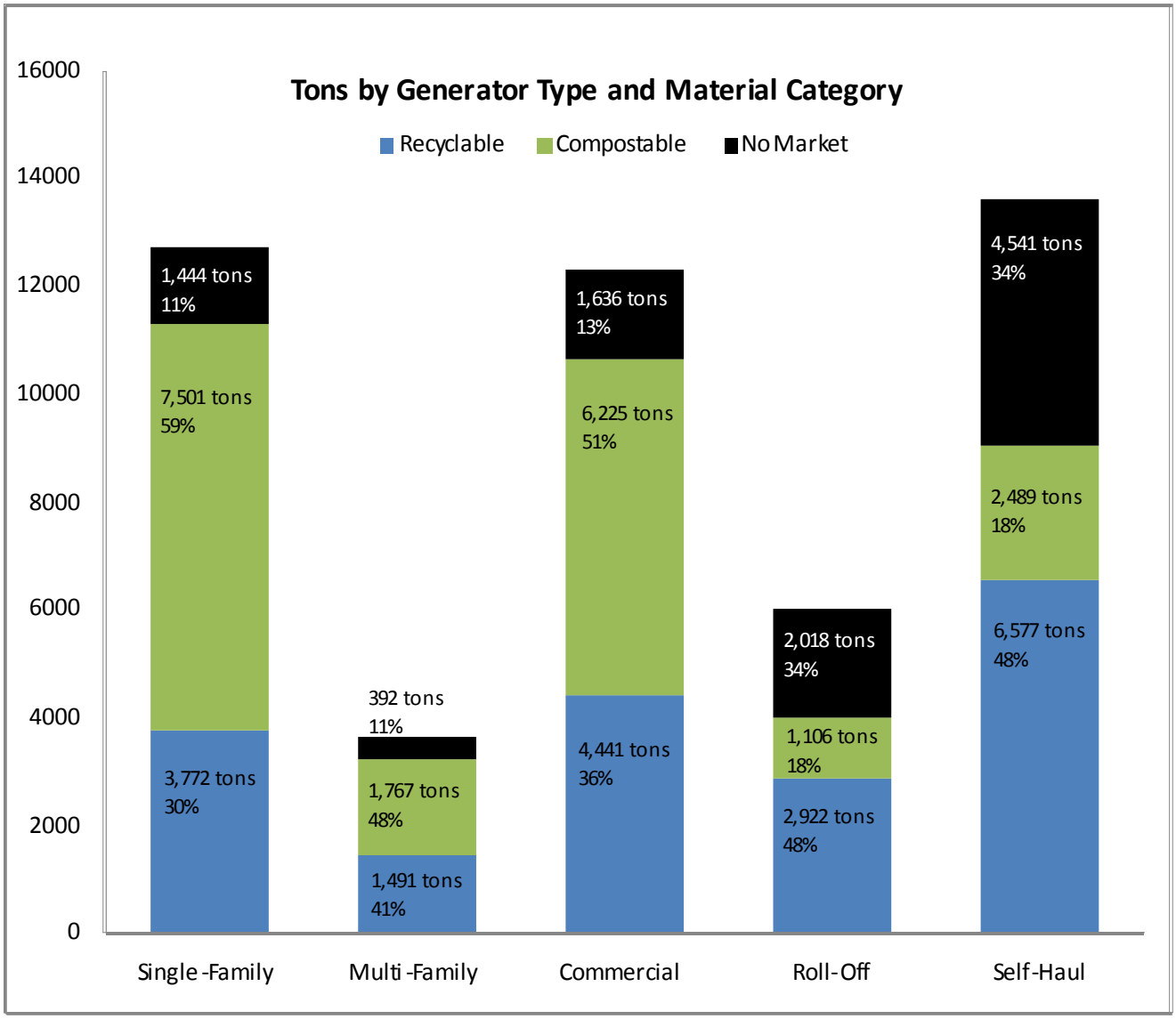
Figure 13 shows the tons disposed by each generator type according to each material category:

Recyclable materials include: paper, plastic, metals, glass, and construction and demolition materials.

Compostable materials include: food scraps, yard trimmings, and compostable paper.

No market materials (those that can't be recycled) include: treated wood, composite materials, and diapers.

Figure 12 2008 Alameda Disposed Waste by Generator Type



As shown in Figure 13, 89 percent of the single family and multi-family waste is recyclable or compostable; 87 percent of the commercial waste is recyclable or compostable; and 66 percent of the roll-off and self-haul waste is recyclable or compostable. Based on this understanding the City can develop targeted programs for each generator sector.

Section 3 Stakeholder Outreach and Input

To engage all potential stakeholders in the zero waste planning process, the City conducted four workshop series in spring 2009 to present zero waste policies, programs, and facility alternatives and to obtain stakeholder input and recommendations.

March Workshops - Opportunities and Constraints

On March 12th, 2009, the City held three workshops all in one day focused on three different constituent groups:

- A **business meeting** was held in the morning to attract business community representatives. This meeting focused on opportunities for increasing commercial recycling and organics diversion. Stakeholders also discussed the barriers for increasing diversion, including space constraints, additional labor, and costs.
- A **school site meeting** was held in the afternoon for families with children and for those interested in recycling at schools. Staff from the Recreation and Parks department provided activities for the kids, so that parents could participate in the workshop.
- A **community meeting**, co-sponsored by CASA, was held in the evening focused on communitywide issues. The City provided an overview of the zero waste planning process and facilitated a discussion of the opportunities and constraints for achieving zero waste in Alameda.

Figure 14 lists the opportunities and constraints identified by stakeholders at the March workshops. The opportunities have been categorized according to the following areas of emphasis:

E	Education
P	Policy
I	Increase locations for recycling
L	Legislation
C	City increases in oversight/participation
M	Multi-family/commercial collection changes
S	School participation
N	New service opportunity

Figure 13 Opportunities and Constraints

Opportunities	Constraints
E Education on the 3Rs – reduce, reuse, recycle I Recycling stations around town for electronics L Business programs to "take back" products L Programs to support businesses who develop "take back" programs C Waste audit programs C Franchise reform—to provide more incentives for diversion C Prepare for statewide mandatory commercial recycling and countywide plant debris ban E Build local support for statewide Extended Producers Responsibility E Consumers need to buy green as well as be green E Quantify benefits to communities (number of football fields, etc.) M Increase financial incentives for commercial recycling and composting collection C Conduct waste audits at businesses and provide technical assistance and equipment C Encourage greater participation in Green Business program M Increase business diversion rates via more support and incentives E Jobs, education, sustainable community C Paperless building and planning permit processes C Community gardens E Educate businesses on the advantages S Blue cart and green cart recycling at schools E Become informed, educate others, empower change in our schools and homes E Workshops, seminars, training at special events P Do the things we know make sense (compost, recycle) then work on harder things S Market compostable bags to help fund education in Alameda E Put together a "How to Give a Zero Waste Party" guide L Biodegradable food packaging E Training for diversion in food service production E Green local directory in the newspaper L Green demolition (50% to be reused) E Focus on reuse E Innovative education/motivation for public E Clear communication between all players	• Fees on recycling and composting are too high for businesses • How do we encourage waste prevention and recycling in businesses? • Need to convince people it's a "good idea" • Explain how this will "benefit me" • Business/residents resistance: cost/time/inconvenience • Perceptions (fruit flies with kitchen waste) • Lack of citywide funding for outreach • Lack of recycling education and practice in schools • Need public policy on retail packaging • Convenience (people who want to recycle sometimes have trouble figuring out how/where) • Big picture thinking (embedded cost ignorance) • Availability of recycling space at offices • Prevailing attitudes • Language barriers • Institutional reluctance, apathy, and inertia • Compliance and costs • Compost facility at Newby Island (where our green materials go) does not accept compostable plastics • Electronic items become e-waste • Need training and bins for schools • Lack of public motivation (out of site-out of mind) • Implementing more food composting (good, could be better) • Sway public outlook on less consumerism • What to do with non-recyclable materials • Institutional constraints • Upstream involvement • Communication • Lack of funding for new programs • Lack of control of upstream • Need to make it easier to purchase sturdy food waste liner bags • Provide food scrap collection at all Alameda workplaces • Difficult to divert materials (cat litter and

Opportunities	Constraints
E Education on product stewardship N Tool lending library C Become an associate of the California Product Stewardship Council N Centralized (easy access) resource recovery park for hard to recycle items E Culture change – make reuse, recycling and repurposing cool L Regulation – green promoting permitting, fines, etc. S Donate items to schools for reuse art projects E Proliferate Freecycle in Alameda M Zero waste and Green Businesses should get fast track on permits and tax breaks E Reminder in every delivery pizza box and to-go containers about composting E Public info on using green waste properly (only 2 of 29 units in my building use it) N Fryer and cooking oil recycling M Need green waste diversion at apartment complexes N Need to recycle plastic bags P Business license renewal tied to proof of participating in recycling C Stickers on bins specifying what goes where E CASA education teams to meet with small groups I Need recycling at Rec and Park facilities (Little League and parks)	personal hygiene products) • Cost of programs • Need better, more effective, graphic communication

Earth Day Sustainability Symposium

To educate residents about zero waste and sustainability, the City sponsored a Sustainability Symposium at the City's Earth Day Celebration at Washington Park on April 25th, 2009. Speakers included City staff, CASA members, and zero waste and sustainability specialists. Listed below is the symposium program, including a description of the topics and speakers.

Sustainable Living Symposium Program

Zero Waste Around the World - Highlighted the work of zero waste communities in the United Kingdom, Italy, Maryland, Los Angeles, and Hawaii among others**.**

Presenter: Rick Anthony, Richard Anthony Associates

Zero Waste in Alameda - Presented potential policies and programs for Alameda residents and businesses to reduce waste and greenhouse gas emissions. Requested input to the zero waste implementation plan!

Presenter: Ruth Abbe, HDR Engineering, Inc.

Community Action for a Sustainable Alameda (CASA) – Discussed recent CASA activities and how residents could get involved locally. CASA was formed in the fall of 2008 to raise awareness, mobilize community action, and facilitate implementation of programs to achieve the goal of Alameda's Local Action Plan for Climate Protection (to reduce Alameda's carbon emissions to 25 percent below 2005 levels by the year 2020) and to increase community sustainability and well-being.

Presenter: David Burton, CASA Steering Committee

Eco-Fact: For each ton of municipal waste landfilled or burned about 71 tons of waste on average has been created "upstream" from the mining, manufacturing and distribution of materials in the product lifecycle.

--US Office of Technology Assessment, 1992

The "Green Sheet" and Zero Waste Challenge - Reviewed and discussed ways to reduce greenhouse gas emissions in Alameda. A comprehensive list of strategies and resources specific to Alameda to reduce greenhouse gas emissions was distributed. Presented findings and observations from an Alameda High School zero waste challenge.

Presenters: Joyce Mercado, CASA Steering Committee and Bike Alameda and Lauren Mercado, Alameda High School Environmental Science

How to Pack a Zero Waste Lunch - Demonstrations for school children (and their parents) on how to pack a zero waste lunch.

Presenter: Sharol Nelson-Embry, East Bay Regional Park District

Growing Food Locally - Community Action for a Sustainable Alameda presented ways to grow food locally including harvesting local fruit trees, victory gardens, and gardening in small places.

Presenters: Susan Welch/Stefani Leto, CASA Food and Water Group

Town Planning and Climate Change- Discussed walkable cities, town centers, and transit-oriented developments as options to reduce greenhouse gas emissions and explained how Alameda fit the "green urbanist" model.

Presenter: Steve Coyle, Town-Green and Co-Founder, National Charrette Institute

Energy Efficiency in Alameda - Provided information on how to conduct an energy audit and save energy and money.

Presenter: Meredith Owens, Alameda Municipal Power

Solar Rebates in Alameda - Provided information on solar energy to power homes or businesses and rebates offered by Alameda Municipal Power and the federal government.

Presenters: Devi Prasad/Bill Garvine, Alameda Municipal Power

COOL 2012 - The GrassRoots Recycling Network discussed ways to keep "**C**ompostable **O**rganics **O**ut of **L**andfills by 2012".

Presenter: Linda Christopher, GrassRoots Recycling Network

June Workshops - Policies and Programs

On June 11th, 2009, the City held follow-up workshops with the three constituent groups – a business representatives meeting, a school site meeting, and a community meeting, co-sponsored with CASA. These workshops focused on identifying the priority policies and programs for the zero waste plan.

At the workshops, the stakeholders completed a questionnaire and were asked to rate over 25 potential policies and programs. Figure 15 presents the results of the rating process – the higher the ranking, the greater the number of participants "strongly agreed" with the policy or program.

The policies and programs have been categorized according to the same areas of emphasis as the March Workshops (page 16).

Figure 14 Stakeholder Policy and Program Rankings

Rank	Policy and Programs
1	Adopt the policy that no compostable organics should go to landfill. [P/L]
2	Work with Alameda Unified School District and private and parochial schools in the City to integrate Zero Waste into curriculum and to implement Zero Waste systems for all schools and administrative offices. [S]
3	Be a strong advocate for legislation and programs regionally, statewide, nationally, and globally that makes manufacturers responsible for their packages and products. [L]
4	Support legislation to require Caltrans to use mulch and compost made from urban organics to landscape freeways, and to use other recycled materials in sub-base and road mixes, e.g., rubberized asphalt. [L]
5	Place recycling bins wherever there are trash cans in all public locations. [I]
6	Train managers of buildings and facilities about Zero Waste systems and resources. [M]
7	City agencies should lead by example to implement all actions asked or required of residents and businesses and report on progress annually. [C]
8	Encourage or require deconstruction, salvage, and reuse of materials from construction and demolition (C&D) projects in addition to existing recycling requirements. [P/L]
9	Require all multi-family dwelling building owners and commercial building owners to provide recycling services to their tenants. [M]
10	Help market urban organics to farmers to restore the health of soils and reduce use of fertilizers, pesticides, and irrigation water. [P/L]
11	Help retain and expand Green Businesses. Provide preferences in City procurement, funding and permitting for certified Green Businesses in the City. [P/C]
12	Expand the City's development of Green Buildings and encourage residents and businesses to develop more Green Buildings. Restore functional buildings, rather than demolish them. [P/C]
13	Require processing of all disposed materials at a Material Recovery Facility (MRF) before they are buried in landfills to leach out toxics and digest organics. [N]
14	Purchase Zero Waste products and services: return to vendor any wasteful packaging; reduce packaging and buy in larger units; use reusable shipping containers; purchase reused, recycled, and compost products; buy remanufactured equipment; lease, rent, and share equipment; buy durables, using life-cycle cost analyses; and purchase less toxic products. [E]
15	Support elimination of state "credit" to count Alternative Daily Cover (ADC) as diversion immediately to help stimulate the development of new composting facilities (including urban areas) particularly ones that can process food scraps. [L]

Rank	Policy and Programs
16	Engage industry; make them aware that all new manufactured products need to be designed to be reusable, recyclable, or compostable. [L]
17	Develop Resource Recovery Parks (neighborhood take-back centers) to accept all reusables, recyclables, and compostables from the public and provide locations for reuse, recycling and composting businesses to process materials, manufacture products, and sell products to the
18	Ask businesses to adopt Zero Waste goals and plans that follow Zero Waste Business Principles. [M]
19	Engage industry, make them aware of materials and products that are problems for the City, and establish a process for resolving those problems. [M]
20	Support the phase-out of the use of yard trimmings statewide as ADC (to cover trash at the end of the day instead of soil) by 2010. [L]
21	Fund large-scale social marketing campaign on an on-going basis to educate residents, businesses, and visitors about the new rules and changes over time. [E]
22	Require all residents, businesses, and institutions to participate in the City's recycling and organics program (mandatory source separation). [P/L]
23	Support local, regional and state landfill surcharges, and bond issues to fund low-interest loans and/or grants to develop needed local recycling and composting infrastructure in urban areas. [L]
24	Use new outreach tools, including Facebook, YouTube, blogging, and Twitter to communicate Zero Waste messages. [E]
25	Ban products or packages from being sold or require manufacturers or retailers to take back designated products and packaging sold in the city that are toxic in their manufacture, use, or disposal, and/or are not currently recyclable in the area. [L]
26	Require reuse, recycling or composting of all bulky items collected in the city (single family, multi-family, and business). [N]
27	Adopt "Precautionary Principle" for all City purchases. The precautionary approach seeks to minimize harm by using the best available science to identify safer, cost-effective alternatives. [26]
28	Consider implementing zoning regulations to allow Zero Waste infrastructure by right in appropriate zones. [P/L]

Space on the questionnaire was provided for additional input or recommendations for additional policies and programs to be considered. These suggestions are summarized in Figure 16 below.

[26] Prior to taking an action that would impact public health or the environment, the City would identify safer alternatives. Mendocino County and the cities of Berkeley, Portland and San Francisco have adopted precautionary principle ordinances.

Figure 15 Additional Issues/Suggestions from Stakeholder Questionnaires
▪ Take back hazardous waste at point of purchase [L]
▪ Garbage cops [P/L]
▪ Require restaurants and products to use less packaging [P/L]
▪ Require every apartment to obtain at least one per each bin (green, blue, gray) [P/l]
▪ Alameda Towne Centre recycling containers [I]
▪ Ban trash in schools [S]
▪ Write-ups for teachers that don't recycle [S]
▪ Incandescent bulb diversion (as with compact fluorescents) [N]
▪ Neighborhood waste/recycling receptacles [I]
▪ Help remodeling contractors: plumbers, electricians, etc. by providing curbside C&D, centralized easy drop-off [I]
▪ Implement 2x per week green bin pick-up for restaurants at 1x per week rates [P/M]
▪ Help low-waste generators with 10 gallon gray bins, picked up every 2 weeks, etc. [P]
▪ "Rollout" for businesses – research [M]
▪ Random phone surveys - find out why folks are not recycling [E]
▪ Educate general population [E]
▪ "Free" commercial recycling only reaches those who'd volunteer - either mandatory recycling or much more significant rate signals needed to change business behavior [P]
▪ Statewide mandatory commercial recycling will likely apply to greater than 4 cubic yard customers. Will probably apply to only a fraction of Alameda businesses. We should have our own standards. [P/M]
▪ Make sure all businesses subscribe to gray bin service [M]
▪ Pricing structure that makes sense for multiplex owners [P/M]
▪ Medical equipment rental library [N]
▪ Require recycling after better voluntary program has been put into effect [P/L]
▪ I would like recycling bins, quote from ACI was $1,000 additional per month [M]
▪ Use rate structure to foster appropriate recycling/disposal behavior [P]
▪ Make readily available information about where materials can be recycled/disposed of [E]

At the workshops, stakeholders discussed additional issues and suggestions. These are listed in Figure 17 below.

Figure 16 Other Issues/Suggestions identified by Stakeholders at Workshops
Monitor implementation of San Francisco mandatory recycling and composting ordinance and consider it as a model for implementation in Alameda [P/L]
Need more information to folks about how to divert food scraps – still dealing with the "ick" factor [E]
Would like to see the return of compost give-back – so generators can see the benefit of composting [P]
Need more incentives and rewards for participation – recognize the restaurants that are in the food scrap program [M]
Need blue and green bins next to every trash bin [I]
More incentives in the rate structure--particularly commercial and multi-family [P]
Focus on organics and how to get everyone to participate [E]
"How to" composting guide/video (ACI video is great – need one focused on green cart) [E]
Need to address use of bags for green cart – this is a barrier – negotiate with ACI to use alternative compost facility that can handle plastic bags [P]
Need to inform people about plastic gyre and use of non-recyclable plastic [E]
Garbage is an invention - in western Samoa there is no garbage [E]
More education is needed in the high schools – City should help [E]
Support green schools challenge initiated by the School District [S]
Styrofoam ban is working – now ban plastic bags [L]
Need to address "hard to recycle materials" such as medical waste, pharmaceuticals, etc. [N]
Provide indoor bins, for free or at cost, for churches and commercial generators [P]
Grandfathered mini-cans are problematic, occasionally ACI drivers throw them away, but low-volume generators need options. Consider every other week collection for low volume generators. [P]
Conduct a random survey to find out why businesses and residents are not recycling/composting [E]
Work with Home Owner Associations to educate residents [E]
Model behavior at all City facilities, including at Mastick [C]

Results from the workshops were used to form the policy and program elements of the plan. These included:

- **A new emphasis on education and outreach [E]**—Much of the input at the workshops focused on a need to increase education and outreach. According to the workshop participants, Alameda generators still do not have all of the information that they need to reduce the generation of waste and fully participate in the City's recycling and composting programs. Stakeholders suggested partnering with community groups and student groups to increase the visibility of the recycling program and message; and to use social marketing techniques to reach populations that have not responded to traditional outreach methods. Providing outreach and education to the school community was seen as a conduit to the greater community. Generators in the city need to be educated on the connection of waste prevention and recycling to environmental impacts, such as climate change, endangered species, and the plastic gyres[27] in the Atlantic and Pacific oceans.
- **Policy and legislative initiatives [P/L]**—Stakeholders wanted the City to implement policy and legislative initiatives to increase waste prevention, recycling, and composting. Stakeholders supported: mandatory recycling requirements if voluntary efforts were not successful; supporting local take-back initiatives and statewide initiatives for Extended Producer Responsibility; building on the City's Styrofoam ban by banning other hard to recycle products, such as single-use plastic bags; requiring building owners to provide recycling and composting to their tenants; providing better rate incentives to commercial businesses and multi-family complexes to encourage recycling and composting; requiring deconstruction prior to demolition of buildings; and expanding development of green buildings and green businesses.
- **City programs and enforcement [C/M]**—Stakeholders suggested increasing the role of the City staff in providing outreach and technical assistance to commercial businesses and schools. Stakeholders sought City government leadership in modeling zero waste behavior through: increasing recycling and composting at City facilities and reporting annually on their progress; strengthening the City's green purchasing policies; and considering adoption of the Precautionary Principle for City purchases.
- **Increasing opportunities to recycle and providing new programs [I/N]**—There was an interest expressed in providing more opportunities to recycle: at City facilities and parks; and where there are City litter cans. Stakeholders also supported processing residual waste prior to landfilling, as a last resort.

[27] Plastic pollution accumulates in oceanic gyres (large systems of rotating ocean currents). The Algalita Marine Research Foundation has documented plastic pollution in each of the major ocean gyres in the Atlantic, Pacific and Indian oceans. http://5gyres.org (accessed August 10, 2010).

August Workshops - Draft Plan Elements

Based on the input from the stakeholders at the March and June workshops, the City conducted an analysis of the policies and programs to estimate their diversion potential, greenhouse gas emissions reduction potential, and planning level costs. The preliminary findings and draft plan elements were presented to the stakeholders at two workshops held on August 19th, 2009. The morning meeting focused on commercial issues and included representation from local businesses and business associations. The evening community meeting, co-sponsored with CASA, covered a broad range of community issues. Both meetings were broadcast over the internet through a webinar format. Stakeholders were able to dial in to the meetings and view the presentations through their home or office computers and pose questions using a chat function. By broadcasting the meeting through the webinar, the City expanded its reach to stakeholders who were not able to be present at the meetings. The workshops focused on the following draft plan elements:

- Add materials to the blue and green cart
- Undertake a social marketing campaign
- Advocate for producer responsibility at the state level and work with local retailers to increase take-back programs
- Increase commercial technical assistance
- Increase construction and demolition debris ordinance requirements and increase C&D technical assistance
- Support product and disposal bans
- Consider mandatory source-separation requirements

Additional Community Surveys

To provide additional opportunities for a broad range of community members, the City conducted surveys at several community events, including the Sand Castle and Sculpture Contest in June, and the Starlight Movie in the Park events in July and August. The survey prepared for adults included questions from the zero waste workshops and the responses generally mirrored the results from the stakeholders that participated in the workshops. The "Enviro Survey for Kids" solicited input on general awareness of zero waste and participation in recycling. It also asked young people about their use of new media, such as Facebook and Twitter. The results of these surveys have been compiled and are included in Appendix A.

The results from these surveys were consistent with feedback from the workshops. In general, responders supported implementing zero waste programs to increase diversion from landfills, including the processing of residual waste at MRFs.

Section 4 Policy and Program Analysis

This section describes the policies and programs that could be implemented to achieve the City's goals of 75 percent diversion and zero waste, based on input received through the public outreach process.

Policies and Programs Options

To understand the effectiveness of the zero waste policies and programs identified by the stakeholders, the City estimated the diversion potential of the key initiatives. Results from this analysis are included in the following sections.

- **Add materials to the blue and green cart** -- targeting residential and commercial generators. Some materials that have recycling or compost markets are not currently collected by ACI. One option for increasing diversion would be to add to the types of materials that can be placed into the blue cart including plastic film, rigid plastics, expanded polystyrene blocks, and textiles; and add materials to the green cart including pet waste and compostable plastics. These material types are currently included in recycling and composting programs in other Bay Area communities and could be included in the City's program.
- **Undertake a social marketing campaign** -- targeting all generator sectors. The City has a well-regarded public outreach program that has been recognized by the Northern California Recycling Association. The City provides print material, advertisements, and web-based information to city generators. However, based on feedback from the stakeholders at the zero waste workshops, this information is not reaching all generators. A community-based social marketing program could be implemented to help change the culture and behavior in the city, with different messages targeted to different demographics using a wide assortment of tools. The social marketing strategy would penetrate all three major aspects of each individual's life--home, work, and play, with a zero waste message. This would not take the form of three separate campaigns, but rather an integrated lifestyle campaign. The four phases of the social marketing campaign would focus on Awareness--employing mostly media tactics, Persuasion--hands-on, community-based work with CASA, school groups and business groups, Implementation--"how-to" strategies and tactics, and Confirmation--publicity on awards, recognition, and success stories.

The Emerald Effect: Recognition of businesses that show a commitment to waste prevention and recycling can be a key motivator. The "Emerald Effect" would acknowledge businesses that achieve sustainability metrics that are a step above the Green Business recognition program. Emerald Businesses could be listed on the City's website and in publications and businesses could advertise their elite

- **Advocate for producer responsibility at the state level and work with local retailers to increase take-back programs** -- targeting all generator sectors. Extended Producer Responsibility (EPR) initiatives require manufacturers of products to take responsibility for their ultimate recycling or disposal. Examples of EPR programs include voluntary or mandatory take back programs, advance recycling fees, and designing products for end-of-life recycling. For this program, the City would support the efforts of the California Product Stewardship Council and work with other zero waste communities to advocate for EPR policies at the state and federal level. The City would support these efforts by resolution of the City Council and funding through the integrated waste management program. The City currently works with retailers on take-back programs for batteries, fluorescent lamps, and used motor oil. Under this initiative, the City could increase its partnerships to address other materials, including pharmaceuticals, through take-back programs.
- **Increase commercial technical assistance** --targeting commercial generators. This program would provide free technical assistance to commercial customers to encourage them to initiate or expand recycling and waste reduction practices at their place of business and at the same time lower their disposal costs. The City would publicize the program to encourage businesses to participate. The City would need to dedicate staff resources to work directly with commercial generators to assist in setting up a recycling program tailored to their needs. Technical assistance would include conducting on-site waste assessments to identify target materials for recycling and waste reduction, securing recycling services through the City's franchised hauler, and distributing appropriate outreach materials describing best practices for setting up or expanding recycling services for different types of businesses. Technical assistance would help to minimize or overcome various obstacles to recycling faced by commercial customers such as: space constraints, labor and sorting requirements, lack of information or training, etc. Technical assistance provided by the City would encourage more commercial customers to set up an effective recycling program that is suited to the customer's site, whether it be a large office complex, bar, restaurant, shopping center, small retail business or other type of commercial site.
- **Increase construction and demolition debris ordinance requirements and increase C&D technical assistance**--targeting roll-off and self-haul generators. The City Municipal Code requires a minimum diversion of 50 percent of all C&D debris from building projects valued at $100,000 or more. The City could increase the minimum diversion requirements, reduce the minimum thresholds, or require the processing of all C&D loads. The current program requires a significant amount of staff time for hauler monitoring and review of waste management plans. The program could be streamlined by requiring all C&D collectors to enter into non-exclusive franchises requiring minimum levels of diversion, 90 percent for inerts and 75 percent for other C&D, and eliminating the generator reporting requirements. Staff time could be used to encourage project sponsors and stakeholders to initiate effective recycling and waste reduction practices during construction and demolition activities. Appendix B includes a summary of the C&D ordinances in Alameda County.

- **Support product bans**—targeting all generators. Stakeholders have expressed an interest in building on the City's successful ban of polystyrene foam to-go containers by banning other materials that are hard to recycle, including single-use plastic grocery bags. There is active interest in banning single-use plastic bags in communities across the state and a bill banning single-use plastic bags was introduced in the state legislature.[28] This bill failed passage in August 2010, but will likely be reintroduced in the next legislative session. The City of San Jose and Green Cities California, a coalition of local governments, have released a "Master Environmental Assessment" on plastic grocery bags paving the way for communities to pass local ordinances if the legislature fails to act.

- **Support disposal bans**--targeting roll-off and self-haul generators. Stopwaste.org implemented a disposal ban for yard trimmings that took effect in January 2010. This ban is directed at generators of materials that have easily available recycling or composting outlets. For this program, the City would work with Stopwaste.org and other member agencies to expand the type of the materials banned from disposal to include: C&D debris, cardboard, paper, and food scraps and other materials with readily available recycling or composting markets.

- **Consider mandatory source-separation requirements**--targeting residential and commercial generators. This program represents a major shift from voluntary to mandatory participation in recycling and organics collection programs, and would require all generators, residential and commercial to separate recyclable materials from the waste they generate, and place it in the appropriate collection container for pickup. To affect this change, the City would adopt a "Mandatory Recycling" ordinance that is carefully developed to address concerns raised by various stakeholders and is consistent with City policy directives. Mandatory commercial recycling was designed as an "early action measure" under the AB 32 scoping plan to reduce GHG emissions. State regulations to address mandatory commercial recycling, for generators with more than three cubic yards per week of solid waste services, may be promulgated as early as January 2011. However, most commercial generators in the city have less than three cubic yards per week of solid waste services and would not be affected by the state regulations. State legislation that would require multi-family building owners to provide recycling to their tenants was passed by the legislature and is awaiting the Governor's signature.[29] Appendix B includes a summary of selected mandatory commercial recycling ordinances.

- **Process residual waste - MRF first**--targeting all generators. The stakeholders recognized that some materials will continue to be disposed rather than source-separated by generators.

[28] Assembly Bill 1998(State of California 2009-10 legislative session) introduced by Assembly Member Julia Brownley

[29] Assembly Bill 737 (State of California 2009-10 legislative session) introduced by Assembly Member Wesley Chesbro

The stakeholders supported the idea of processing all residual waste prior to landfilling. Communities and service providers throughout the state are investing in infrastructure for processing "gray cart" materials through mixed Material Recovery Facilities (MRF) where residual waste is sorted from recyclable and compostable materials. Examples of mixed waste MRFs include: Pleasanton Transfer Station, Sunnyvale SMaRT Station, and Green Waste Recovery in San Jose. Materials recovered from the residual waste can then be further processed through municipal solid waste composting facilities, like the Z-Best Compost Facility, or treated through anaerobic digestion or conversion technologies. These facilities are further described in the following sections.

City Government

Green Team

As part of the implementation process for the Local Action Plan for Climate Protection, the City has convened a "Green Team" consisting of City staff from Public Works, Community Development, and Alameda Municipal Power. At its meeting on Wednesday, February 18th, 2009, the Green Team met to provide input to the zero waste planning process.

To ensure that the City sets an example in zero waste, the City should establish goals and procedures for all City departments to reduce solid waste and increase recycling consistent with the requirements considered for residents and businesses in the city. Goal setting should be done in collaboration with all department heads and those responsible for implementation. The City's program would include:

- Each City department would designate a coordinator to promote waste reduction and recycling
- All City buildings must establish recycling and organics collection services, and select waste prevention strategies for implementation
- Provide City employees with technical assistance and training in waste reduction
- Collect data on waste generation, reduction, and recycling to measure the program's success at City facilities
- Report progress, lessons-learned, and next year's plans for each department to the City Council
- Strengthen the City's Environmentally Preferable Purchasing Policy to increase the City's commitment to close the loop by buying recycled content products
- Provide clear plastic bags for comingled recyclables and heavy-duty paper bags for compostable materials to City custodians for better management of the recycling and organics program
- Publicize the City's accomplishments.

City Employee Recycling Program

Based on the Green Team's recommendations, in July 2008, the City Employee Recycling Program, sponsored by Public Works, initiated organics collection at City facilities. Public Works staff provided food scrap recycling kits to all City departments prior to the roll-out, which provided tools and techniques for managing food scrap diversion at City facilities.

Food scrap recycling kits delivered to all departments prior to roll-out

Through the City Employee Recycling Program, Public Works staff also provides technical assistance to City departments to implement recycling and organics programs, including:

- Battery collection at City Hall, City Hall West, the Main Library, Alameda Municipal Power, and the City's Maintenance Services Center
- Recycling hotline for questions from City employees about the recycling program
- Waste assessments at City facilities and implementation of new collection services

As shown in Figure 18, City government facilities are currently achieving 40 percent diversion overall. Key opportunities for increasing diversion include:

- Increasing recycling and organics participation at all City facilities and optimizing collection services at all facilities
- Providing recycling and organics containers at key locations throughout City buildings
- Increasing recycling participation and implementing organics collection at Recreation Centers and parks
- Adding a roll-off box for scrap metal and other recyclable bulky items at the Maintenance Center

Figure 17 City Facility Annual Disposal and Diversion Tons

Facility/Department	Recycling	Organics	Disposal	Diversion Rate
City Hall	15	2	21	45%
City Hall West	8	1	21	30%
Civic Center Garage			6	0%
Maintenance Center	7	169	156	53%
Central Garage	5	1	5	53%
Leaf Box (Osborne Field)		11		100%
Recreation and Parks	28	3	187	14%
Mastick Center	3	2	5	49%
Teen Center	6	1	31	17%
Golf Course		28	20	59%
Officers' Club	4	2	16	29%
Fire Department	24	5	31	48%
Libraries	17	3	12	63%
Alameda Municipal Power	11	1	18	41%
Housing Authority	6	1	8	47%
Animal Shelter		1	6	10%
Total	**134**	**231**	**543**	**40%**

Source: ACI contract (tons calculated based on service volumes) as of July 2010. Quantities may not sum due to rounding.

Alameda Unified School District

The Local Action Plan for Climate protection identified working with AUSD to implement zero waste initiatives as a key strategy to increase diversion and decrease greenhouse gas emissions. In 2009, AUSD implemented an organics diversion program through Waste Management, Inc.. The program was designed to match the recycling and organics program that children have at their homes through ACI.

One of the highest ranked policy initiatives identified by the stakeholders at the zero waste workshops was to:

- Work with Alameda Unified School District and private and parochial schools in the city to integrate Zero Waste into curriculum and to implement Zero Waste systems for all schools and administrative offices.

CASA has also emphasized school outreach as a way of reaching the greater Alameda community. By recycling and composting at school, Alameda students learn the importance of reduction and conservation and bring the message back home to their families. In this way, AUSD and the City can change the "norms" of behavior to strive for zero waste.

As shown in Figure 19, AUSD achieved 41 percent diversion overall in 2008.

Figure 18 AUSD Annual Disposal and Diversion Tons

School/Facility	Recycling	Disposal	Diversion Rate
Alameda High School	31	55	36%
Bay Farm Elementary	5	21	20%
Chipman Middle School	31	52	38%
Earhart Elementary	39	21	65%
Edison Elementary	16	16	50%
Encinal High School	47	47	50%
Franklin Elementary	16	16	50%
Haight Elementary	16	16	50%
Island High School	5	8	40%
Lincoln Middle School	21	47	31%
Longfellow Center	21	21	50%
Lum Elementary	16	21	43%
Miller Center	16	31	33%
Otis Elementary	16	21	43%
Paden Elementary	13	21	38%
Ruby Bridges Elementary	21	91	19%
Thompson Field	0	8	0%
Washington Elementary	31	16	67%
Wood Middle School	78	42	65%
Woodstock Center	21	36	36%
District Offices	31	21	60%
Clement Warehouse	0	5	0%
Maintenance Yard	0	44	0%
WCWD	0	21	0%
Total	**489**	**694**	**41%**

Source: CIWA Schedule of Service (tons calculated based on service volumes), August 2008. Quantities may not sum due to rounding.

Alameda Green Schools Challenge

In early 2009, AUSD began a new program to increase sustainable practices at the school sites. The Maintenance, Operations, and Facilities department is working with school stakeholders, including student groups, teachers, custodians, principals, parents, and CASA members to implement new recycling and composting programs in the schools. In June 2009, AUSD received a three-year grant from the Altamont Education Advisory Board for $142,000 for equipment and outreach materials to implement new recycling and composting programs at all schools and district facilities. The grant goals include:

- Universal access to recycling
- Phase-in food scrap diversion
- Education to promote cultural change
- Communication and sharing best practices
- Increase diversion from 41 percent to 75 percent in 3 years
- Uniform recycling and composting programs at all schools and district facilities
- Reduce greenhouse gas emissions
- Create zero waste cultural change throughout the community

Bay Farm Elementary School's "Tree Musketeers" helped out with the AUSD waste audit

As part of the Alameda Green Schools Challenge, AUSD implemented an organics diversion pilot in fall of 2009. Five schools are included in the organics diversion pilot, including: Bay Farm, Chipman, Edison, Otis, and Paden. Bay Farm and Edison implemented the program on the first day of school and the results were highly successful, reducing lunchtime waste from 5 to 7 bags of trash per day to one-half of a bag per day. Figure 20 shows the diversion rates at each of the pilot schools prior to and after implementation of the new recycling and composting program. These figures are based on the current service levels (in cubic yards of service per month) for each school. Based on lessons learned from the pilot project, AUSD will expand the program to all schools within three years.

Figure 19 Diversion Rates for Pilot School

Pilot School	Old Diversion Rate	Current Diversion Rate	Current Service Levels (cubic yards of service per month)		
			Recycling	Compost	Trash
Bay Farm	30%	60%	13	13	17
Chipman	33%	67%	52	9	30
Edison	33%	59%	13	5	13
Otis	27%	67%	26	9	17
Paden	24%	65%	22	11	17
Total	30%	64%	126	47	94

The new collection program at the AUSD schools is modeled on the City's residential collection program and includes the same target materials and color coding: blue for commingled recyclables, green for food scraps and organics, gray for residual waste.

By matching the City's program, the AUSD program will provide continuity between the recycling and organics practices at school and the practices at home; reinforcing both.

School Education and Outreach

The City supports recycling at the public, private, and parochial schools through outreach and education programs. The City offers free puppet shows and coloring books that explain waste prevention, recycling, and pollution prevention in a story format, featuring the City's mascot, Sedgwick, the Purple Squirrel. Recycling resources for students and teachers are available on the City's website at www.planetalameda.com and ACI's website www.alamedacountyindustries.com. In addition, the City's program staff and ACI's outreach team provide classroom presentations and assemblies featuring the 4 Rs – reduce, reuse, recycle, and rot, available to all schools in the city.

Section 5 Facility and Technology Options

At the zero waste workshops, the stakeholders identified the need for more conveniently located facilities to handle materials that are difficult to recycle through the curbside collection program, including household hazardous wastes, building materials, and hard to handle materials, such as Styrofoam blocks, textiles and large rigid plastics. These types of facilities are available nearby in Oakland and San Leandro, but stakeholders would prefer to reuse and recycle without leaving the city. Alameda Point has been home to The Re-use People, a building materials reuse center, and currently houses the Cycles of Change/Alameda Point Collaborative Bike Shop which helps disadvantaged youths refurbish discarded bicycles for reuse. Examples of other community scale facilities include:

Eco-Fact: For every 10,000 tons of solid waste, we could create:

1 job at a landfill

4 jobs at a compost facility

10 jobs at a recycling facility

75 to 250 jobs at a reuse facility

--Institute for Local Self-Reliance

- Repair and reuse businesses
- Used building materials yards or re-stores
- Resource Recovery Centers
- Resources Recovery Parks
- Household Hazardous Waste Centers
- Product care centers

A description of these facilities is provided in Appendix C.

The more materials that can be processed and used within the city the less impact there will be to transport materials to regional facilities or overseas. Community scale or neighborhood scale facilities also create jobs and impart skills at the local level to reduce the environmental and economic burdens of transporting workers and materials in the local economy. Further, by using materials locally, such as compost or recovered building materials, through deconstruction, the value of these products will rise, strengthening the economics of these programs.

Regional Scale Facilities

All of the regional solid waste and recycling facilities used by Alameda generators are located outside of the city. Large scale industrial facilities will likely not be developed within the city in the near-term. However, the City can support the development of regional scale facilities in nearby areas through the development of new programs and diversion of new materials including recycling, composting, and C&D. Regional scale facilities include:

- Material recovery facilities
- Transfer stations
- C&D processing

- Composting
- Biomass facilities
- Conversion technology facilities

A description of these facilities is provided in Appendix C.

Section 6 Diversion Results and Greenhouse Gas Reduction Potential

Recommended Approach

Based on the input from the stakeholders at the March and June workshops, the City conducted an analysis of the policies and programs to estimate their diversion potential, greenhouse gas emissions reduction potential, and planning level costs. The preliminary findings and draft plan elements were presented to the stakeholders at the August workshops and at the CASA Town Hall meeting held November 5, 2009.

Stakeholders at the zero waste workshops and Town Hall meeting supported a phased approach where increased outreach and technical assistance was provided prior to mandatory requirements. Figure 21 describes the diversion results based on three scenarios which build upon each other:

- **Increasing voluntary programs**--adding materials to the blue and green carts, undertaking social marketing, advocating for producer responsibility, increasing commercial technical assistance, and streamlining implementation of the City's existing C&D ordinance
- **Implementing mandatory requirements**--including mandatory recycling, product bans (for hard-to-recycle materials like single-use plastic bags) and disposal bans (for recyclable materials like cardboard)
- **Processing residual waste**--processing all solid waste (placed in the gray cart) prior to landfilling.

Figure 20 Diversion Estimates by Scenario

	Baseline (existing programs)	Increasing voluntary programs	Adding mandatory requirements	Add residual waste processing
Diversion (tons)	98,108	112,199	122,054	130,260
Disposal (tons)	48,323	34,231	24,376	16,170
Diversion rate	67%	77%	83%	89%

Source for baseline numbers: City of Alameda 2008 Annual Report to the CIWMB, CIWMB Disposal Reporting System.

Appendix D includes the assumptions and calculations used for estimating the diversion potential of each of the scenarios based on the policies and programs identified by the stakeholders. The diversion estimates are based on comparable policies and programs implemented in other jurisdictions, research, and educated estimates.

The diversion rates are presented as a snapshot in time assuming full implantation of all programs. In reality, policies and programs will be developed over time through additional research, testing,

and pilot programs before the programs are fully implemented. Several policies will require new ordinances and regulations which will require City Council action and time to implement. Based on this analysis, the City can achieve 89 percent diversion, a very high rate of diversion, by implementing the policies and programs identified by the stakeholders.

Zero waste is a design framework for reducing generation of waste and maximizing diversion, not a strict tonnage goal. By implementing the policies and programs identified by the stakeholders, the City will be striving towards zero waste, but there will still be some residual wastes that will be disposed.

Materials remaining to be disposed after all policies and programs are implemented include:

- 7,500 tons that will still be disposed in landfills because they are difficult to recycle. These materials include, but are not limited to: composite materials, non-marketable glass, plastic and metals. Also included are materials that do not have markets including, painted or treated wood, diapers, hazardous waste and special waste.
- 6,000 tons of organic materials including compostable paper and foods scraps, that are not captured through the collection programs or processing systems.
- 2,500 tons of recyclable materials including paper, glass, plastic and C&D, that are not captured through the collection programs or processing systems.

Greenhouse Gas Reduction Potential

The zero waste initiatives recommended in this plan can significantly reduce the City's greenhouse gas emissions.

Based on the estimated diversion rates discussed above, Figure 22 presents the GHG reduction potential of the scenarios using the U.S. EPA WAste Reduction Model (WARM) to estimate GHG reduction based on material types and amounts diverted. Appendix D includes the detailed results of the WARM calculations.

Figure 21 GHG Reduction Estimates by Scenario

	Increasing voluntary programs	Adding mandatory requirements	Add residual waste processing
$MTCO_2E$[1]	(24,120)	(38,374)	(44,424)
Equivalent number of cars removed from the road	4,418	7,028	8,137

[1]Metric Tons of Carbon Dioxide Equivalent

The U.S. EPA created WARM to help solid waste planners and organizations track and voluntarily report greenhouse gas emissions reductions from several different waste management practices.

WARM calculates and totals GHG emissions of baseline and alternative waste management practices—source reduction, recycling, composting, and landfilling. The model calculates emissions in metric tons of carbon equivalent (MTCE), metric tons of carbon dioxide equivalent ($MTCO_2E$), and energy units (million BTU) across a wide range of material types commonly found in municipal solid waste.

The Local Action Plan estimated that the city could achieve a reduction 44,114 $MTCO_2E$ by implementing zero waste initiatives. This is very close to the estimates derived using the assumptions and calculations included in Appendix D. Based on this analysis, the city can achieve a reduction of 44,424 $MTCO_2E$, by implementing the policies and programs identified by the stakeholders.

Section 7 Cost Estimates for Implementing Zero Waste Programs

Cost Estimates

Many of the policies and programs recommended in this plan can be implemented by the City without increasing staff resources. Reorganizing of staff functions and streamlining of regulations could make staff time available for new initiatives.

New staff or contractor resources will be needed to provide zero waste outreach; technical assistance to commercial businesses, multi-family complexes, and City departments; organics technical assistance; and the development of zero waste policy initiatives. Current recycling programs staff and projects are funded through the City's Assembly Bill 939 fee, the City's allocation of the Countywide Measure D fee, and grant funding from the Department of Conservation and the California Integrated Waste Management Board. Staffing and program costs should be evaluated based on the following estimated costs for the programs described in the phased implementation approach.

- **Adding new materials to the blue and green carts.** This program relies on ACI's ability to collect and market materials that are currently not included in the City's blue and green carts. Textiles, rigid plastics, including toys and furniture, and plastic film are currently collected and marketed by recyclers in Oakland and San Jose. Styrofoam blocks are currently collected and marketed by recyclers in the City of Los Angeles and shipped to Stockton for recycling into crown molding. Manures, including pet waste, and compostable plastics are accepted for composting in San Francisco. The City could solicit a proposal from ACI to add more potentially recyclable materials to the blue and green cart collection program and evaluate the cost of adding the materials and its affect on collection rates. As expressed at the zero waste workshops, stakeholders in the city would accept some higher fees in order to recycle more materials. Adding materials to the collection program is expected to have limited impact on collection costs. Based on conservative estimates, collection costs could increase by as much as $80,000 per year depending on the materials adding to the program, the additional tons processed, the distance to markets, and the costs or revenues from the sale of materials.[30]

[30] Currently, ACI receives $0.07 to $0.10 per pound for plastics 1-7. The current market price for mixed rigid plastics is $0.03 per pound. If the City were to add more material types to the program, ACI would receive less revenue per ton but would receive more tons of material. Thus no net new costs for handling more plastics are assumed. Currently, ACI takes organics to the Newby Island compost facility in Milpitas and pays $42.95 per ton. Newby Island is limited in the types of compostable materials it can process. Compost facilities in Santa Clara County and San Joaquin County are able to process more materials, but are located farther away. Based on recent proposals received by the South Bayside Waste Management Authority, the cost differential for hauling to the Grover Landscape compost facility in Modesto is estimated to be $3.15 per ton (based on a lower tipping fee of $32 per ton, but higher transportation costs).

- **Implementing a Social Marketing Campaign.** A large-scale, highly visible social marketing campaign will require staff and contractor resources amounting to approximately $0.20 per household, or business establishment, per month or $85,000 per year. Activities include facilitating the work of community-based organizations such as CASA, business and school groups; developing a social marketing campaign, coordinating media buys and Public Service Announcements, including pre-movie messages at the Alameda Cineplex; and the development of outreach program materials for social marketing activities. This funding should also be made available to sustain the City's "Trash Talker" program where volunteers are trained to educate residents and visitors about how to recycle and compost at special events, including Earth Day, Webster Street Jam, and the Park Street Art and Wine Festival. This program could also be expanding to include Trash Talker volunteers at the monthly Auctions by the Bay event, one of the City's Large Venues under the Assembly Bill 2176 program.
- **Advocating for Producer Responsibility.** The City can best leverage its resources by coordinating efforts through other zero waste communities to sponsor and support legislation for producer responsibility and supporting the work of the California Product Stewardship Council, a non-profit organization formed by zero waste communities to advance producer responsibility initiatives in the state legislature. Contributing $1,000 to $5,000 per year will help keep this lean organization focused on developing producer responsibility initiatives.
- **Increasing Commercial Technical Assistance.** The City maintains staff resources at Public Works and through ACI to provide commercial technical assistance. The City may also request technical assistance for large businesses, such as Abbott Labs, Alameda Hospital, Alameda Towne Centre, Peet's and Wind River, through the Stopwaste.org Business Partnership. Organics technical assistance is also available through Stopwaste.org contractors. CASA has also initiated an outreach program to restaurants and faith-based organizations to encourage greenhouse gas emissions reduction through waste prevention, recycling, and composting. Coordinating efforts through all resources available to the City could provide adequate additional assistance. Freeing up staff resources by streamlining other programs, such as the C&D permitting process, could also allow more time for commercial technical assistance. New dedicated staff or contractor resources may also be needed to optimize this program.
- **Streamlining the City's C&D Ordinance.** City staff have identified stream-lining of the C&D ordinance as a way of making staff resources available for other projects and potentially increasing C&D diversion. Revising and updating the ordinance and issuing the non-exclusive franchises will require some staff resources, but could be accommodated through existing staff resources.
- **Implementing Mandatory Requirements.** Developing the mandatory source-separation ordinance and implementing the mandatory requirements will require some staff resources, but can be accommodated through existing staff resources. The City of San Francisco recently adopted a mandatory source-separation ordinance and intends to implement it through existing staff resources. The City has no direct control over the solid waste facilities

in the region and cannot, on its own, implement a disposal ban. However, it can, through its representation on the board, support the work of Stopwaste.org and other jurisdictions where the facilities are located.

- **Processing Residual Waste.** The City will likely not be a direct developer of processing facilities for residual waste. These capabilities are most appropriately developed at existing solid waste facilities, such as the regional transfer stations and material recovery facilities. However, the City can request a proposal from its franchisee, ACI or disposal contractor, Waste Management, for processing the Alameda's residual waste prior to landfilling. The City can also collaborate with other communities, such as Oakland and San Leandro in the development of regional processing capacity. Costs for processing residual waste through mixed waste MRFs, anaerobic digestion, municipal solid waste composting or conversion technologies range from $50 to $200 per ton. The costs for some technologies can be competitive with the City's current disposal costs. For planning purposes, we are assuming an incremental increase of $50 per ton over current disposal costs[31] for processing the residual waste.

Figure 23 summarizes the estimated costs for implementing zero waste programs.

Figure 22 Zero Waste Program Cost Estimates (2010 $)

Program	Annual Cost	Cost per household or business establishment per month
New materials[1]	$80,000	$0.19
Social Marketing	$85,000	$0.20
Producer Responsibility	$5,000	$0.01
Commercial Technical Assistance[2]	$85,000	$0.20
Total costs for voluntary programs	**$255,000**	**$0.60[5]**
C&D Ordinance	$0	$0
Mandatory Requirements[3]	$0	$0
Total costs including voluntary and mandatory programs	**$255,000**	**$0.60**
Residual Waste Processing[4]	$1,000,000	$2.40
Total costs at full implementation of programs and facilities	**$1,255,000**	**$3.00[6]**

[1]Assumes $3.15 per ton increase in green cart processing and transportation costs for 25,000 tons per year. No net new costs for handling more plastics are assumed.
[2]Assumes one additional part-time staff person hired by the City or ACI.
[3]Assumes current levels of City and ACI staff to address compliance issues.
[4]Assumes $50 per ton increase in gray cart processing costs for 20,000 tons per year.

[31] The City's current disposal costs are approximately $70 per ton. For planning purposes, we are assuming that total costs for preprocessing and disposal would be $120 per ton.

[5]This represents a 2% increase for standard residential 32-gallon service.
[6]This represents a 10% increase for standard residential 32-gallon service.

Cost Benefit Analysis

To assess the cost benefit of the policies and programs, we calculated the costs per ton of waste diverted and costs per ton of $MTCO_2E$ reduced. The results of this analysis are presented in Figure 24. Costs for implementing the voluntary and mandatory programs amount to $18 per ton diverted or $11 per $MTCO_2E$ reduced. Adding residual waste processing would cost about $122 per ton diverted or $165 per $MTCO_2E$ reduced.

Figure 23 Costs per Ton Diverted and $MTCO_2E$ Reduced

	Increasing voluntary programs	Adding mandatory requirements[1]	Add residual waste processing
Tons diverted per year (net new tons)	14,091	9,855	8,206
Annual costs	$255,000	$0	$1,000,000
Costs per ton	$18	$0	$122
GHG emissions reductions ($MTCO_2E$) (net new reductions)	(24,120)	(14,254)	(6,050)
Costs per $MTCO_2E$ reduced	$11	$0	$165

[1]Assumes current levels of City and ACI staff to address compliance issues.

Mandatory requirements are cost-effective, particularly if the City does not have to invest in additional staff resources to address compliance issues. This is a reasonable assumption, since the City's Styrofoam ban achieved a high level of compliance with negligible additional costs to the City. Similarly, the City of San Francisco does not intend to dedicate additional staff resources to the enforcement of its recently adopted mandatory recycling ordinance. New regulations and requirements, just like smoking bans and seat belt laws, require implementation of policy initiatives, since the City would be asking generators to change their behavior. In contrast, behind the scenes processing technologies require the expenditure of financial capital, since the City or its service providers would need to invest in new infrastructure. In discussing the mandatory requirements being considered by the City, generators, including commercial generators, felt that this would be acceptable, provided that there was a level playing field and the new programs were cost-effective and did not pose an undue burden on generators.

Reducing GHG emissions through zero waste initiatives is also very cost-effective. While the City will incur costs to implement the zero waste initiatives, overall system costs will likely be reduced as generators reduce waste and increase diversion. Individual generators, particularly commercial generators, may realize cost-savings by increasing recycling collection service and reducing solid waste collection service. Zero waste initiatives are also cost-effective compared to other potential

strategies for reducing GHG emissions such as increased public transportation infrastructure, switching to non-fossil fuels, and developing renewable energy resources.

Section 8 Implementation Plan

Implementation Tasks

Figure 25 lists all of the tasks necessary to undertake the Zero Waste Implementation Plan. Model ordinances and draft code amendments and contract amendments that may be needed to implement some of these action steps are included in Appendix B.

Figure 24 Implementation Tasks 2011 through 2020

Task	Lead Responsibility	Participants
Voluntary Programs 2011-2013		
2011 – Year 1 Activities		
Add materials to blue and green cart --More recyclable plastics --More compostable materials	Public Works	ACI
Social Marketing **Year 1 Activities** --Marketing plan --Media buys --Volunteer training --Outreach materials	Public Works	ACI CASA School groups Business groups Contract assistance (if needed)
Trash Talker Program	Public Works	Recreation and Parks ACI
City Facility Zero Waste **Year 1 Activities** --Department goal setting (e.g., 75% diversion) --I Increase recycling and organics collection, decrease solid waste collection --Quarterly report to the Green Team on Department progress	Public Works	Green Team All Department Heads
Alameda Green School Challenge --Provide outreach and technical assistance, as requested --Participate in quarterly meetings coordinated by CASA with AUSD facilities staff and other private and parochial schools	Public Works CASA	AUSD CASA Public Works
Producer responsibility	Public Works	Green Team

Task	Lead Responsibility	Participants
--Develop Council Resolution to support Product Stewardship --Support California Product Stewardship Council --Continue voluntary take-back efforts with local retailers		
Commercial Technical Assistance **Year 1 Activities** --Participate in quarterly meetings coordinated by CASA with Stopwaste and ACI to identify specific generators for technical assistance (such as restaurants and large generators) --Share information on priority generators --Concentrate activities on generators without blue cart and green cart services	Public Works CASA	ACI Stopwaste.org
Ordinance Changes --By June, meet with Commercial/Multifamily user group to build consensus for implementation of a mandatory recycling ordinance --Modify Chapter XXI to include Commercial/Multifamily Recycling Ordinance with implementation dates and mandatory participation requirements as determined	Public Works	City Attorney
2012 – Year 2 Activities		
Ordinance Implementation --Implement Commercial/Multifamily Recycling Ordinance as determined in Year I	Public Works	City Attorney
Social Marketing **Year 2 Activities** --Provide Support to School and Community Organizations to assist with environmental stewardship, outreach and education efforts	Public Works	ACI CASA School groups Business groups
City Facility Zero Waste **Year 2 Activities** --Department technical assistance --Program monitoring	Public Works	Green Team All Department Heads

Task	Lead Responsibility	Participants
--Quarterly report to the Green Team on Department progress		
Commercial Technical Assistance Year 2 Activities --Participate in quarterly meetings coordinated by CASA with Stopwaste and ACI to identify specific generators for technical assistance (such as restaurants and large generators) --Target generators without blue cart and green cart services --Set initial goal of 25 percent diversion for commercial sector --Monitor progress toward goal	Public Works CASA	ACI Stopwaste.org
2013 - Year 3 Activities		
Social Marketing Year 3 Activities --Business recycling recognition awards event --"Emerald Effect" recognition --Green restaurant list published --Case studies publish on website, newspaper, Chamber newspapers	Public Works	ACI CASA School groups Business groups
City Facility Zero Waste Year 3 Activities --Department recycling recognition awards event --"Emerald Effect" recognition for City Departments --Program monitoring --Quarterly report to the Green Team on Department progress	Public Works	Green Team All Department Heads
Commercial Technical Assistance Year 3 Activities --Audit progress in obtaining the 50% participation rate --Monitor and adjust program to achieve 75% participation --"Emerald Effect" recognition for new	Public Works	ACI Stopwaste.org

Task	Lead Responsibility	Participants
business recyclers		
Re-evaluate marketable materials that can be included in blue cart and green cart	Public Works	ACI
Evaluate the effectiveness of C&D ordinance changes	Public Works	
Evaluate the effectiveness of Social Marketing Activities	Public Works	ACI CASA School groups Business groups Contract assistance (if needed)
Evaluate the effectiveness of City Facility Zero Waste Activities	Public Works	Green Team All Department Heads
Evaluate the effectiveness of Commercial Technical Assistance Activities	Public Works	ACI CASA Stopwaste.org
Add new materials to the blue cart and green cart	Public Works	ACI City Attorney
Update Social Marketing tools	Public Works	ACI CASA School groups Business groups Contract assistance (if needed)
Implement new City Facility Zero Waste tasks, as developed	Public Works	Green Team All Department Heads
Implement new Commercial Technical Assistance tasks, as developed	Public Works	ACI CASA Stopwaste.org
Mandatory Programs 2014-2016[32]		
2014 – Year 4 Activities		
Consider implementation of additional	Public Works	

[32] Implementation of mandatory programs can be expedited if required by State or County legislation or directed by the City Council.

Task	Lead Responsibility	Participants
product bans, such as single-use plastic bags		
Consider implementation of mandatory recycling and composting requirements	Public Works	
2015 – Year 5 Activities		
Work with Stopwaste.org to identify and implement new Disposal Bans	Stopwaste.org	Public Works
Monitor and support California Product Stewardship Council and League of California Cities on issues pertaining to integrated waste streams	Public Works	
Residual Waste Processing 2016-2020		
Support regional and private development of Residual Waste Processing	Public Works	

Section 9 - Conclusion

The City of Alameda currently has a successful waste diversion program, diverting 67 percent of materials from landfills in 2008. However, based on a waste characterization study conducted by Stopwaste.org in 2008, nearly 80 percent of the City's disposed waste is reusable, recyclable or compostable. The City conducted numerous workshops throughout the city and among different generator sectors to elicit feedback on the interest and preferences of the community to implement Zero Waste programs and policies. Based on this feedback, the City has developed a 10-year program which is expected to increase the City's diversion rate to 89 percent and reduce Greenhouse Gas emissions by 44,424 $MTCO_2E$ by 2020.

Appendix A Community Survey Results

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Sand Castle and Sculpture Contest, June 2009—Final Tally

Please indicate which policies you strongly agree with and which you strongly disagree with. Also, please identify additional policies not included on this list that the City should consider adopting to achieve Zero Waste.

- Engage industry, make them aware of materials and products that are problems for the City, and establish a process for resolving those problems.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
88	56	6	1	1

- Adopt the policy that no compostable organics should go to landfill.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
76	59	14	3	0

- Require processing of all materials (MRF first) before they are buried in landfills to leach out toxics and digest organics.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
76	56	9	2	0

- Adopt "Precautionary Principle" for all City purchases. The precautionary approach seeks to minimize harm by using the best available science to identify safer, cost-effective alternatives.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
70	63	16	2	0

- Ask businesses to adopt Zero Waste goals and plans that follow Zero Waste Business Principles.[33]

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
71	65	18	2	0

- Use new outreach tools, including Facebook, YouTube, blogging, and Twitter to communicate Zero Waste messages.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

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68	56	22	4	0

Starlight Movies in the Park, July 2009—Final Tally, Adult Survey

Please indicate which policies you strongly agree with and which you strongly disagree with. Also, please identify additional policies not included on this list that the City should consider adopting to achieve Zero Waste.

1. Engage industry, make them aware of materials and products that are problems for the City, and establish a process for resolving those problems.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
18	13	0	0	0

2. Adopt the policy that no compostable organics should go to landfill.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
17	7	7	0	0

3. Require processing of all materials (MRF first) before they are buried in landfills to leach out toxics and digest organics.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
16	8	7	0	0

4. Adopt "Precautionary Principle" for all City purchases. The precautionary approach seeks to minimize harm by using the best available science to identify safer, cost-effective alternatives.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
16	8	7	0	0

5. Ask businesses to adopt Zero Waste goals and plans that follow Zero Waste Business Principles.[34]

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
15	15	1	0	0

6. Use new outreach tools, including Facebook, YouTube, blogging, and Twitter to communicate Zero Waste messages.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
15	10	3	1	0

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Starlight Movies in the Park, August 2009—Final Tally, Adult Survey

Please indicate which policies you strongly agree with and which you strongly disagree with. Also, please identify additional policies not included on this list that the City should consider adopting to achieve Zero Waste.

1. Engage industry, make them aware of materials and products that are problems for the City, and establish a process for resolving those problems.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
4	2	2	0	0

2. Adopt the policy that no compostable organics should go to landfill.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
3	2	2	1	0

3. Require processing of all materials (MRF first) before they are buried in landfills to leach out toxics and digest organics.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
3	3	2	0	0

4. Adopt "Precautionary Principle" for all City purchases. The precautionary approach seeks to minimize harm by using the best available science to identify safer, cost-effective alternatives.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
2	6	0	0	0

5. Ask businesses to adopt Zero Waste goals and plans that follow Zero Waste Business Principles.[35]

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
4	2	2	1	0

6. Use new outreach tools, including Facebook, YouTube, blogging, and Twitter to communicate Zero Waste messages.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
2	3	2	2	0

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4th of July Jubilee Kid's Survey (k – 6)

Name: 4th of July Jubilee **Date**: July 4, 2009

1. Have you heard about Zero Waste? Yes: 11 No: 29

   If Yes, from where? School: 9

2. Do you separate recycling and composting into the blue and green carts at home?

   Please Circle One: Yes: 38 No: 0 Don't Know: 1

3. Have you ever visited <PlanetAlameda.com>? Yes: 2 No: 35 Don't Know: 3

4. Please circle any or all of the following you use to communicate:

Facebook:	4
You Tube:	11
Blogging:	1
Twitter:	1
My Space:	2
Other:	2
Email:	3
No Answer:	3

July Movies in the Park Kid's Survey (k-6)

Event: July Movies in the Park **Date:** July 24, 2009

5. Have you heard about Zero Waste? Yes: **9** No: **22**

   If Yes, from where? School; Dad; Ice Rink at event in Alameda; friends; ACI Newsletter; 4th of July Festival

6. Do you separate recycling and composting into the blue and green carts at home?

   Yes: **26** No: **3**

7. Please circle any or all of the following you use to communicate:

Facebook:	6
You Tube:	4
Blogging:	1
Twitter:	0
My Space:	5
Other:	1

August Movies in the Park Kid's Survey (k-6)

Event: August Movies in the Park **Date**: August 28, 2009

1. Have you heard about Zero Waste? Yes: **11** No: **40**

   If Yes, from where?
   School: **8**
   Parents: **1**
   Rap: **1**

2. Do you separate recycling and composting into the blue and green carts at home?

   Yes: **43** No: **7** Don't Know: **1**

3. Please circle any or all of the following you use to communicate:

   Email: **7**
   AOL: **1**
   Facebook: **3**
   You Tube: **7**
   Blogging: **1**
   Twitter: **1**
   My Space: **1**
   Other: **2**

Appendix B Model Ordinances, Draft Code Amendments, and Contract Amendments

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Summary of Selected Mandatory Commercial Recycling Ordinances (provided by Stopwaste.org)

Jurisdiction	Materials Covered	Thresholds: Business / MFD / Mobile	Enforcement/ Exemption	Performance Metric (goal, reporting)	Amount Spent on Enforcement/ Funding	Technical Assistance / Outreach
Sacramento	All food / beverage establishments: aluminum & steel containers; glass bottles / containers, plastics, cardboard and boxes. All other businesses: paper, plastic, aluminum cans, scrap metal, wood pallets.	All business and non-residential properties that subscribe 4 cubic yard or greater per week garbage service. Multi-family with five or more unit per parcel.	Hazardous material and food inspectors check for compliance. Exemption: A self-hauling form is filled out that certifies all self-hauling activities. Exempt if space limitation or if compliance will result in zoning violation. Up to $1000 day fine for noncompliance	Businesses submit a detailed plan about on-site recycling. Haulers report quarterly on recycling tonnages and destination of recyclables. Waste haulers required to submit Recycling Plans; City staff review quarterly hauler reports, conduct on-site inspections, and can audit hauler records.	1st year enforcement = $400k. This covers 3,000 businesses per year of the 9,000 total targeted for enforcement. Enforcement on a 3 year cycle City spends approximately $100-$130/business to enforce on approximately 40% of eligible businesses Franchise hauler fees ($500 per truck annually)	Each business has to provide containers for recycling, signage, and written recycling requirements site. SWA provides a handbook, sample signage, and other information; Over 10,000 Direct Mailers were mailed out.
San Diego	All papers, cardboard, plastic and glass bottles and jars, metal cans, and also other materials for which markets exist.	Residential / multi-family: 1/1/2008 Phased approach for commercial customers, by size: 20,000 square feet or more, 10,000 square feet or more on and for all businesses. For multi-family 100 units or more, for 50 or more, for all complexes unless exempt.	Solid waste code enforcement officers work in concert with recycling staff. Exemptions for 6 cubic Yards per week or less of generation of recyclables and refuse. A business may also apply for an exemption if they lack space to recycle, or if they generate no recyclables.	Haulers must provide an annual report. Staff targets those with low service levels of recycling, informs them of the ordinance, and offers assistance. If service levels don't increase, staff can take enforcement actions.	Approximately $221,000/year (estimated) Recycling enterprise fund, an AB 939 fee A direct fee for multifamily complexes One code enforcement inspector, 2 recycling specialists, .5 admin aide	The party who sets up the recycling program is also responsible for educating tenants or occupants annually, upon occupancy, or when changes to the program occur. Technical assistance to businesses, events and venues is also provided by City staff.

Jurisdiction	Materials Covered	Thresholds: Business / MFD / Mobile	Enforcement/ Exemption	Performance Metric (goal, reporting)	Amount Spent on Enforcement/ Funding	Technical Assistance / Outreach
						There are guidelines for appropriate containers and signage.
City and County of San Francisco	Almost all recyclables (i.e. paper, bottles, cans and plastic, etc.) and compostables.	All--applicable to everyone. No threshold. Multi-family is included.	Drivers will leave tags when they see the wrong material in trash, recycling or composting containers. Other Recology employees may look as can SFE, DPW and DPH City staff. Exemptions include a space waiver and small generator fines are capped at $100. Mixing of materials at multi-tenant buildings will not be enforced until July 1, 2011.	100% compliance is the goal. On-site inspection for reviewing compliance.	$185k per year Existing funding will be used, in addition to fines and fees that will provide funding.	SFE will do broad outreach on the ordinance in an effort to make every person in SF aware of it. The City will send letters to businesses and apartment owners. Recology will include info in bills and send letters to small property owners and hang flyers on containers as they re-label them.
Seattle, WA	Prohibited from commercial trash: significant amount of paper, cardboard, yard	The ordinance (this is a landfill ban, not a mandatory recycling ordinance) is applicable to residential, multi-family, commercial, and self-haul customers. Free recycling for multi-family customers. Some flexibility for hotels.	The penalty phase started one year after the implementation of the program. Non-compliance is defined as more than 10% of such material in trash by visual inspection. Two warnings, then $50 surcharge to haul the material away. So far, 18 fines	60% diversion goal.	One full-time commercial business inspector has been hired. Funded through solid waste rates.	The City contracts with Resource Venture, a program of the Greater Seattle Chamber of Commerce, to provide free waste reduction and recycling technical assistance to Seattle businesses.

Jurisdiction	Materials Covered	Thresholds: Business / MFD / Mobile	Enforcement/ Exemption	Performance Metric (goal, reporting)	Amount Spent on Enforcement/ Funding	Technical Assistance / Outreach
			were collected. Exemption: space limitation for containers.			

Links to Sample Mandatory Recycling Ordinances

Sacramento Regional Solid Waste Authority Business and Multi-family Recycling Requirements http://www.msa2.saccounty.net/swa/Documents/Title-IV.pdf (accessed October 15, 2009)

San Diego Recycling Ordinance

http://docs.sandiego.gov/municode/MuniCodeChapter06/Ch06Art06Division07.pdf (accessed October 15, 2009)

San Francisco Mandatory Recycling and Composting Ordinance

http://www.sfenvironment.org/downloads/library/sf_universal_recycling__composting_ordinance.pdf (accessed October 15, 2009)

Seattle Prohibition of Recyclables in Garbage

http://www.seattle.gov/util/stellent/groups/public/@spu/@csb/documents/webcontent/cos_003964.pdf (accessed October 15, 2009)

Summary of C&D Ordinances in Alameda County (provided by Stopwaste.org)

Jurisdiction	Diversion Requirement	Threshold	Who can haul
Alameda	50% of waste generated	Projects valued at $100,000 or more	Local franchise waste hauler - Alameda County Industries (ACI) or Permitee as approved by Public Works Department. Self-haul if materials are loaded onto fixed body vehicle and delivered directly to facilities.
Albany	100% of asphalt, concrete and similar material, at least 50%, by weight, of all other C&D Debris generated.	Projects valued at $75,000 or more. $25,000 for just demolition projects.	Local franchise waste hauler. Self haul for commodities, donated materials or materials hauled by owner or occupant, or its contractor.
Berkeley	100% of concrete and asphalt, 50% of remaining waste generated (Applicants shall make salvageable materials available for reuse prior to demolition)	All construction or renovation projects valued at $100,000 or greater. All demolition projects.	Mixed debris or source separated materials can be self-hauled to a qualifying mixed C&D facility *(identified in the builders guide)*. Self-haul clean loads to Berkeley transfer station which sorts mixed C&D material, and has discount fee for clean compostable loads - *unpainted untreated wood, sheetrock, garden trimmings*. Contractor, self-haul, or local franchised haulers: *City of Berkeley, Biagini Refuse Services, Golden Gate Disposal, Richmond Sanitary, US Eagle, Waste Management & Bayview Refuse.*
Dublin	100% of concrete and Asphalt 50% of remaining waste Generated	Projects valued at $100,000 or more. Projects valued at $1,000,000 or more require a performance security deposit.	Debris boxes must be from a City of Dublin Pre-Approved Franchisee. Source separated recyclable materials may be removed by licensed transporters. Demolition debris may be removed by a licensed demolition/ construction company. Request a list of approved haulers from the City.
Fremont	100% of concrete and asphalt 50% of remaining waste generated.	Construction and renovation projects valued $300,000 or greater (residential, commercial and civic). All demolition projects.	Anyone can haul. Recycling loads cannot contain more than 10% residual waste, otherwise Allied Waste must haul as Municipal Solid Waste (MSW). Strictly MSW boxes must go through Allied Waste.
Hayward	100% of asphalt, concrete and similar material (dirt, inerts)	Projects valued at $75,000 or more and all City sponsored projects.	Debris boxes must be from franchise hauler- Waste Management of Alameda County (WMAC). Mixed debris or source separated materials can be self-hauled to a qualifying

Jurisdiction	Diversion Requirement	Threshold	Who can haul
	50% of remaining waste generated (not inerts)		mixed C&D facility *(identified in the builders guide)*. Weight tags are required to be turned in at the end of the project.
Livermore	50% of waste generated	Projects valued at $300,000 for construction or renovation. $40,000 for demolition. $1,000,000+ requires performance security deposit.	Open competition.
Newark	100% Asphalt and Concrete 50% of remaining waste Generated	All City or privately owned projects valued at $100,000 or greater. Structure demolition projects greater than $20,000	
Oakland	100% Asphalt and Concrete 65% of remaining waste Generated	All new construction, All demolition projects, Commercial projects valued at $50,000 or more.	Licensed franchised collector, Waste Management of Alameda County. Source separated C&D may be collected through private arrangements between generator and collector or licensed contractor as part of service or self-haul.
Piedmont	50% of waste generated	All construction, demolition or renovation valued at $50,000 or more	The City will provide one-half the cost of debris boxes used exclusively for the purpose of mixed C&D materials removed from the site by the City's franchised waste hauler for covered projects until funding is exhausted.
San Leandro	100% of asphalt, concrete, and similar material. 50% of remaining waste generated (not including inerts).	All construction projects valued at $100,000 or more.	The contractor/ subcontractors can self-haul; or local franchised waste hauler Alameda County Industries 510-357-7282 or Waste Management of Alameda County 510-613-8710; or A cleanup contractor (D63 classification) if doing cleanup work at the site.
Union City	50% of waste generated	Construction and demolition projects valued at $100,000 or more. Residential remodels increasing square footage by 50% or more	Allied Waste is the City's solid waste franchisee and provides collection and debris box services for construction sites. The City issues permits for others to collect and process construction and demolition debris. Permit holders shall only collect construction and demolition debris that has been separated from other solid waste and placed at a

Jurisdiction	Diversion Requirement	Threshold	Who can haul
			designated location for collection.
Alameda County	Traditional Public Works projects are required to divert 75% of asphalt, concrete, and similar materials and 50% for remaining C&D materials generated. County Projects must divert 50% of all C&D materials generated.	Construction – County projects and traditional public works projects valued at $100,000 or more. Demolition projects valued at $25,000 or more.	
Castro Valley Sanitary District	50% of waste generated	Construction and renovation projects valued at $75,000 or more. Demolition projects totaling an area of 1,000 square feet or more. Small projects do not fall under full enforcement of ordinance, but must still divert at least 50% and either use Waste Management of Alameda County or self-haul.	Franchised hauler, Waste Management of Alameda County or Self-haul by a fixed body vehicle to District-approved site. (sites approved as needed; no list available).
Oro Loma Sanitary District	100% of asphalt, concrete, and similar materials. 50% of remaining waste materials generated	Construction projects valued at $100,000 or more. Demolition projects valued at $40,000 or more.	Self-haul or use debris boxes from District's franchised waste hauler.

Links to Sample Non-Exclusive C&D Hauling Franchises and C&D Ordinances

City of Santa Rosa Non-Exclusive C&D Franchise Agreement
http://web1.ci.santa-rosa.ca.us/city_hall/pdf/City_Council/25494attA.pdf (accessed October 15, 2009)

City of Palo Alto C&D Ordinance
http://www.cityofpaloalto.org/civica/filebank/blobdload.asp?BlobID=15593 (accessed October 15, 2009)

City of Santa Clara Non-Exclusive Industrial Franchise Agreement
http://cityclerkdatabase.santaclaraca.gov/pdfCreator/Export.aspx?did=AAAAD051209051026389.DID&db=SCAGENDA (accessed October 15, 2009)

Appendix C Community and Regional Scale Facilities

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Community Scale Facilities

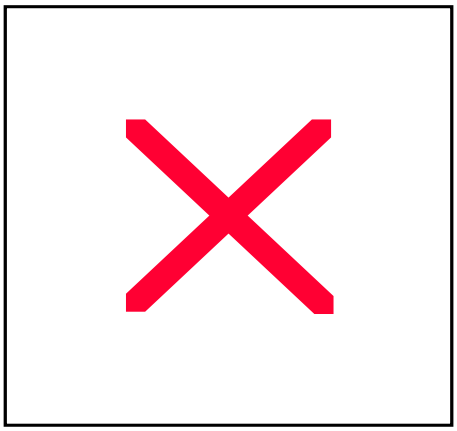
The more materials that can be processed and used within the city the less impact there will be to transport materials to regional facilities or overseas. Community scale or neighborhood scale facilities also create jobs and impart skills at the local level to reduce the environmental and economic burdens of transporting workers and materials in the local economy. Further, by using materials locally, such as compost or recovered building materials, through deconstruction, the value of these products will rise, strengthening the economics of these programs.

Reuse and repair businesses – Many household items can be feedstock for repair enterprises or programs that return items for reuse. These enterprises and programs also help people acquire important skills, including retail, which can be used to get jobs or further personal projects. Examples of reuse and repair businesses include:

Cycles of Change at Alameda Point

- **Bicycle Repair**. Non-profit bicycle repair operations focus on imparting skills and refurbished bicycles within their communities. Often these shops combine the sale of refurbished bicycles with sales of new bicycles and accessories. Cycles of Change and the Alameda Point Collaborative operates a bike center at Alameda Point. Youth and adults are able to volunteer in exchange for credits toward bikes and bike parts. The center also sells used bicycles and provides job training.
- **Appliance Repair**. Appliances that are not too old are refurbished and made available for sale at greatly discounted prices. This process also trains workers in mechanical and electrical skills. Appliances that are too old for meaningful repair are recycled through the scrap metals yards and brokers. Appliance fix-it shops take responsibility for removing liquids such as Freon from refrigerators, prior to final recycling as prescribed by law. An excellent example of a small-scale appliance program is St. Vincent De Paul, Springfield/Eugene, Oregon.
- **Furniture Repair**. Furniture repair shops are involved with cosmetic repairs on slightly damaged items or comprehensive overhaul of wood or metal-framed furniture. These facilities train workers in upholstery skills and woodworking. Some of these operations recycle mattresses, stripping out stuffing, sterilizing the material for reuse, and recycling the metal springs.

- **Textile Refurbishing and Recycling**. There is a vibrant international market for textile discards. A textile operation can collect high-grade textile discards and segregate quality items that can be repaired and resold in local markets. Reused clothing stores throughout the US make high quality items available at modest prices. These entities also train workers in skills associated with textile refurbishment. For example, the Korean Cultural Center, located in the City of Los Angeles is producing embroidered canvas bags for sale as replacements for one-way paper and plastic grocery and shopping bags. In Oakland, St. Vincent de Paul's Found Art Project employs homeless women to make purses and gift bags out of donated materials that are damaged or can't be resold. Some of these items are on sale at the St. Vincent de Paul store in Alameda.



St. Vincent de Paul Found Art Project

- **Bulky Item Collection for Repair and Recycling**. All cities have bulky items that have to be collected on a regular basis. If not, some bulky items such as furniture, appliances, windows, and other building materials are improperly discarded on streets, alleys, and parks.
- The City has addressed this problem by providing bulky item collection services through the on-call collection program operated by ACI. However, currently, all of the items collected through the program are reused or recycled outside of the city.
  - **Reuse partners**. Items collected could be made available to fix-it shops as inventory for their operations. Other entities can recycle materials that cannot be refurbished. In Oakland, the City contracts with a grassroots reuse group that does the bulky items collection for the City and then refurbishes and recycles items before ultimate disposal. In Fremont, a non-profit for reuse precedes the garbage company's bulky pickup truck and collects whatever items they think are reusable.
  - **Lot sales**. Lot sales allow fix-it shop operators to bid on a large number of bulky items as opposed to single item acquisition. This approach allows for speedy processing of bulky items. In Austin, Texas, the most profitable operation for an extensive Goodwill operation is the "Blue Hangar" which is where all the reusable items are sold after not being "sellable" in their network of stores in the area.

Used Building Materials – "Re-stores"[36] are businesses that sell used building materials. Some entities also resell new building materials donated by builders, manufacturers, and households. Successful resale operations require an estimated 100,000 square feet under roof for maximum

[36] Habitat for Humanity, Habitat ReStores, http://www.habitat.org/env/restores.aspx (accessed September 9, 2009). The term "re-store" is now used generically as denoting a used building materials resale store.

efficiency, but many programs have started with as little as 15,000 square feet under roof, plus space for loading docks and customer and employee parking. A resale business of 100,000 square feet requires 10 workers. Expandable space is critical, as re-stores traditionally grow rapidly. Moving a re-store can be very expensive. Hence, a re-store that uses space that can be readily expanded through lease or new construction, has a great advantage. Re-stores can save a community $250,000 annually based on reduced prices for good building materials and supplies.

A re-store typically relies on three sources of materials for inventory/sales. The re-store may be affiliated with a deconstruction entity that provides recovered building materials. If the re-store is a non-profit organization, it receives donations from builders, contractors, brokers, and businesses that are remodeling their facilities such as hotels, apartment houses, office buildings. Traditional building material retail stores also provide overstock or outdated, but still useful, products. A third source of inventory are individual households that are remodeling and want to see their old, but still useful cabinets, appliances, and flooring put to good use. It is important for a re-store to establish relationships with all of these sources of inventory.

The ReUse People operated a used building materials warehouse at Alameda Point. This facility has relocated to Oakland and is co-located with the Habitat for Humanity ReStore and the St. Vincent de Paul Outlet Center Store in a mini "eco-park".

Resource Recovery Centers – A city the size of Alameda could support a small center for drop-off of hard to recycle items. These centers could be staffed and supported by advanced product fees collected on a citywide basis, with payments from the City on a per ton basis for diverting materials from disposal to donations and local enterprises. Neighborhood business districts would also benefit from a neighborhood scale center to service their immediate needs. A drop-off site for corrugated cardboard could reduce the amount of waste hauled by the City's contractors by 50 percent. Commercial recycling service providers could own and operate these small centers, which would earn revenue from tip fees and sale of materials.

Resource Recovery Parks – Resource Recovery Parks are places where materials can be dropped off for donation or buyback and co-locate reuse, recycling and composting, processing, manufacturing, and distribution activities. Typically, these facilities are located in industrially zoned areas that are reserved for companies that process secondary materials or make products from these materials.

The Resource Recovery Park concept has been evolving naturally in California at landfills and transfer stations. These facilities have continued to provide additional recycling opportunities for self-hauled loads. Landfills and transfer stations have been near the centers of waste generation. A Resource Recovery Park can make the landfill or transfer station more sustainable by diversifying revenue, conserving capacity, and extending the useful life of those facilities.

Household Hazardous Waste Centers – There are four drop-off household hazardous waste centers in Alameda County, including the facility at 2100 East 7th Street in Oakland which is the most convenient for Alameda residents. Residents can drop-off household chemicals, paints, medicines, needles, light fixtures, pool supplies, motor oil, pesticides, and batteries. These materials are processed for recycling whenever feasible. ACI also accepts a limited number of household hazardous wastes at its office on Blanding Avenue, including batteries and paint.

Additional locations may be needed to make drop-off more convenient for people who live far from the existing sites. Management of household hazardous waste center materials is costly.

Center for Hard to Recycle Materials – In Boulder, Colorado, Eco-Cycle, a grassroots recycling program under contract with the City, has started a Center for Hard to Recycle Materials (CHaRM) to address the need to manage new products that enter the discard stream and are not readily recyclable or reusable. The CHaRM Center accepts computers, printers, TVs, cell phones, textiles, plastic bags, white block foam, and other hard-to-recycle materials. CHaRM ensures that electronic components are dismantled in the US and that toxics are handled in a responsible manner. The program is funded through a local "trash tax" on the private waste haulers. Most recently, in an effort to put the responsibility for hard-to-recycle materials back on manufacturers, CHaRM has launched the Partners for Responsible Recycling that encourages retailers and brand manufacturers to assist CHaRM in developing in-store takeback programs. Eco-Cycle now gets financial support from industries that produce the products that are dropped off at that CHaRM facility.[37]

British Columbia, Canada has also pioneered the development of takeback programs with industry. In the l980s, the Province determined that household products and vehicles were major contributors to the household hazardous waste stream (paint made up of 70 percent HHW; solvents/thinners/fuels; 17 percent; and domestic pesticides; 7 percent). Together, these products accounted for 94 percent of the HHW stream (all of which was paid for by taxpayers). The provincial government, therefore, adopted Extended Producer Responsibility programs for producers and users of products that created the problem waste. These products included paints, solvents and flammable liquids, pesticides, pharmaceuticals, tires, and lubricating oil.[38] Manufactures of covered products must take back the products for recycling or appropriate disposal.

Product Care Centers – As takeback programs expand and increase, more manufacturers will take more products back. Retailers must be the intermediaries in moving the materials from consumer to manufacturer. Yet, retail stores often do not have the space or workforce to manage take back products and materials. A community product care center can serve numerous manufacturers, which would pick up the products and materials they are responsible for. This model has been developed extensively in British Columbia. By aggregating materials, collection costs are reduced. Further, properly trained staff for a product care center will keep products and materials safe from contaminating other materials or the environment. As noted above, a product care center could be integrated into other community scale facilities, forming a small resource recovery center.

[37] Ecocycle, Center for Hard to Recycle Materials (CHaRM), http://www.ecocycle.org/charm/index.cfm (accessed September 9, 2009)

[38] British Columbia Ministry of Environment, Product Stewardship, http://www.env.gov.bc.ca/epd/recycling/ (accessed September 9, 2009)

Regional Scale Facilities

Material Recovery Facility – An intermediate processing facility designed to remove recyclables and other valuable materials from the waste stream. A "dirty MRF" removes recyclable and compostable materials from unseparated solid waste. A "clean MRF" separates materials from commingled recyclables, typically collected from residential or commercial curbside programs[39]. Recyclable materials from the City's residential curbside program are processed at a clean MRF in San Leandro, owned and operated by ACI. Commercial recyclables collected by ACI and materials collected from the Bulky Item pick-up program are also processed at this facility. Commercial recyclables collected by Biagini and Waste Management[40] are processed at the Smurfit-Stone Recycling Company in Oakland.

Mixed Material Recovery Facility – Also referred to as a "dirty MRF", this facility processes solid waste through mechanical, optical, and hand sorting to separate recyclable and compostable materials from solid waste. Local examples of mixed material recovery facilities are the Sunnyvale SMaRT Station owned by the City of Sunnyvale and operated by Bay Counties Waste Services and the GreenWaste Recovery Facility in San Jose, owned and operated by GreenWaste Recovery. The Sunnyvale SMaRT Station processes solid waste from the cities of Sunnyvale, Mountain View and Palo Alto. The facility has been recently upgraded and diverts between 22 to 30 percent of incoming materials. It currently has excess capacity of up to 500 tons per day. The GreenWaste Recovery Facility processes solid waste from the cities of San Jose, Portola Valley and Woodside. Compostable materials from the GreenWaste Recovery Facility are further processed at the Z-Best Compost Facility in Gilroy. GreenWaste Recovery is diverting up to 75 percent of incoming materials through mixed material processing and composting.

Transfer Station – A facility which receives, handles, separates, converts, or otherwise processes solid waste, whose activities are governed by the California Integrated Waste Management Board Registration Permit tier or Solid Waste Facility Permit requirements. These facilities typically transfer solid waste directly from one container to another, or from one vehicle to another, for transport, or for temporary storage solid waste prior to final disposal at a landfill or a waste-to-energy facility[41]. Solid waste collected by ACI is transferred at the Davis Street Transfer Station and Resource Recovery Complex in San Leandro and disposed at the Altamont Landfill near Livermore. These facilities are owned and operated by Waste Management of Alameda County.

C&D processing facility – A facility designed to process building materials from construction and demolition sites. Typical C&D materials include: asphalt, concrete, brick, lumber, wallboard, roofing

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[39] State of California, CIWMB Glossary of Terms http://www.ciwmb.ca.gov/LGcentral/Glossary/default.htm (accessed September 9, 2009)

[40] Biagini Waste Reduction Systems, Inc. and Waste Management, Inc. are "grandfathered recyclers" that provide commercial recycling collection to customers they have had since 2001, through an annually renewable permit.

[41] Ibid.

material, ceramic tile, plastic pipe, and associated packaging. C&D collected by the City's permitted C&D haulers is processed at the Davis Street Transfer Station in San Leandro.

C&D Processing Line at Davis Street Transfer Station

Composting facility – A facility for collecting, grinding, mixing, piling, and supplying sufficient moisture and air to organic materials to speed natural decay. The finished product of a composting operation is compost, a soil amendment suitable for incorporating into topsoil and for growing plants. Compost is different than mulch, which is a shredded or chipped organic product placed on top of soil as a protective layer[42]. Compost technologies include:

- **Windrow** – compostable material is piled in long rows and regularly turned to enhance aerobic activity and control temperature.
- **In-vessel** – compostable material is placed in enclosed reactors such as metal tanks, concrete bunkers or plastic tubes, where airflow and temperature can be controlled through perforated pipes buried in the material.
- **Aerated static pile** – compostable material is placed in piles on perforated pipes under removable covers, and fans are used to push or pull air through the pipes to control the composting process.
- **Anaerobic digestion** – compostable material is placed in a chamber where microbial activity occurs in the absence of oxygen producing biogas that can be used for energy production. Anaerobic digestion of solid waste is sometimes included in descriptions of "conversion technology" or "alternative technology". Anaerobic digestion is regulated as composting under state law[43].

Anaerobic Digestion Facility in Europe

[42] Ibid.

[43] Guidance Document: How Conversion Technologies Fit Current Board Regulatory Structure, December 2007, CIWMB, p. 5.

Compostable materials collected by ACI are processed at the Newby Island Compost Facility in Milpitas.

Biomass facility – A waste-to-energy facility for controlled burning of specified organic materials, such as wood waste, agricultural crop residues, leaves, grass clippings, and prunings to produce electricity or heat[44].

"Non-Combustion Thermal Technologies" -- including Pyrolysis, Gasification, and Plasma Arc Gasification

Pyrolysis, gasification, and plasma arc gasification are all technologies, typically referred to as "conversion technologies" or "non-combustion thermal technologies." These technologies can be used to treat waste producing a synthesis gas, or "syngas" that can be used to produce electricity or can be converted into a transportation fuel. Pyrolysis uses an indirect external source of heat in the absence of oxygen; gasification partially oxidizes the waste; and plasma arc uses a plasma torch to super-heat the waste to produce the synthesis gas.

These technologies may be included under the definition of renewable energy under the Renewable Portfolio Standard, but only if the facility meets the following specific environmental standards[45]:

1) The technology must not use air or oxygen in the conversion process;
2) The technology produces no discharge of air contaminants;
3) The technology produces no discharges to surface or ground water;
4) The technology produces no hazardous waste; and
5) To the extent feasible, the technology removes all recyclable materials from the solid waste.

Under state law, "pyrolysis" is considered "transformation" and jurisdictions may count up to 10 percent of their 50 percent diversion goal through transformation. "Gasification" is specifically not included in the definition of "transformation"[46].

State legislation[47] was introduced to allow facilities that convert solid waste into energy or chemicals to count as a renewable electricity generation facility under the State's Renewable Portfolio Standard and allows local governments to count solid waste that is converted into energy toward their recycling diversion goals. This bill failed passage in 2010 but may be reintroduced in the next legislative session.

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[44] State of California, CIWMB Glossary of Terms http://www.ciwmb.ca.gov/LGcentral/Glossary/default.htm (accessed September 9, 2009)

[45] California Public Resources Code Section 25741, Subdivision (b)(3)

[46] California Public Resources Code Section 40201.

[47] Assembly Bill 222 (State of California 2009-10 legislative session) introduced by Assembly Members Anthony Adams and Fiona Ma

Siting Conversion Technology Facilities

Thermal Facilities

Siting of thermal conversion technology facilities in California is potentially controversial. According to the California Energy Commission, some of the major issues associated with thermal technology facilities include:[48]

- Ability to meet air quality requirements
- Possible classification of the ash as a hazardous material
- Disposal of ash and other by-products
- Possible conflict with adjacent land uses
- Disturbances to biological resources
- Use of large amounts of water for cooling purposes--if wet cooling towers are used
- Changes to visual quality due to power plant structures and traffic patterns
- Transportation impacts from numerous truck trips from the solid waste source to the facility. Note: Collection and transportation would already be occurring, so the facility would only cause a change in traffic patterns.
- Likely public opposition because of uncertainties over health, safety, odor, and traffic impacts--since it is most economical for the facility to be located near urban centers where the waste is generated
- Possible conflicts between using solid waste for electricity generation and programs/goals for waste reduction techniques and recycling
- Possible hazardous materials leakage that may necessitate site cleanup after facility closure

In 2001, the City's electrical utility, Alameda Power and Telecom, now known as Alameda Municipal Power, investigated the development of a gasification facility for treating solid waste as a potential source of renewable energy. This project became controversial because of concerns about siting the facility and the potential emissions from the facility.

Given the strict regulatory environment for air emissions in the Bay Area, it is unlikely that a thermal facility could be sited in the city or nearby. While the conversion technologies are emerging, they do not appear to be viable for the city at this time.

[48] California Energy Commission, Municipal Solid Waste Power Plants, http://www.energy.ca.gov/biomass/msw.html

Biological Facilities

There is active interest, however, in developing biological treatment methods for organic materials and post-processing residual solid waste. The cities of San Jose and San Francisco are supporting private sector development of anaerobic digestion for treating organic materials. The City of Oakland and Stopwaste.org are supporting the development of anaerobic digestion at the East Bay Municipal Utility District, where excess biosolids digester capacity at the facility is being used for source-separated food scraps and other digestable materials.

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Appendix D Diversion and Greenhouse Gas Calculations

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Appendix D Diversion and Greenhouse Gas Calculations

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Summary of Overall Material Tonnages for City of Alameda

Material Group	Material	Total	Single-Family Residential			Multi-Family			Commercial			Roll-Off			Self-Haul			Total		
			Recyclable	Compostable	No Market	Recyclable	Compostable	No Market	Recyclable	Compostable	No Market	Recyclable	Compostable	No Market	Recyclable	Compostable	No Market	Recyclable	Compostable	No Market
Paper		**9,110**																		
	1 Uncoated Corrugated Cardboard	1,113	11			21			185			276			621			1,113		
	2 High Grade Paper	288	36			12			185			17			38			288		
	3 Newspaper	549	230			40			209			22			49			549		
	4 Mixed Recyclable Paper	1,588	236			138			406			248			559			1,588		
	5 Compostable Paper	5,101		2,429			541			2,092			12			28			5,101	
	6 Other Paper	471			95			20			271			26			59			471
Plastics		**4,528**																		
	7 HDPE Bottles (#2)	165	64			34			62			2			4			165		
	8 PETE Bottles (#1)	182	68			28			74			4			8			182		
	9 Other Plastic Containers	324	134			79			98			4			8			324		
	10 Plastic Bags	554	273			121			148			4			8			554		
	11 Other Film	1,631	738			146			664			25			57			1,631		
	12 Expanded Polystyrene Blocks	254	30			7			25			59			133			254		
	13 Mixed Rigid Plastics	1,039	333			151			332			69			155			1,039		
	14 Other Plastics	378			152			32			135			18			40			378
Glass		**1,613**																		
	15 Recyclable Glass Bottles/Containers	949	276			103			308			81			182			949		
	16 Other Glass	663			20			31			74			166			373			663
Metals		**2,335**																		
	17 Aluminum	59	18			7			25			3			6			59		
	18 Other Non-Ferrous	310	49			16			49			60			136			310		
	19 Steel Food and Beverage Cans	312	113			36			148			5			11			312		
	20 Other Ferrous	1,561	100			98			320			321			722			1,561		
	21 White Goods	93	7			-			25			19			42			93		
Yard Waste		**1,152**																		
	22 Leaves/Grass/Chips	599		31			22			283			81			182			599	
	23 Branches/Stumps/Prunings/Trimmings	553		41			16			62			134			301			553	
Organics		**22,477**																		
	24 Food Waste	9,127		4,296			1,067			3,580			56			127			9,127	
	25 Tires	18	-			-			-			6			13			18		
	26 Untreated Lumber	2,151		2			13			74			634			1,428			2,151	
	27 Pallets	675		1			-			86			181			407			675	
	28 Treated Wood Waste	4,667			99			51			308			1,295			2,915			4,667
	29 Textiles and Leather	1,326	412			181			332			123			277			1,326		
	30 Carpet	1,238	39			26			98			330			743			1,238		
	31 Diapers	1,596			908			209			480			-			-			1,596
	32 Manure	882		700			108			49			8			17			882	
	33 Other Organics	797			118			30			148			154			347			797
Inerts		**5,424**																		
	34 Crushables	2,791	288			68			418			620			1,396			2,791		
	35 Other Inerts	950	311			112			271			79			178			950		
	36 Gypsum Board	385	-			-			-			119			267			385		
	37 Asphalt Roofing	1,297	3			-			-			398			896			1,297		
HHW		**356**																		
	38 Paint/Adhesives	19			6			-			12			-			-			19
	39 Vehicles & Equipment Fluids	38			-			1			37			-			-			38
	40 Universal Hazardous Waste	20			18			2			-			-			-			20
	41 Medical Waste	31			19			-			12			-			-			31
	42 Medicine	3			1			2			-			-			-			3
	43 Covered E-Waste	9	-			-			-			3			6						9
	44 Other E-Waste	51	2			30			12			2			4						51
	45 Other Hazardous Waste	185			7			-			-			55			123			185
Special		**1,329**																		
	46 Brown Goods	167	-			38			49			24			55			167		
	47 Composite Bulky Items	1,113			-			14			111			304			684			1,113
	48 Other Special Waste	49			-			-			49			-						49
TOTAL		**48,323**	**3,772**	**7,501**	**1,444**	**1,491**	**1,767**	**392**	**4,441**	**6,225**	**1,636**	**2,922**	**1,106**	**2,018**	**6,577**	**2,489**	**4,541**	**19,144**	**19,088**	**10,091**

Single-Family Residential

Material Group	Material	Single-Family (Stopwaste)	Single-Family %	Single-Family (Calculated)	Add Materials to Blue Cart and Green Cart		Social Marketing		EPR		Mandatory Source-Separation		Process Black Cart (MRF First)		Total Diversion
					Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	
Paper		**2,854**	**23.9%**	**3,037**		**3,037**		**2,885**		**2,885**		**1,897**		**993**	67%
	1 Uncoated Corrugated Cardboard	10	0.1%	11		11	0.05	10		10	0.75	3	0.5	1	88%
	2 High Grade Paper	34	0.3%	36		36	0.05	34		34	0.75	9	0.5	4	88%
	3 Newspaper	216	1.8%	230		230	0.05	218		218	0.75	55	0.5	27	88%
	4 Mixed Recyclable Paper	222	1.9%	236		236	0.05	224		224	0.75	56	0.5	28	88%
	5 Compostable Paper	2283	19.1%	2,429		2429	0.05	2308		2,308	0.27	1,685	0.5	842	65%
	6 Other Paper	89	0.7%	95		95	0.05	90		90		90		90	5%
Plastics		**1,685**	**14.1%**	**1,793**		**1,449**		**1,377**		**977**		**462**		**260**	85%
	7 HDPE Bottles (#2)	60	0.5%	64		64	0.05	61		61	0.56	27	0.5	13	79%
	8 PETE Bottles (#1)	64	0.5%	68		68	0.05	65		65	0.56	28	0.5	14	79%
	9 Other Plastic Containers	126	1.1%	134		134	0.05	127		127	0.56	56	0.5	28	79%
	10 Plastic Bags	257	2.2%	273	0.25	205	0.05	195	0.81	37	0.56	16	0.5	8	97%
	11 Other Film	694	5.8%	738	0.25	554	0.05	526		526	0.56	232	0.5	116	84%
	12 Expanded Polystyrene Blocks	28	0.2%	30	0.25	22	0.05	21	0.6	8	0.56	4	0.5	2	94%
	13 Mixed Rigid Plastics	313	2.6%	333	0.25	250	0.05	237	0.6	95	0.56	42	0.5	21	94%
	14 Other Plastics	143	1.2%	152		152	0.05	145	0.6	58		58		58	62%
Glass		**278**	**2.3%**	**296**		**296**		**281**		**281**		**72**		**45**	85%
	15 Recyclable Glass Bottles/Containers	259	2.2%	276		276	0.05	262		262	0.8	52	0.5	26	91%
	16 Other Glass	19	0.2%	20		20	0.05	19		19		19		19	5%
Metals		**270**	**2.3%**	**287**		**287**		**273**		**273**		**55**		**27**	91%
	17 Aluminum	17	0.1%	18		18	0.05	17		17	0.8	3	0.5	2	91%
	18 Other Non-Ferrous	46	0.4%	49		49	0.05	47		47	0.8	9	0.5	5	91%
	19 Steel Food and Beverage Cans	106	0.9%	113		113	0.05	107		107	0.8	21	0.5	11	91%
	20 Other Ferrous	94	0.8%	100		100	0.05	95		95	0.8	19	0.5	10	91%
	21 White Goods	7	0.1%	7		7	0.05	7		7	0.8	1	0.5	1	91%
Yard Waste		**68**	**0.6%**	**72**		**72**		**69**		**69**		**10**		**5**	93%
	22 Leaves/Grass/Chips	29	0.2%	31		31	0.05	29		29	0.86	4	0.5	2	93%
	23 Branches/Stumps/Prunings/Trimmings	39	0.3%	41		41	0.05	39		39	0.86	6	0.5	3	93%
Organics		**6,179**	**51.7%**	**6,575**		**6,297**		**5,987**		**5,447**		**4,046**		**2,308**	65%
	24 Food Waste	4037	33.8%	4,296		4296	0.05	4,081		4,081	0.27	2,979	0.5	1,490	65%
	25 Tires	0	0.0%	-		0	0.05	0	0.6	0		0	0.5	0	0%
	26 Untreated Lumber	2	0.0%	2		2	0.05	2		2	0.27	1	0.5	1	65%
	27 Pallets	1	0.0%	1		1	0.05	1		1	0.27	1	0.5	0	65%
	28 Treated Wood Waste	93	0.8%	99		99		99		99		99		99	0%
	29 Textiles and Leather	387	3.2%	412	0.25	309	0.05	293		293	0.56	129	0.5	65	84%
	30 Carpet	37	0.3%	39		39	0.05	37	0.6	15		15		15	62%
	31 Diapers	853	7.1%	908		908	0.05	862	0.6	345		345		345	62%
	32 Manure	658	5.5%	700	0.25	525	0.05	499		499	0.27	364	0.5	182	74%
	33 Other Organics	111	0.9%	118		118	0.05	112		112		112		112	5%
Inerts		**566**	**4.7%**	**602**		**602**		**572**		**572**		**572**		**286**	53%
	34 Crushables	271	2.3%	288		288	0.05	274		274		274	0.5	137	53%
	35 Other Inerts	292	2.4%	311		311	0.05	295		295		295	0.5	148	53%
	36 Gypsum Board	0	0.0%	-		0	0.05	0		0		0	0.5	0	0%
	37 Asphalt Roofing	3	0.0%	3		3	0.05	3		3		3	0.5	2	53%
HHW		**51**	**0.4%**	**54**		**54**		**52**		**10**		**10**		**5**	91%
	38 Paint/Adhesives	6	0.1%	6		6	0.05	6	0.81	1		1	0.5	1	91%
	39 Vehicles & Equipment Fluids	0	0.0%	-		0	0.05	0	0.81	0		0	0.5	0	0%
	40 Universal Hazardous Waste	17	0.1%	18		18	0.05	17	0.81	3		3	0.5	2	91%
	41 Medical Waste	18	0.2%	19		19	0.05	18	0.81	3		3	0.5	2	91%
	42 Medicine	1	0.0%	1		1	0.05	1	0.81	0		0	0.5	0	91%
	43 Covered E-Waste	0	0.0%	-		0	0.05	0	0.81	0		0	0.5	0	0%
	44 Other E-Waste	2	0.0%	2		2	0.05	2	0.81	0		0	0.5	0	91%
	45 Other Hazardous Waste	7	0.1%	7		7	0.05	7	0.81	1		1	0.5	1	91%
Special		**-**	**0.0%**	**-**		**-**		**-**		**-**		**-**		**-**	0%
	46 Brown Goods	0	0.0%	-		0	0.05	0	0.81	0		0	0.5	0	0%
	47 Composite Bulky Items	0	0.0%	-		0	0.05	0	0.6	0		0		0	0%
	48 Other Special Waste	0	0.0%	-		0	0.05	0	0.6	0		0		0	0%
TOTAL		**11,951**	**100.0%**	**12,717**		**12,095**		**11,495**		**10,514**		**7,122**		**3,930**	69%

Multi-Family Residential

Material Group	Material	Multi-Family (Stopwaste)	Multi-Family %	Multi-Family (calculated)	Add Materials to Blue Cart and Green Cart		Social Marketing		EPR		Mandatory Source-Separation		Process Black Cart (MRF First)		Total Diversion
					Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	
Paper		**772**	**21.1%**	**772**		**772**		**733**		**733**		**444**		**232**	70%
	1 Uncoated Corrugated Cardboard	21	0.6%	21		21	0.05	20		20	0.75	5	0.5	2	88%
	2 High Grade Paper	12	0.3%	12		12	0.05	11		11	0.75	3	0.5	1	88%
	3 Newspaper	40	1.1%	40		40	0.05	38		38	0.75	9	0.5	5	88%
	4 Mixed Recyclable Paper	138	3.8%	138		138	0.05	131		131	0.75	33	0.5	16	88%
	5 Compostable Paper	541	14.8%	541		541	0.05	514		514	0.27	375	0.5	187	65%
	6 Other Paper	20	0.5%	20		20	0.05	19		19		19		19	5%
Plastics		**598**	**16.4%**	**598**		**491**		**467**		**311**		**144**		**78**	87%
	7 HDPE Bottles (#2)	34	0.9%	34		34	0.05	32		32	0.56	14	0.5	7	79%
	8 PETE Bottles (#1)	28	0.8%	28		28	0.05	27		27	0.56	12	0.5	6	79%
	9 Other Plastic Containers	79	2.2%	79		79	0.05	75		75	0.56	33	0.5	17	79%
	10 Plastic Bags	121	3.3%	121	0.25	91	0.05	86	0.81	16	0.56	7	0.5	4	97%
	11 Other Film	146	4.0%	146	0.25	109	0.05	104		104	0.56	46	0.5	23	84%
	12 Expanded Polystyrene Blocks	7	0.2%	7	0.25	5	0.05	5	0.6	2	0.56	1	0.5	0	94%
	13 Mixed Rigid Plastics	151	4.1%	151	0.25	113	0.05	108	0.6	43	0.56	19	0.5	9	94%
	14 Other Plastics	32	0.9%	32		32	0.05	30	0.6	12		12		12	62%
Glass		**134**	**3.7%**	**134**		**134**		**127**		**127**		**49**		**39**	71%
	15 Recyclable Glass Bottles/Containers	103	2.8%	103		103	0.05	98		98	0.8	20	0.5	10	91%
	16 Other Glass	31	0.8%	31		31	0.05	29		29		29		29	5%
Metals		**157**	**4.3%**	**157**		**157**		**149**		**149**		**30**		**15**	91%
	17 Aluminum	7	0.2%	7		7	0.05	7		7	0.8	1	0.5	1	91%
	18 Other Non-Ferrous	16	0.4%	16		16	0.05	15		15	0.8	3	0.5	2	91%
	19 Steel Food and Beverage Cans	36	1.0%	36		36	0.05	34		34	0.8	7	0.5	3	91%
	20 Other Ferrous	98	2.7%	98		98	0.05	93		93	0.8	19	0.5	9	91%
	21 White Goods	0	0.0%	-		0	0.05	0		0	0.8	0	0.5	0	0%
Yard Waste		**38**	**1.0%**	**38**		**38**		**36**		**36**		**5**		**3**	93%
	22 Leaves/Grass/Chips	22	0.6%	22		22	0.05	21		21	0.86	3	0.5	1	93%
	23 Branches/Stumps/Prunings/Trimmings	16	0.4%	16		16	0.05	15		15	0.86	2	0.5	1	93%
Organics		**1,686**	**46.2%**	**1,685**		**1,613**		**1,535**		**1,401**		**1,031**		**600**	64%
	24 Food Waste	1068	29.2%	1,067		1067	0.05	1,014		1,014	0.27	740	0.5	370	65%
	25 Tires	0	0.0%	-		0	0.05	0	0.6	0		0	0.5	0	0%
	26 Untreated Lumber	13	0.4%	13		13	0.05	12		12	0.27	9	0.5	5	65%
	27 Pallets	0	0.0%	-		0	0.05	0		0	0.27	0	0.5	0	0%
	28 Treated Wood Waste	51	1.4%	51		51		51		51		51		51	0%
	29 Textiles and Leather	181	5.0%	181	0.25	136	0.05	129		129	0.56	57	0.5	28	84%
	30 Carpet	26	0.7%	26		26	0.05	25	0.6	10		10		10	62%
	31 Diapers	209	5.7%	209		209	0.05	198	0.6	79		79		79	62%
	32 Manure	108	3.0%	108	0.25	81	0.05	77		77	0.27	56	0.5	28	74%
	33 Other Organics	30	0.8%	30		30	0.05	28		28		28		28	5%
Inerts		**180**	**4.9%**	**180**		**180**		**171**		**171**		**171**		**85**	53%
	34 Crushables	68	1.9%	68		67.96276013	0.05	65		65		65	0.5	32	53%
	35 Other Inerts	112	3.1%	112		111.9386637	0.05	106		106		106	0.5	53	53%
	36 Gypsum Board	0	0.0%	-		0	0.05	0		0		0	0.5	0	0%
	37 Asphalt Roofing	0	0.0%	-		0	0.05	0		0		0	0.5	0	0%
HHW		**35**	**1.0%**	**35**		**35**		**33**		**6**		**6**		**3**	91%
	38 Paint/Adhesives	0	0.0%	-		0	0.05	0	0.81	0		0	0.5	0	0%
	39 Vehicles & Equipment Fluids	1	0.0%	1		0.999452355	0.05	1	0.81	0		0	0.5	0	0%
	40 Universal Hazardous Waste	2	0.1%	2		1.99890471	0.05	2	0.81	0		0	0.5	0	91%
	41 Medical Waste	0	0.0%	-		0	0.05	0	0.81	0		0	0.5	0	0%
	42 Medicine	2	0.1%	2		1.99890471	0.05	2	0.81	0		0	0.5	0	91%
	43 Covered E-Waste	0	0.0%	-		0	0.05	0	0.81	0		0	0.5	0	0%
	44 Other E-Waste	30	0.8%	30		29.98357065	0.05	28	0.81	5		5	0.5	3	91%
	45 Other Hazardous Waste	0	0.0%	-		0	0.05	0	0.81	0		0	0.5	0	0%
Special		**52**	**1.4%**	**52**		**52**		**49**		**12**		**12**		**9**	0%
	46 Brown Goods	38	1.0%	38		37.97918949	0.05	36	0.81	7		7	0.5	3	91%
	47 Composite Bulky Items	14	0.4%	14		13.99233297	0.05	13	0.6	5		5		5	0%
	48 Other Special Waste	0	0.0%	-		0	0.05	0	0.6	0		0		0	0%
TOTAL		**3,652**	**100.0%**	**3,650**		**3,472**		**3,301**		**2,947**		**1,892**		**1,063**	71%

Commercial

Material Group	Material	Commercial (Stopwaste)	Commercial %	Commercial (calculated)	Add Materials to Blue Cart and Green Cart		Increased Commercial Technical Assistance		Social Marketing		EPR		Mandatory Source-Separation		Process Black Cart (MRF First)		Total Diversion
					Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	
Paper		**3,346**	**27.2%**	**3,346**		**3,346**		**3,193**		**3,033**		**3,033**		**1,857**		**1,057**	68%
	1 Uncoated Corrugated Cardboard	182	1.5%	185		185	0.05	175	0.05	167		167	0.75	42	0.5	21	89%
	2 High Grade Paper	182	1.5%	185		185	0.05	175	0.05	167		167	0.75	42	0.5	21	89%
	3 Newspaper	215	1.7%	209		209	0.05	199	0.05	189		189	0.75	47	0.5	24	89%
	4 Mixed Recyclable Paper	401	3.3%	406		406	0.05	386	0.05	366		366	0.75	92	0.5	46	89%
	5 Compostable Paper	2091	17.0%	2,092		2,092	0.05	1987	0.05	1888		1888	0.27	1378	0.5	689	67%
	6 Other Paper	275	2.2%	271		271		271	0.05	257		257		257		257	5%
Plastics		**1,536**	**12.5%**	**1,538**		**1,246**		**1,183**		**1,124**		**825**		**390**		**220**	86%
	7 HDPE Bottles (#2)	64	0.5%	62		62	0.05	58	0.05	56		56	0.56	24	0.5	12	80%
	8 PETE Bottles (#1)	73	0.6%	74		74	0.05	70	0.05	67		67	0.56	29	0.5	15	80%
	9 Other Plastic Containers	98	0.8%	98		98	0.05	94	0.05	89		89	0.56	39	0.5	20	80%
	10 Plastic Bags	149	1.2%	148	0.25	111	0.05	105	0.05	100	0.81	19	0.56	8	0.5	4	97%
	11 Other Film	660	5.4%	664	0.25	498	0.05	473	0.05	450		450	0.56	198	0.5	99	85%
	12 Expanded Polystyrene Blocks	27	0.2%	25	0.25	18	0.05	18	0.05	17	0.6	7	0.56	3	0.5	1	94%
	13 Mixed Rigid Plastics	330	2.7%	332	0.25	249	0.05	237	0.05	225	0.6	90	0.56	40	0.5	20	94%
	14 Other Plastics	135	1.1%	135		135	0.05	129	0.05	122	0.6	49		49		49	64%
Glass		**378**	**3.1%**	**381**		**381**		**366**		**348**		**348**		**126**		**98**	74%
	15 Recyclable Glass Bottles/Containers	309	2.5%	308		308	0.05	292	0.05	278		278	0.8	56	0.5	28	91%
	16 Other Glass	69	0.6%	74		74		74	0.05	70		70		70		70	5%
Metals		**559**	**4.6%**	**566**		**566**		**538**		**511**		**511**		**102**		**51**	91%
	17 Aluminum	24	0.2%	25		25	0.05	23	0.05	22		22	0.8	4	0.5	2	91%
	18 Other Non-Ferrous	45	0.4%	49		49	0.05	47	0.05	44		44	0.8	9	0.5	4	91%
	19 Steel Food and Beverage Cans	142	1.2%	148		148	0.05	140	0.05	133		133	0.8	27	0.5	13	91%
	20 Other Ferrous	324	2.6%	320		320	0.05	304	0.05	289		289	0.8	58	0.5	29	91%
	21 White Goods	24	0.2%	25		25	0.05	23	0.05	22		22	0.8	4	0.5	2	91%
Yard Waste		**343**	**2.8%**	**344**		**344**		**327**		**311**		**311**		**44**		**22**	94%
	22 Leaves/Grass/Chips	280	2.3%	283		283	0.05	269	0.05	255		255	0.86	36	0.5	18	94%
	23 Branches/Stumps/Prunings/Trimmings	63	0.5%	62		62	0.05	58	0.05	56		56	0.86	8	0.5	4	94%
Organics		**5,164**	**41.9%**	**5,155**		**5,060**		**4,871**		**4,643**		**4,313**		**3,260**		**1,964**	62%
	24 Food Waste	3580	29.1%	3,580		3580	0.05	3401	0.05	3231		3231	0.27	2359	0.5	1179	67%
	25 Tires	0	0.0%	-		0	0.05	0	0.05	0	0.6	0		0	0.5	0	0%
	26 Untreated Lumber	76	0.6%	74		74	0.05	70	0.05	67		67	0.27	49	0.5	24	67%
	27 Pallets	88	0.7%	86		86	0.05	82	0.05	78		78	0.27	57	0.5	28	67%
	28 Treated Wood Waste	309	2.5%	308		308		308		308		308		308		308	0%
	29 Textiles and Leather	334	2.7%	332	0.25	249		249	0.05	237		237	0.56	104	0.5	52	84%
	30 Carpet	103	0.8%	98		98		98	0.05	94	0.6	37		37		37	62%
	31 Diapers	481	3.9%	480		480		480	0.05	456	0.6	182		182		182	62%
	32 Manure	49	0.4%	49	0.25	37	0.05	35	0.05	33		33	0.27	24	0.5	12	75%
	33 Other Organics	144	1.2%	148		148		148	0.05	140		140		140		140	5%
Inerts		**681**	**5.6%**	**689**		**689**		**655**		**622**		**622**		**622**		**311**	55%
	34 Crushables	413	3.4%	418		418	0.05	397	0.05	378		378		378	0.5	189	55%
	35 Other Inerts	268	2.2%	271		271	0.05	257	0.05	244		244		244	0.5	122	55%
	36 Gypsum Board	0	0.0%	-		0	0.05	0	0.05	0		0		0	0.5	0	0%
	37 Asphalt Roofing	0	0.0%	-		0	0.05	0	0.05	0		0		0	0.5	0	0%
HHW		**86**	**0.6%**	**74**		**74**		**74**		**70**		**13**		**13**		**7**	91%
	38 Paint/Adhesives	16	0.1%	12		12		12	0.05	12	0.81	2		2	0.5	1	91%
	39 Vehicles & Equipment Fluids	35	0.3%	37		37		37	0.05	35	0.81	7		7	0.5	3	0%
	40 Universal Hazardous Waste	4	0.0%	-		0		0	0.05	0	0.81	0		0	0.5	0	0%
	41 Medical Waste	9	0.1%	12		12		12	0.05	12	0.81	2		2	0.5	1	91%
	42 Medicine	4	0.0%	-		0		0	0.05	0	0.81	0		0	0.5	0	0%
	43 Covered E-Waste	0	0.0%	-		0		0	0.05	0	0.81	0		0	0.5	0	0%
	44 Other E-Waste	15	0.1%	12		12		12	0.05	12	0.81	2		2	0.5	1	91%
	45 Other Hazardous Waste	3	0.0%	-		0		0	0.05	0	0.81	0		0	0.5	0	0%
Special		**211**	**1.7%**	**209**		**209**		**207**		**196**		**69**		**69**		**65**	0%
	46 Brown Goods	44	0.4%	49		49	0.05	47	0.05	44	0.81	8		8	0.5	4	91%
	47 Composite Bulky Items	115	0.9%	111		111		111	0.05	105	0.6	42		42		42	0%
	48 Other Special Waste	52	0.4%	49		49		49	0.05	47	0.6	19		19		19	0%
TOTAL		**12,304**	**100.0%**	**12,303**		**11,915**		**11,413**		**10,857**		**10,045**		**6,483**		**3,794**	69%

Roll-Off

Material Group	Material	Roll-Off %	Roll-Off (calculated)	Increase C&D Ordinance Requirements		EPR		Disposal Bans		MRF First		Total Diversion
				Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	
Paper		**9.9%**	**601**		**179**		**179**		**74**		**50**	92%
	1 Uncoated Corrugated Cardboard	4.6%	276	0.75	69		69	0.75	17	0.5	9	97%
	2 High Grade Paper	0.3%	17	0.75	4		4	0.75	1	0.5	1	97%
	3 Newspaper	0.4%	22	0.75	5		5	0.75	1	0.5	1	97%
	4 Mixed Recyclable Paper	4.1%	248	0.75	62		62	0.75	16	0.5	8	97%
	5 Compostable Paper	0.2%	12		12		12		12	0.5	6	50%
	6 Other Paper	0.4%	26		26		26		26		26	0%
Plastics		**3.1%**	**184**		**60**		**29**		**17**		**12**	94%
	7 HDPE Bottles (#2)	0.0%	2	0.75	0		0	0.56	0	0.5	0	95%
	8 PETE Bottles (#1)	0.1%	4	0.75	1		1	0.56	0	0.5	0	95%
	9 Other Plastic Containers	0.1%	4	0.75	1		1	0.56	0	0.5	0	95%
	10 Plastic Bags	0.1%	4	0.75	1	0.81	0	0.56	0	0.5	0	99%
	11 Other Film	0.4%	25	0.75	6		6	0.56	3	0.5	1	95%
	12 Expanded Polystyrene Blocks	1.0%	59	0.75	15	0.6	6	0.56	3	0.5	1	98%
	13 Mixed Rigid Plastics	1.1%	69	0.75	17	0.6	7	0.56	3	0.5	2	98%
	14 Other Plastics	0.3%	18		18	0.6	7		7		7	60%
Glass		**4.1%**	**247**		**186**		**186**		**170**		**168**	32%
	15 Recyclable Glass Bottles/Containers	1.3%	81	0.75	20		20	0.8	4	0.5	2	98%
	16 Other Glass	2.7%	166		166		166		166		166	0%
Metals		**6.7%**	**408**		**102**		**102**		**20**		**10**	98%
	17 Aluminum	0.0%	3	0.75	1		1	0.8	0	0.5	0	98%
	18 Other Non-Ferrous	1.0%	60	0.75	15		15	0.8	3	0.5	2	98%
	19 Steel Food and Beverage Cans	0.1%	5	0.75	1		1	0.8	0	0.5	0	98%
	20 Other Ferrous	5.3%	321	0.75	80		80	0.8	16	0.5	8	98%
	21 White Goods	0.3%	19	0.75	5		5	0.8	1	0.5	0	98%
Yard Waste		**3.5%**	**215**		**54**		**54**		**8**		**4**	98%
	22 Leaves/Grass/Chips	1.3%	81	0.75	20		20	0.86	3	0.5	1	98%
	23 Branches/Stumps/Prunings/Trimmings	2.2%	134	0.75	33		33	0.86	5	0.5	2	98%
Organics		**46.1%**	**2,788**		**2,788**		**2,586**		**2,280**		**1,931**	31%
	24 Food Waste	0.9%	56		56		56	0.27	41	0.5	21	64%
	25 Tires	0.1%	6		6	0.6	2		2	0.5	1	0%
	26 Untreated Lumber	10.5%	634		634		634	0.27	463	0.5	232	64%
	27 Pallets	3.0%	181		181		181	0.27	132	0.5	66	64%
	28 Treated Wood Waste	21.4%	1,295		1295		1295		1295		1295	0%
	29 Textiles and Leather	2.0%	123		123		123	0.56	54	0.5	27	78%
	30 Carpet	5.5%	330		330	0.6	132		132		132	60%
	31 Diapers	0.0%	-		0	0.6	0		0		0	0%
	32 Manure	0.1%	8		8		8	0.27	5	0.5	3	64%
	33 Other Organics	2.6%	154		154		154		154		154	0%
Inerts		**20.1%**	**1,216**		**122**		**122**		**122**		**61**	95%
	34 Crushables	10.3%	620	0.9	62		62		62	0.5	31	95%
	35 Other Inerts	1.3%	79	0.9	8		8		8	0.5	4	95%
	36 Gypsum Board	2.0%	119	0.9	12		12		12	0.5	6	0%
	37 Asphalt Roofing	6.6%	398	0.9	40		40		40	0.5	20	95%
HHW		**1.0%**	**59**		**56**		**11**		**11**		**5**	91%
	38 Paint/Adhesives	0.0%	-		0	0.81	0		0	0.5	0	0%
	39 Vehicles & Equipment Fluids	0.0%	-		0	0.81	0		0	0.5	0	0%
	40 Universal Hazardous Waste	0.0%	-		0	0.81	0		0	0.5	0	0%
	41 Medical Waste	0.0%	-		0	0.81	0		0	0.5	0	0%
	42 Medicine	0.0%	-		0	0.81	0		0	0.5	0	0%
	43 Covered E-Waste	0.0%	3	0.75	1	0.81	0		0	0.5	0	98%
	44 Other E-Waste	0.0%	2	0.75	0	0.81	0		0	0.5	0	98%
	45 Other Hazardous Waste	0.9%	55		55	0.81	10		10	0.5	5	91%
Special		**5.4%**	**328**		**82**		**32**		**32**		**31**	0%
	46 Brown Goods	0.4%	24	0.75	6	0.81	1		1	0.5	1	98%
	47 Composite Bulky Items	5.0%	304	0.75	76	0.6	30		30		30	0%
	48 Other Special Waste	0.0%	-		0	0.6	0		0		0	0%
TOTAL		**100.0%**	**6,046**		**3,627**		**3,299**		**2,732**		**2,271**	62%

Self-Haul

Material Group	Material	Self-Haul %	Self Haul (calculated)	Increase C&D Ordinance Requirements		EPR		Disposal Bans		MRF First		Total Diversion
				Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	Percent Diverted	Resulting Composition	
Paper		**9.9%**	**1,353**		**404**		**404**		**166**		**113**	92%
	1 Uncoated Corrugated Cardboard	4.6%	621	0.75	155		155	0.75	39	0.5	19	97%
	2 High Grade Paper	0.3%	38	0.75	10		10	0.75	2	0.5	1	97%
	3 Newspaper	0.4%	49	0.75	12		12	0.75	3	0.5	2	97%
	4 Mixed Recyclable Paper	4.1%	559	0.75	140		140	0.75	35	0.5	17	97%
	5 Compostable Paper	0.2%	28		28		28		28	0.5	14	50%
	6 Other Paper	0.4%	59		59		59		59		59	0%
Plastics		**3.1%**	**415**		**134**		**65**		**38**		**27**	94%
	7 HDPE Bottles (#2)	0.0%	4	0.75	1		1	0.56	0	0.5	0	95%
	8 PETE Bottles (#1)	0.1%	8	0.75	2		2	0.56	1	0.5	0	95%
	9 Other Plastic Containers	0.1%	8	0.75	2		2	0.56	1	0.5	0	95%
	10 Plastic Bags	0.1%	8	0.75	2	0.81	0	0.56	0	0.5	0	99%
	11 Other Film	0.4%	57	0.75	14		14	0.56	6	0.5	3	95%
	12 Expanded Polystyrene Blocks	1.0%	133	0.75	33	0.6	13	0.56	6	0.5	3	98%
	13 Mixed Rigid Plastics	1.1%	155	0.75	39	0.6	15	0.56	7	0.5	3	98%
	14 Other Plastics	0.3%	40		40	0.6	16		16		16	60%
Glass		**4.1%**	**555**		**418**		**418**		**382**		**377**	32%
	15 Recyclable Glass Bottles/Containers	1.3%	182	0.75	46		46	0.8	9	0.5	5	98%
	16 Other Glass	2.7%	373		373		373		373		373	0%
Metals		**6.7%**	**917**		**229**		**229**		**46**		**23**	98%
	17 Aluminum	0.0%	6	0.75	2		2	0.8	0	0.5	0	98%
	18 Other Non-Ferrous	1.0%	136	0.75	34		34	0.8	7	0.5	3	98%
	19 Steel Food and Beverage Cans	0.1%	11	0.75	3		3	0.8	1	0.5	0	0%
	20 Other Ferrous	5.3%	722	0.75	181		181	0.8	36	0.5	18	98%
	21 White Goods	0.3%	42	0.75	11		11	0.8	2	0.5	1	0%
Yard Waste		**3.5%**	**483**		**121**		**121**		**17**		**8**	98%
	22 Leaves/Grass/Chips	1.3%	182	0.75	46		46	0.86	6	0.5	3	98%
	23 Branches/Stumps/Prunings/Trimmings	2.2%	301	0.75	75		75	0.86	11	0.5	5	98%
Organics		**46.1%**	**6,274**		**6,274**		**5,820**		**5,131**		**4,345**	31%
	24 Food Waste	0.9%	127		127		127	0.27	93	0.5	46	64%
	25 Tires	0.1%	13		13	0.6	5		5	0.5	3	0%
	26 Untreated Lumber	10.5%	1,428		1428		1428	0.27	1,042	0.5	521	64%
	27 Pallets	3.0%	407		407		407	0.27	297	0.5	148	64%
	28 Treated Wood Waste	21.4%	2,915		2915		2,915		2,915		2,915	0%
	29 Textiles and Leather	2.0%	277		277		277	0.56	122	0.5	61	78%
	30 Carpet	5.5%	743		743	0.6	297		297		297	0%
	31 Diapers	0.0%	-		0	0.6	0		0		0	0%
	32 Manure	0.1%	17		17		17	0.27	12	0.5	6	0%
	33 Other Organics	2.6%	347		347		347		347		347	0%
Inerts		**20.1%**	**2,737**		**274**		**274**		**274**		**137**	95%
	34 Crushables	10.3%	1,396	0.9	140		140		140	0.5	70	95%
	35 Other Inerts	1.3%	178	0.9	18		18		18	0.5	9	95%
	36 Gypsum Board	2.0%	267	0.9	27		27		27	0.5	13	0%
	37 Asphalt Roofing	6.6%	896	0.9	90		90		90	0.5	45	0%
HHW		**1.0%**	**133**		**126**		**24**		**24**		**12**	91%
	38 Paint/Adhesives	0.0%	-		0	0.81	0		0	0.5	0	0%
	39 Vehicles & Equipment Fluids	0.0%	-		0	0.81	0		0	0.5	0	0%
	40 Universal Hazardous Waste	0.0%	-		0	0.81	0		0	0.5	0	0%
	41 Medical Waste	0.0%	-		0	0.81	0		0	0.5	0	0%
	42 Medicine	0.0%	-		0	0.81	0		0	0.5	0	0%
	43 Covered E-Waste	0.0%	6	0.75	2	0.81	0		0	0.5	0	98%
	44 Other E-Waste	0.0%	4	0.75	1	0.81	0		0	0.5	0	0%
	45 Other Hazardous Waste	0.9%	123		123	0.81	23		23	0.5	12	0%
Special		**5.4%**	**739**		**185**		**71**		**71**		**70**	0%
	46 Brown Goods	0.4%	55	0.75	14	0.81	3		3	0.5	1	0%
	47 Composite Bulky Items	5.0%	684	0.75	171	0.6	68		68		68	0%
	48 Other Special Waste	0.0%	-		0	0.6	0		0		0	0%
TOTAL		**100.0%**	**13,607**		**8,164**		**7,426**		**6,147**		**5,112**	62%

Summary of Overall Material Tonnages for City of Alameda After Diversion Programs
Adding Mandatory Requirements and Residual Waste Processing

Material Group	Material	Single-Family Residential	Multi-Family Residential	Commercial	Roll-Off	Self Haul	Total	Residual Disposal: Recyclable	Residual Disposal: Compostable	Residual Disposal: No Market	Diversion Percentages: Single-Family Residential	Diversion Percentages: Multi-Family Residential	Diversion Percentages: Commercial	Diversion Percentages: Roll-Off	Diversion Percentages: Self Haul	Diversion Percentages: Total
Paper		**993**	**232**	**1,057**	**50**	**113**	**2,445**	**Recyclable**	**Compostable**	**No Market**	**67%**	**70%**	**68%**	**92%**	**92%**	**73%**
	1 Uncoated Corrugated Cardboard	1	2	21	9	19	53	53			88%	88%	89%	97%	97%	95%
	2 High Grade Paper	4	1	21	1	1	28	28			88%	88%	89%	97%	97%	90%
	3 Newspaper	27	5	24	1	2	58	58			88%	88%	89%	97%	97%	89%
	4 Mixed Recyclable Paper	28	16	46	8	17	115	115			88%	88%	89%	97%	97%	93%
	5 Compostable Paper	842	187	689	6	14	1,739		1,739		65%	65%	67%	50%	50%	66%
	6 Other Paper	90	19	257	26	59	452			452	5%	5%	5%	0%	0%	4%
Plastics		**260**	**78**	**220**	**12**	**27**	**596**				**85%**	**87%**	**86%**	**94%**	**94%**	**87%**
	7 HDPE Bottles (#2)	13	7	12	0	0	33	33			79%	79%	80%	95%	95%	80%
	8 PETE Bottles (#1)	14	6	15	0	0	35	35			79%	79%	80%	95%	95%	81%
	9 Other Plastic Containers	28	17	20	0	0	65	65			79%	79%	80%	95%	95%	80%
	10 Plastic Bags	8	4	4	0	0	16	16			97%	97%	97%	99%	99%	97%
	11 Other Film	116	23	99	1	3	242	242			84%	84%	85%	95%	95%	85%
	12 Expanded Polystyrene Blocks	2	0	1	1	3	8	8			94%	94%	94%	98%	98%	97%
	13 Mixed Rigid Plastics	21	9	20	2	3	55	55			94%	94%	94%	98%	98%	95%
	14 Other Plastics	58	12	49	7	16	142			142	62%	62%	64%	60%	60%	62%
Glass		**45**	**39**	**98**	**168**	**377**	**728**				**85%**	**71%**	**74%**	**32%**	**32%**	**55%**
	15 Recyclable Glass Bottles/Containers	26	10	28	2	5	70	70			91%	91%	91%	98%	98%	93%
	16 Other Glass	19	29	70	166	373	657			657	5%	5%	5%	0%	0%	1%
Metals		**27**	**15**	**51**	**10**	**23**	**126**				**91%**	**91%**	**91%**	**98%**	**98%**	**95%**
	17 Aluminum	2	1	2	0	0	5	5			91%	91%	91%	98%	98%	92%
	18 Other Non-Ferrous	5	2	4	2	3	16	16			91%	91%	91%	98%	98%	95%
	19 Steel Food and Beverage Cans	11	3	13	0	0	28	28			91%	91%	91%	98%	0%	91%
	20 Other Ferrous	10	9	29	8	18	74	74			91%	91%	91%	98%	98%	95%
	21 White Goods	1	-	2	0	1	4	4			91%	0%	91%	98%	0%	95%
Yard Waste		**5**	**3**	**22**	**4**	**8**	**41**				**93%**	**93%**	**94%**	**98%**	**98%**	**96%**
	22 Leaves/Grass/Chips	2	1	18	1	3	26		26		93%	93%	94%	98%	98%	96%
	23 Branches/Stumps/Prunings/Trimmings	3	1	4	2	5	15		15		93%	93%	94%	98%	98%	97%
Organics		**2,308**	**600**	**1,964**	**1,931**	**4,345**	**11,148**				**65%**	**64%**	**62%**	**31%**	**31%**	**50%**
	24 Food Waste	1,490	370	1,179	21	46	3,106		3,106		65%	65%	67%	64%	64%	66%
	25 Tires	-	-	-	1	3	4	4			0%	0%	0%	0%	0%	80%
	26 Untreated Lumber	1	5	24	232	521	782		782		65%	65%	67%	64%	64%	64%
	27 Pallets	0	-	28	66	148	243		243		65%	0%	67%	64%	64%	64%
	28 Treated Wood Waste	99	51	308	1,295	2,915	4,667			4,667	0%	0%	0%	0%	0%	0%
	29 Textiles and Leather	65	28	52	27	61	233	233			84%	84%	84%	78%	78%	82%
	30 Carpet	15	10	37	132	297	492	492			62%	62%	62%	60%	0%	60%
	31 Diapers	345	79	182	-	-	607			607	62%	62%	62%	0%	0%	62%
	32 Manure	182	28	12	3	6	231		231		74%	74%	75%	64%	0%	74%
	33 Other Organics	112	28	140	154	347	783			783	5%	5%	5%	0%	0%	2%
Inerts		**286**	**85**	**311**	**61**	**137**	**880**				**53%**	**53%**	**55%**	**95%**	**95%**	**84%**
	34 Crushables	137	32	189	31	70	459	459			53%	53%	55%	95%	95%	84%
	35 Other Inerts	148	53	122	4	9	336	336			53%	53%	55%	95%	95%	65%
	36 Gypsum Board	-	-	-	6	13	19	19			0%	0%	0%	0%	0%	95%
	37 Asphalt Roofing	2	-	-	20	45	66	66			53%	0%	0%	95%	0%	95%
HHW		**5**	**3**	**7**	**5**	**12**	**32**				**91%**	**91%**	**91%**	**91%**	**91%**	**91%**
	38 Paint/Adhesives	1	-	1	-	-	2			2	91%	0%	91%	0%	0%	91%
	39 Vehicles & Equipment Fluids	-	0	3	-	-	3			3	0%	0%	0%	0%	0%	91%
	40 Universal Hazardous Waste	2	0	-	-	-	2			2	91%	91%	0%	0%	0%	91%
	41 Medical Waste	2	-	1	-	-	3			3	91%	0%	91%	0%	0%	91%
	42 Medicine	0	0	-	-	-	0			0	91%	91%	0%	0%	0%	91%
	43 Covered E-Waste	-	-	-	0	0	0	0			0%	0%	0%	98%	98%	98%
	44 Other E-Waste	0	3	1	0	0	4	4			91%	91%	91%	98%	0%	92%
	45 Other Hazardous Waste	1	-	-	5	12	18			18	91%	0%	0%	91%	0%	91%
Special		**-**	**9**	**65**	**31**	**70**	**174**				**0%**	**0%**	**0%**	**0%**	**0%**	**87%**
	46 Brown Goods	-	3	4	1	1	10	10			0%	91%	91%	98%	0%	94%
	47 Composite Bulky Items	-	5	42	30	68	146			146	0%	0%	0%	0%	0%	87%
	48 Other Special Waste	-	-	19	-	-	19			19	0%	0%	0%	0%	0%	62%
TOTAL		**3,930**	**1,063**	**3,794**	**2,271**	**5,112**	**16,170**	**2,528**	**6,143**	**7,500**	**69%**	**71%**	**69%**	**62%**	**62%**	**67%**

Summary of Overall Material Tonnages for City of Alameda After Diversion Programs
Optimizing Voluntary Programs

Material Group	Material	Single-Family Residential	Multi-Family Residential	Commercial	Roll-Off	Self Haul	Total	Residual Disposal: Recyclable	Residual Disposal: Compostable	Residual Disposal: No Market	Diversion Percentages: Single-Family Residential	Diversion Percentages: Multi-Family Residential	Diversion Percentages: Commercial	Diversion Percentages: Roll-Off	Diversion Percentages: Self Haul	Diversion Percentages: Total
Paper		**2,885**	**733**	**3,033**	**179**	**404**	**7,234**	**Recyclable**	**Compostable**	**No Market**	**67%**	**70%**	**68%**	**92%**	**92%**	**73%**
	1 Uncoated Corrugated Cardboard	10	20	167	69	155	421	421			88%	88%	89%	97%	97%	95%
	2 High Grade Paper	34	11	167	4	10	226	226			88%	88%	89%	97%	97%	90%
	3 Newspaper	218	38	189	5	12	463	463			88%	88%	89%	97%	97%	89%
	4 Mixed Recyclable Paper	224	131	366	62	140	924	924			88%	88%	89%	97%	97%	93%
	5 Compostable Paper	2,308	514	1,888	12	28	4,749		4,749		65%	65%	67%	50%	50%	66%
	6 Other Paper	90	19	257	26	59	452			452	5%	5%	5%	0%	0%	4%
Plastics		**977**	**311**	**825**	**29**	**65**	**2,207**				**85%**	**87%**	**86%**	**94%**	**94%**	**87%**
	7 HDPE Bottles (#2)	61	32	56	0	1	150	150			79%	79%	80%	95%	95%	80%
	8 PETE Bottles (#1)	65	27	67	1	2	161	161			79%	79%	80%	95%	95%	81%
	9 Other Plastic Containers	127	75	89	1	2	294	294			79%	79%	80%	95%	95%	80%
	10 Plastic Bags	37	16	19	0	0	73	73			97%	97%	97%	99%	99%	97%
	11 Other Film	526	104	450	6	14	1,100	1,100			84%	84%	85%	95%	95%	85%
	12 Expanded Polystyrene Blocks	8	2	7	6	13	36	36			94%	94%	94%	98%	98%	97%
	13 Mixed Rigid Plastics	95	43	90	7	15	250	250			94%	94%	94%	98%	98%	95%
	14 Other Plastics	58	12	49	7	16	142			142	62%	62%	64%	60%	60%	62%
Glass		**281**	**127**	**348**	**186**	**418**	**1,360**				**85%**	**71%**	**74%**	**32%**	**32%**	**55%**
	15 Recyclable Glass Bottles/Containers	262	98	278	20	46	703	703			91%	91%	91%	98%	98%	93%
	16 Other Glass	19	29	70	166	373	657			657	5%	5%	5%	0%	0%	1%
Metals		**273**	**149**	**511**	**102**	**229**	**1,264**				**91%**	**91%**	**91%**	**98%**	**98%**	**95%**
	17 Aluminum	17	7	22	1	2	48	48			91%	91%	91%	98%	98%	92%
	18 Other Non-Ferrous	47	15	44	15	34	155	155			91%	91%	91%	98%	98%	95%
	19 Steel Food and Beverage Cans	107	34	133	1	3	278	278			91%	91%	91%	98%	0%	91%
	20 Other Ferrous	95	93	289	80	181	738	738			91%	91%	91%	98%	98%	95%
	21 White Goods	7	-	22	5	11	45	45			91%	0%	91%	98%	0%	95%
Yard Waste		**69**	**36**	**311**	**54**	**121**	**590**				**93%**	**93%**	**94%**	**98%**	**98%**	**96%**
	22 Leaves/Grass/Chips	29	21	255	20	46	371		371		93%	93%	94%	98%	98%	96%
	23 Branches/Stumps/Prunings/Trimmings	39	15	56	33	75	219		219		93%	93%	94%	98%	98%	97%
Organics		**5,447**	**1,401**	**4,313**	**2,586**	**5,820**	**19,568**				**65%**	**64%**	**62%**	**31%**	**31%**	**50%**
	24 Food Waste	4,081	1,014	3,231	56	127	8,510		8,510		65%	65%	67%	64%	64%	66%
	25 Tires	-	-	-	2	5	7	7			0%	0%	0%	0%	0%	80%
	26 Untreated Lumber	2	12	67	634	1,428	2,143		2,143		65%	65%	67%	64%	64%	64%
	27 Pallets	1	-	78	181	407	666		666		65%	0%	67%	64%	64%	64%
	28 Treated Wood Waste	99	51	308	1,295	2,915	4,667			4,667	0%	0%	0%	0%	0%	0%
	29 Textiles and Leather	293	129	237	123	277	1,060	1,060			84%	84%	84%	78%	78%	82%
	30 Carpet	15	10	37	132	297	492	492			62%	62%	62%	60%	0%	60%
	31 Diapers	345	79	182	-	-	607			607	62%	62%	62%	0%	0%	62%
	32 Manure	499	77	33	8	17	634		634		74%	74%	75%	64%	0%	74%
	33 Other Organics	112	28	140	154	347	783			783	5%	5%	5%	0%	0%	2%
Inerts		**572**	**171**	**622**	**122**	**274**	**1,760**				**53%**	**53%**	**55%**	**95%**	**95%**	**84%**
	34 Crushables	274	65	378	62	140	918	918			53%	53%	55%	95%	95%	84%
	35 Other Inerts	295	106	244	8	18	671	671			53%	53%	55%	95%	95%	65%
	36 Gypsum Board	-	-	-	12	27	39	39			0%	0%	0%	0%	0%	95%
	37 Asphalt Roofing	3	-	-	40	90	132	132			53%	0%	0%	95%	0%	95%
HHW		**10**	**6**	**13**	**11**	**24**	**64**				**91%**	**91%**	**91%**	**91%**	**91%**	**91%**
	38 Paint/Adhesives	1	-	2	-	-	3			3	91%	0%	91%	0%	0%	91%
	39 Vehicles & Equipment Fluids	-	0	7	-	-	7			7	0%	0%	0%	0%	0%	91%
	40 Universal Hazardous Waste	3	0	-	-	-	4			4	91%	91%	0%	0%	0%	91%
	41 Medical Waste	3	-	2	-	-	6			6	91%	0%	91%	0%	0%	91%
	42 Medicine	0	0	-	-	-	1			1	91%	91%	0%	0%	0%	91%
	43 Covered E-Waste	-	-	-	0	0	0	0			0%	0%	0%	98%	98%	98%
	44 Other E-Waste	0	5	2	0	0	8	8			91%	91%	91%	98%	0%	92%
	45 Other Hazardous Waste	1	-	-	10	23	35			35	91%	0%	0%	91%	0%	91%
Special		**-**	**12**	**69**	**32**	**71**	**184**				**0%**	**0%**	**0%**	**0%**	**0%**	**87%**
	46 Brown Goods	-	7	8	1	3	19	19			0%	91%	91%	98%	0%	94%
	47 Composite Bulky Items	-	5	42	30	68	146			146	0%	0%	0%	0%	0%	87%
	48 Other Special Waste	-	-	19	-	-	19			19	0%	0%	0%	0%	0%	62%
TOTAL		**10,514**	**2,947**	**10,045**	**3,299**	**7,426**	**34,231**	**9,412**	**17,291**	**7,527**	**69%**	**71%**	**69%**	**62%**	**62%**	**67%**

Summary of Overall Material Tonnages for City of Alameda After Diversion Programs
Adding Mandatory Requirements

Material Group	Material	Residual Disposal: Single-Family Residential	Multi-Family Residential	Commercial	Roll-Off	Self Haul	Total	Recyclable	Compostable	No Market	Diversion Percentages: Single-Family Residential	Multi-Family Residential	Commercial	Roll-Off	Self Haul	Total
Paper		**1,897**	**444**	**1,857**	**74**	**166**	**4,437**				**67%**	**70%**	**68%**	**92%**	**92%**	**73%**
	1 Uncoated Corrugated Cardboard	**3**	**5**	**42**	**17**	**39**	105	105			88%	88%	89%	97%	97%	95%
	2 High Grade Paper	**9**	**3**	**42**	**1**	**2**	57	57			88%	88%	89%	97%	97%	90%
	3 Newspaper	**55**	**9**	**47**	**1**	**3**	116	116			88%	88%	89%	97%	97%	89%
	4 Mixed Recyclable Paper	**56**	**33**	**92**	**16**	**35**	231	231			88%	88%	89%	97%	97%	93%
	5 Compostable Paper	**1,685**	**375**	**1,378**	**12**	**28**	3,477		3,477		65%	65%	67%	50%	50%	66%
	6 Other Paper	**90**	**19**	**257**	**26**	**59**	452			452	5%	5%	5%	0%	0%	4%
Plastics		**462**	**144**	**390**	**17**	**38**	**1,051**				**85%**	**87%**	**86%**	**94%**	**94%**	**87%**
	7 HDPE Bottles (#2)	**27**	**14**	**24**	**0**	**0**	66	66			79%	79%	80%	95%	95%	80%
	8 PETE Bottles (#1)	**28**	**12**	**29**	**0**	**1**	71	71			79%	79%	80%	95%	95%	81%
	9 Other Plastic Containers	**56**	**33**	**39**	**0**	**1**	129	129			79%	79%	80%	95%	95%	80%
	10 Plastic Bags	**16**	**7**	**8**	**0**	**0**	32	32			97%	97%	97%	99%	99%	97%
	11 Other Film	**232**	**46**	**198**	**3**	**6**	484	484			84%	84%	85%	95%	95%	85%
	12 Expanded Polystyrene Blocks	**4**	**1**	**3**	**3**	**6**	16	16			94%	94%	94%	98%	98%	97%
	13 Mixed Rigid Plastics	**42**	**19**	**40**	**3**	**7**	110	110			94%	94%	94%	98%	98%	95%
	14 Other Plastics	**58**	**12**	**49**	**7**	**16**	142			142	62%	62%	64%	60%	60%	62%
Glass		**72**	**49**	**126**	**170**	**382**	**798**				**85%**	**71%**	**74%**	**32%**	**32%**	**55%**
	15 Recyclable Glass Bottles/Containers	**52**	**20**	**56**	**4**	**9**	141	141			91%	91%	91%	98%	98%	93%
	16 Other Glass	**19**	**29**	**70**	**166**	**373**	657			657	5%	5%	5%	0%	0%	1%
Metals		**55**	**30**	**102**	**20**	**46**	**253**				**91%**	**91%**	**91%**	**98%**	**98%**	**95%**
	17 Aluminum	**3**	**1**	**4**	**0**	**0**	10	10			91%	91%	91%	98%	98%	92%
	18 Other Non-Ferrous	**9**	**3**	**9**	**3**	**7**	31	31			91%	91%	91%	98%	98%	95%
	19 Steel Food and Beverage Cans	**21**	**7**	**27**	**0**	**1**	56	56			91%	91%	91%	98%	0%	91%
	20 Other Ferrous	**19**	**19**	**58**	**16**	**36**	148	148			91%	91%	91%	98%	98%	95%
	21 White Goods	**1**	-	**4**	**1**	**2**	9	9			91%	0%	91%	98%	0%	95%
Yard Waste		**10**	**5**	**44**	**8**	**17**	**83**				**93%**	**93%**	**94%**	**98%**	**98%**	**96%**
	22 Leaves/Grass/Chips	**4**	**3**	**36**	**3**	**6**	52		52		93%	93%	94%	98%	98%	96%
	23 Branches/Stumps/Prunings/Trimmings	**6**	**2**	**8**	**5**	**11**	31		31		93%	93%	94%	98%	98%	97%
Organics		**4,046**	**1,031**	**3,260**	**2,280**	**5,131**	**15,747**				**65%**	**64%**	**62%**	**31%**	**31%**	**50%**
	24 Food Waste	**2,979**	**740**	**2,359**	**41**	**93**	6,212		6,212		65%	65%	67%	64%	64%	66%
	25 Tires	-	-	-	**2**	**5**	7	7			0%	0%	0%	0%	0%	80%
	26 Untreated Lumber	**1**	**9**	**49**	**463**	**1,042**	1,564		1,564		65%	65%	67%	64%	64%	64%
	27 Pallets	**1**	-	**57**	**132**	**297**	486		486		65%	0%	67%	64%	64%	64%
	28 Treated Wood Waste	**99**	**51**	**308**	**1,295**	**2,915**	4,667			4,667	0%	0%	0%	0%	0%	0%
	29 Textiles and Leather	**129**	**57**	**104**	**54**	**122**	466	466			84%	84%	84%	78%	78%	82%
	30 Carpet	**15**	**10**	**37**	**132**	**297**	492	492			62%	62%	62%	60%	0%	60%
	31 Diapers	**345**	**79**	**182**	-	-	607			607	62%	62%	62%	0%	0%	62%
	32 Manure	**364**	**56**	**24**	**5**	**12**	463		463		74%	74%	75%	64%	0%	74%
	33 Other Organics	**112**	**28**	**140**	**154**	**347**	783			783	5%	5%	5%	0%	0%	2%
Inerts		**572**	**171**	**622**	**122**	**274**	**1,760**				**53%**	**53%**	**55%**	**95%**	**95%**	**84%**
	34 Crushables	**274**	**65**	**378**	**62**	**140**	918	918			53%	53%	55%	95%	95%	84%
	35 Other Inerts	**295**	**106**	**244**	**8**	**18**	671	671			53%	53%	55%	95%	95%	65%
	36 Gypsum Board	-	-	-	**12**	**27**	39	39			0%	0%	0%	0%	0%	95%
	37 Asphalt Roofing	**3**	-	-	**40**	**90**	132	132			53%	0%	0%	95%	0%	95%
HHW		**10**	**6**	**13**	**11**	**24**	**64**				**91%**	**91%**	**91%**	**91%**	**91%**	**91%**
	38 Paint/Adhesives	**1**	-	**2**	-	-	3			3	91%	0%	91%	0%	0%	91%
	39 Vehicles & Equipment Fluids	-	**0**	**7**	-	-	7			7	0%	0%	0%	0%	0%	91%
	40 Universal Hazardous Waste	**3**	**0**	-	-	-	4			4	91%	91%	0%	0%	0%	91%
	41 Medical Waste	**3**	-	**2**	-	-	6			6	91%	0%	91%	0%	0%	91%
	42 Medicine	**0**	**0**	-	-	-	1			1	91%	91%	0%	0%	0%	91%
	43 Covered E-Waste	-	-	-	**0**	**0**	0	0			0%	0%	0%	98%	98%	98%
	44 Other E-Waste	**0**	**5**	**2**	**0**	**0**	8	8			91%	91%	91%	98%	0%	92%
	45 Other Hazardous Waste	**1**	-	-	**10**	**23**	35			35	91%	0%	0%	91%	0%	91%
Special		-	**12**	**69**	**32**	**71**	**184**				**0%**	**0%**	**0%**	**0%**	**0%**	**87%**
	46 Brown Goods	-	**7**	**8**	**1**	**3**	19	19			0%	91%	91%	98%	0%	94%
	47 Composite Bulky Items	-	**5**	**42**	**30**	**68**	146			146	0%	0%	0%	0%	0%	87%
	48 Other Special Waste	-	-	**19**	-	-	19			19	0%	0%	0%	0%	0%	62%
TOTAL		**7,122**	**1,892**	**6,483**	**2,732**	**6,147**	**24,376**	**4,564**	**12,285**	**7,527**	**69%**	**71%**	**69%**	**62%**	**62%**	**67%**

Version 9.01 (3/09)

WAste Reduction Model (WARM) -- Inputs

Use this worksheet to describe the baseline and alternative MSW management scenarios that you want to compare. The shaded areas indicate where you need to enter information.

1. Describe the baseline generation and management for the MSW materials listed below. If the material is not generated in your community or you do not want to analyze it, leave it blank or enter 0. Make sure that the total quantity generated equals the total quantity managed.

Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Aluminum Cans	59		59		NA
Steel Cans	312		312		NA
Copper Wire			-		NA
Glass	1,613		1,613		NA
HDPE	165		165		NA
LDPE	2,186		2,186		NA
PET	182		182		NA
Corrugated Cardboard	1,113		1,113		NA
Magazines/Third-class Mail			-		NA
Newspaper	549		549		NA
Office Paper	288		288		NA
Phonebooks			-		NA
Textbooks			-		NA
Dimensional Lumber	7,493		7,493		NA
Medium-density Fiberboard			-		NA
Food Scraps	9,127	NA	9,127		
Yard Trimmings	1,152	NA	1,152		
Grass		NA	-		
Leaves		NA	-		
Branches		NA	-		
Mixed Paper (general)	2,059		2,059		NA
Mixed Paper (primarily residential)			-		NA
Mixed Paper (primarily from offices)			-		NA
Mixed Metals	1,964		1,964		NA
Mixed Plastics	1,995		1,995		NA
Mixed Recyclables	1,458		1,458		NA
Mixed Organics	9,703	NA	9,703		
Mixed MSW		NA	-		NA
Carpet	1,238		1,238		NA
Personal Computers	226		226		NA
Clay Bricks		NA	-	NA	NA
Concrete[1]	5,424		5,424	NA	NA
Fly Ash[2]			-	NA	NA
Tires[3]	18		18		NA

Please enter data in short tons (1 short ton = 2,000 lbs.)

Please refer to the User's Guide if you need assistance completing this table.

[1] Recycled concrete used as aggregate in the production of new concrete

[2] Recycled fly ash is utilized to displace Portland cement in concrete production.

[3] Recycling tires is defined in this analysis as retreading and does not include other recycling activities (i.e. crumb rubber applications).

2. Describe the alternative management scenario for the MSW materials generated in the baseline.
Any decrease in generation should be entered in the Source Reduction column.
Any increase in generation should be entered in the Source Reduction column as a negative value.
(Make sure that the total quantity generated equals the total quantity managed.)

Material	Baseline Generation	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Aluminum Cans	59		11	48		NA
Steel Cans	312		34	278		NA
Copper Wire	-					NA
Glass	1,613		253	1,360		NA
HDPE	165		15	150		NA
LDPE	2,186		1,013	1,173		NA
PET	182		21	161		NA
Corrugated Cardboard	1,113		692	421		NA
Magazines/Third-class Mail	-					NA
Newspaper	549		86	463		NA
Office Paper	288		62	226		NA
Phonebooks	-					NA
Textbooks	-					NA
Dimensional Lumber	7,493		17	7,476		NA
Medium-density Fiberboard	-					NA
Food Scraps	9,127	NA	NA	8,510		617
Yard Trimmings	1,152	NA	NA	590		562
Grass	-	NA	NA			
Leaves	-	NA	NA			
Branches	-	NA	NA			
Mixed Paper, Broad	2,059	NA	683	1,376		NA
Mixed Paper, Resid.	-	NA				NA
Mixed Paper, Office	-	NA				NA
Mixed Metals	1,964	NA	1,027	937		NA
Mixed Plastics	1,995	NA	1,272	723		NA
Mixed Recyclables	1,458	NA	1,238	220		NA
Mixed Organics	9,703	NA	NA	7,832		1,871
Mixed MSW	-	NA	NA			NA
Carpet	1,238		746	492		NA
Personal Computers	226		198	28		NA
Clay Bricks	-		NA		NA	NA
Concrete[1]	5,424	NA	3,664	1,760	NA	NA
Fly Ash[2]	-	NA			NA	NA
Tires[3]	18		11	7		NA

Please enter data in short tons (1 short ton = 2,000 lbs.)
Please refer to the User's Guide if you need assistance completing this table.

[1] Recycled concrete used as aggregate in the production of new concrete

[2] Recycled fly ash is utilized to displace Portland cement in concrete production.

[3] Recycling tires is defined in this analysis as retreading and does not include other recycling activities (i.e. crumb rubber applications).

3. To estimate the benefits from source reduction, EPA usually assumes that the material that is source reduced would have been manufactured from the current mix of virgin and recycled inputs. However, you may choose to estimate the emission reductions from source reduction under the assumption that the material would have been manufactured from 100% virgin inputs in order to obtain an upper bound estimate of the benefits from source reduction. Select which assumption you want to use in the analysis.

- (●) Current Mix
- ( ) 100% Virgin

4a. The emissions from landfilling depends on whether the landfill where your waste is disposed has a landfill gas (LFG) control system. If you do not know whether your landfill has LFG control, select "National Average" to calculate emissions based on the estimated proportions of landfills with LFG control in 2004. If your landfill does not have a LFG system, select "No LFG Recovery" and go to question 5. If a LFG system is in place at your landfill, select "LFG Recovery" and click one of the indented buttons in 4b to indicate whether LFG is recovered for energy or flared.

- ( ) National Average
- (●) LFG Recovery
- ( ) No LFG Recovery

4b. If your landfill has gas recovery, does it recover the methane for energy or flare it?

- (●) Recover for energy
- ( ) Flare
- ( ) Not Applicable

4c. If your landfill has gas recovery, what is the efficiency of the system?
The national analysis assumes a gas collection system efficiency of 75%. If you do not know what the efficiency of your system is, you may want to use 75% as a default.

Landfill Gas Collection System Efficiency:	60%

5a. Emissions that occur during transport of materials to the management facility are included in this model. You may use default transport distances, indicated in the table below, or provide information on the transport distances for the various MSW management options.

○ Use Default Distances
◉ Provide Information

5b. If you have chosen to provide information, please fill in the table below.
Distances should be from the curb to the landfill, combustor, or material recovery facility (MRF).
***Please note that if you chose to provide information, you must provide distances for both the baseline and the alternative scenarios.**

Management Option	Default Distance (Miles)	Distance (Miles)
Landfill	20	35
Combustion	20	0
Recycling	20	7
Composting	20	32

6. If you wish to personalize your results report, input your name & organization, and also specify the project period corresponding to the data you entered above.

Name	
Organization	

Project Period	From		to	

7. Please select between displaying units in metric tons of carbon equivalent (MTCE) and metric tons of carbon dioxide equivalent ($MTCO_2E$).

○ MTCE
◉ MTCO2E

8. Check the button below to see results in units of energy consumption (million BTU) and equivalencies (e.g., cars off the road).

☐ Energy Consumption (million BTU)

Congratulations! You have finished all the inputs.
A summary of your results awaits you on the sheet(s) titled "Summary Report."
For more detailed analyses of GHG emissions, see the sheet(s) titled "Analysis Results."

GHG Emissions Analysis -- Summary Report

Version 9.01 (3/09)

GHG Emissions Waste Management Analysis for
Prepared by:
Project Period for this Analysis: 01/00/00 to 01/00/00

GHG Emissions from Baseline Waste Management ($MTCO_2E$): (4,078)

Commodity	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	59	-	NA	2
Steel Cans	-	312	-	NA	13
Glass	-	1,613	-	NA	65
HDPE	-	165	-	NA	7
LDPE	-	2,186	-	NA	89
PET	-	182	-	NA	7
Corrugated Cardboard	-	1,113	-	NA	(80)
Newspaper	-	549	-	NA	(568)
Office Paper	-	288	-	NA	311
Dimensional Lumber	-	7,493	-	NA	(5,473)
Food Scraps	NA	9,127	-	-	3,827
Yard Trimmings	NA	1,152	-	-	(558)
Mixed Paper, Broad	-	2,059	-	NA	(218)
Mixed Metals	-	1,964	-	NA	80
Mixed Plastics	-	1,995	-	NA	81
Mixed Recyclables	-	1,458	-	NA	(279)
Mixed Organics	NA	9,703	-	-	(1,664)
Carpet	-	1,238	-	NA	50
Personal Computers	-	226	-	NA	9
Concrete	-	5,424	NA	NA	220
Tires	-	18	-	NA	1

GHG Emissions from Alternative Waste Management Scenario ($MTCO_2E$): (28,199)

Commodity	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	11	48	-	NA	(148)
Steel Cans	-	34	278	-	NA	(50)
Glass	-	253	1,360	-	NA	(16)
HDPE	-	15	150	-	NA	(15)
LDPE	-	1,013	1,173	-	NA	(1,685)
PET	-	21	161	-	NA	(26)
Corrugated Cardboard	-	692	421	-	NA	(2,184)
Newspaper	-	86	463	-	NA	(720)
Office Paper	-	62	226	-	NA	67
Dimensional Lumber	-	17	7,476	-	NA	(5,502)
Food Scraps	NA	NA	8,510	-	617	3,447
Yard Trimmings	NA	NA	590	-	562	(396)
Mixed Paper, Broad	NA	683	1,376	-	NA	(2,562)
Mixed Metals	NA	1,027	937	-	NA	(5,363)
Mixed Plastics	NA	1,272	723	-	NA	(1,910)
Mixed Recyclables	NA	1,238	220	-	NA	(3,613)
Mixed Organics	NA	NA	7,832	-	1,871	(1,711)
Carpet	-	746	492	-	NA	(5,377)
Personal Computers	-	198	28	-	NA	(449)
Concrete	NA	3,664	1,760	NA	NA	36
Tires	-	11	7	-	NA	(20)

Total Change in GHG Emissions: (24,120) $MTCO_2E$

This is equivalent to…		
Removing	**4,418**	Passenger Cars from the Roadway Each Year

Note: a negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

a) For explanation of methodology, see the EPA report:
Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (EPA530-R-06-004)
-- available on the Internet at http://epa.gov/climatechange/wycd/waste/downloads/fullreport.pdf (5.6 Mb PDF file).

b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.

Version 9.01 (3/09)

WAste Reduction Model (WARM) -- Inputs

Use this worksheet to describe the baseline and alternative MSW management scenarios that you want to compare. The shaded areas indicate where you need to enter information.

1. Describe the baseline generation and management for the MSW materials listed below. If the material is not generated in your community or you do not want to analyze it, leave it blank or enter 0. Make sure that the total quantity generated equals the total quantity managed.

Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Aluminum Cans	59		59		NA
Steel Cans	312		312		NA
Copper Wire			-		NA
Glass	1,613		1,613		NA
HDPE	165		165		NA
LDPE	2,186		2,186		NA
PET	182		182		NA
Corrugated Cardboard	1,113		1,113		NA
Magazines/Third-class Mail			-		NA
Newspaper	549		549		NA
Office Paper	288		288		NA
Phonebooks			-		NA
Textbooks			-		NA
Dimensional Lumber	7,493		7,493		NA
Medium-density Fiberboard			-		NA
Food Scraps	9,127	NA	9,127		
Yard Trimmings	1,152	NA	1,152		
Grass		NA	-		
Leaves		NA	-		
Branches		NA	-		
Mixed Paper (general)	2,059		2,059		NA
Mixed Paper (primarily residential)			-		NA
Mixed Paper (primarily from offices)			-		NA
Mixed Metals	1,964		1,964		NA
Mixed Plastics	1,995		1,995		NA
Mixed Recyclables	1,458		1,458		NA
Mixed Organics	9,703	NA	9,703		
Mixed MSW		NA	-		NA
Carpet	1,238		1,238		NA
Personal Computers	226		226		NA
Clay Bricks		NA	-	NA	NA
Concrete[1]	5,424		5,424	NA	NA
Fly Ash[2]			-	NA	NA
Tires[3]	18		18		NA

Please enter data in short tons (1 short ton = 2,000 lbs.)

Please refer to the User's Guide if you need assistance completing this table.

[1] Recycled concrete used as aggregate in the production of new concrete

[2] Recycled fly ash is utilized to displace Portland cement in concrete production.

[3] Recycling tires is defined in this analysis as retreading and does not include other recycling activities (i.e. crumb rubber applications).

2. Describe the alternative management scenario for the MSW materials generated in the baseline.
Any decrease in generation should be entered in the Source Reduction column.
Any increase in generation should be entered in the Source Reduction column as a negative value.
(Make sure that the total quantity generated equals the total quantity managed.)

Material	Baseline Generation	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Aluminum Cans	59		49	10		NA
Steel Cans	312		256	56		NA
Copper Wire	-					NA
Glass	1,613		815	798		NA
HDPE	165		99	66		NA
LDPE	2,186		1,670	516		NA
PET	182		111	71		NA
Corrugated Cardboard	1,113		1,008	105		NA
Magazines/Third-class Mail	-					NA
Newspaper	549		433	116		NA
Office Paper	288		231	57		NA
Phonebooks	-					NA
Textbooks	-					NA
Dimensional Lumber	7,493		775	6,718		NA
Medium-density Fiberboard	-					NA
Food Scraps	9,127	NA	NA	6,212		2,915
Yard Trimmings	1,152	NA	NA	83		1,069
Grass	-	NA	NA			
Leaves	-	NA	NA			
Branches	-	NA	NA			
Mixed Paper, Broad	2,059	NA	1,376	683		NA
Mixed Paper, Resid.	-	NA				NA
Mixed Paper, Office	-	NA				NA
Mixed Metals	1,964	NA	1,777	187		NA
Mixed Plastics	1,995	NA	1,597	398		NA
Mixed Recyclables	1,458	NA	1,238	220		NA
Mixed Organics	9,703	NA	NA	5,796		3,907
Mixed MSW	-	NA	NA			NA
Carpet	1,238		746	492		NA
Personal Computers	226		198	28		NA
Clay Bricks	-		NA		NA	NA
Concrete[1]	5,424	NA	3,664	1,760	NA	NA
Fly Ash[2]	-	NA			NA	NA
Tires[3]	18		11	7		NA

Please enter data in short tons (1 short ton = 2,000 lbs.)
Please refer to the User's Guide if you need assistance completing this table.

[1] Recycled concrete used as aggregate in the production of new concrete

[2] Recycled fly ash is utilized to displace Portland cement in concrete production.

[3] Recycling tires is defined in this analysis as retreading and does not include other recycling activities (i.e. crumb rubber applications).

3. To estimate the benefits from source reduction, EPA usually assumes that the material that is source reduced would have been manufactured from the current mix of virgin and recycled inputs. However, you may choose to estimate the emission reductions from source reduction under the assumption that the material would have been manufactured from 100% virgin inputs in order to obtain an upper bound estimate of the benefits from source reduction. Select which assumption you want to use in the analysis.

- (●) Current Mix
- ( ) 100% Virgin

4a. The emissions from landfilling depends on whether the landfill where your waste is disposed has a landfill gas (LFG) control system. If you do not know whether your landfill has LFG control, select "National Average" to calculate emissions based on the estimated proportions of landfills with LFG control in 2004. If your landfill does not have a LFG system, select "No LFG Recovery" and go to question 5. If a LFG system is in place at your landfill, select "LFG Recovery" and click one of the indented buttons in 4b to indicate whether LFG is recovered for energy or flared.

- ( ) National Average
- (●) LFG Recovery
- ( ) No LFG Recovery

4b. If your landfill has gas recovery, does it recover the methane for energy or flare it?

- (●) Recover for energy
- ( ) Flare
- ( ) Not Applicable

4c. If your landfill has gas recovery, what is the efficiency of the system?
The national analysis assumes a gas collection system efficiency of 75%. If you do not know what the efficiency of your system is, you may want to use 75% as a default.

Landfill Gas Collection System Efficiency:	60%

5a. Emissions that occur during transport of materials to the management facility are included in this model. You may use default transport distances, indicated in the table below, or provide information on the transport distances for the various MSW management options.

○ Use Default Distances
◉ Provide Information

5b. If you have chosen to provide information, please fill in the table below.
Distances should be from the curb to the landfill, combustor, or material recovery facility (MRF).
***Please note that if you chose to provide information, you must provide distances for both the baseline and the alternative scenarios.**

Management Option	Default Distance (Miles)	Distance (Miles)
Landfill	20	35
Combustion	20	0
Recycling	20	7
Composting	20	32

6. If you wish to personalize your results report, input your name & organization, and also specify the project period corresponding to the data you entered above.

Name	
Organization	

Project Period	From		to	

7. Please select between displaying units in metric tons of carbon equivalent (MTCE) and metric tons of carbon dioxide equivalent ($MTCO_2E$).

○ MTCE
◉ MTCO2E

8. Check the button below to see results in units of energy consumption (million BTU) and equivalencies (e.g., cars off the road).

☐ Energy Consumption (million BTU)

Congratulations! You have finished all the inputs.
A summary of your results awaits you on the sheet(s) titled "Summary Report."
For more detailed analyses of GHG emissions, see the sheet(s) titled "Analysis Results."

GHG Emissions Analysis -- Summary Report

Version 9.01 (3/09)

GHG Emissions Waste Management Analysis for
Prepared by:
Project Period for this Analysis: 01/00/00 to 01/00/00

GHG Emissions from Baseline Waste Management ($MTCO_2E$): (4,078)

Commodity	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	59	-	NA	2
Steel Cans	-	312	-	NA	13
Glass	-	1,613	-	NA	65
HDPE	-	165	-	NA	7
LDPE	-	2,186	-	NA	89
PET	-	182	-	NA	7
Corrugated Cardboard	-	1,113	-	NA	(80)
Newspaper	-	549	-	NA	(568)
Office Paper	-	288	-	NA	311
Dimensional Lumber	-	7,493	-	NA	(5,473)
Food Scraps	NA	9,127	-	-	3,827
Yard Trimmings	NA	1,152	-	-	(558)
Mixed Paper, Broad	-	2,059	-	NA	(218)
Mixed Metals	-	1,964	-	NA	80
Mixed Plastics	-	1,995	-	NA	81
Mixed Recyclables	-	1,458	-	NA	(279)
Mixed Organics	NA	9,703	-	-	(1,664)
Carpet	-	1,238	-	NA	50
Personal Computers	-	226	-	NA	9
Concrete	-	5,424	NA	NA	220
Tires	-	18	-	NA	1

GHG Emissions from Alternative Waste Management Scenario ($MTCO_2E$): (42,453)

Commodity	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	49	10	-	NA	(670)
Steel Cans	-	256	56	-	NA	(458)
Glass	-	815	798	-	NA	(196)
HDPE	-	99	66	-	NA	(136)
LDPE	-	1,670	516	-	NA	(2,835)
PET	-	111	71	-	NA	(169)
Corrugated Cardboard	-	1,008	105	-	NA	(3,145)
Newspaper	-	433	116	-	NA	(1,333)
Office Paper	-	231	57	-	NA	(597)
Dimensional Lumber	-	775	6,718	-	NA	(6,811)
Food Scraps	NA	NA	6,212	-	2,915	2,032
Yard Trimmings	NA	NA	83	-	1,069	(250)
Mixed Paper, Broad	NA	1,376	683	-	NA	(4,941)
Mixed Metals	NA	1,777	187	-	NA	(9,338)
Mixed Plastics	NA	1,597	398	-	NA	(2,419)
Mixed Recyclables	NA	1,238	220	-	NA	(3,613)
Mixed Organics	NA	NA	5,796	-	3,907	(1,761)
Carpet	-	746	492	-	NA	(5,377)
Personal Computers	-	198	28	-	NA	(449)
Concrete	NA	3,664	1,760	NA	NA	36
Tires	-	11	7	-	NA	(20)

Total Change in GHG Emissions: (38,374) $MTCO_2E$

This is equivalent to…		
Removing	**7,028**	Passenger Cars from the Roadway Each Year

Note: a negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

a) For explanation of methodology, see the EPA report:
Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (EPA530-R-06-004)
-- available on the Internet at http://epa.gov/climatechange/wycd/waste/downloads/fullreport.pdf (5.6 Mb PDF file).

b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.

Version 9.01 (3/09)

WAste Reduction Model (WARM) -- Inputs

Use this worksheet to describe the baseline and alternative MSW management scenarios that you want to compare. The shaded areas indicate where you need to enter information.

1. Describe the baseline generation and management for the MSW materials listed below. If the material is not generated in your community or you do not want to analyze it, leave it blank or enter 0. Make sure that the total quantity generated equals the total quantity managed.

Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Aluminum Cans	59		59		NA
Steel Cans	312		312		NA
Copper Wire			-		NA
Glass	1,613		1,613		NA
HDPE	165		165		NA
LDPE	2,186		2,186		NA
PET	182		182		NA
Corrugated Cardboard	1,113		1,113		NA
Magazines/Third-class Mail			-		NA
Newspaper	549		549		NA
Office Paper	288		288		NA
Phonebooks			-		NA
Textbooks			-		NA
Dimensional Lumber	7,493		7,493		NA
Medium-density Fiberboard			-		NA
Food Scraps	9,127	NA	9,127		
Yard Trimmings	1,152	NA	1,152		
Grass		NA	-		
Leaves		NA	-		
Branches		NA	-		
Mixed Paper (general)	2,059		2,059		NA
Mixed Paper (primarily residential)			-		NA
Mixed Paper (primarily from offices)			-		NA
Mixed Metals	1,964		1,964		NA
Mixed Plastics	1,995		1,995		NA
Mixed Recyclables	1,458		1,458		NA
Mixed Organics	9,703	NA	9,703		
Mixed MSW		NA	-		NA
Carpet	1,238		1,238		NA
Personal Computers	226		226		NA
Clay Bricks		NA	-	NA	NA
Concrete[1]	5,424		5,424	NA	NA
Fly Ash[2]			-	NA	NA
Tires[3]	18		18		NA

Please enter data in short tons (1 short ton = 2,000 lbs.)

Please refer to the User's Guide if you need assistance completing this table.

[1] Recycled concrete used as aggregate in the production of new concrete

[2] Recycled fly ash is utilized to displace Portland cement in concrete production.

[3] Recycling tires is defined in this analysis as retreading and does not include other recycling activities (i.e. crumb rubber applications).

2. Describe the alternative management scenario for the MSW materials generated in the baseline.
Any decrease in generation should be entered in the Source Reduction column.
Any increase in generation should be entered in the Source Reduction column as a negative value.
(Make sure that the total quantity generated equals the total quantity managed.)

Material	Baseline Generation	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Aluminum Cans	59		54	5		NA
Steel Cans	312		284	28		NA
Copper Wire	-					NA
Glass	1,613		885	728		NA
HDPE	165		132	33		NA
LDPE	2,186		1,928	258		NA
PET	182		147	35		NA
Corrugated Cardboard	1,113		1,060	53		NA
Magazines/Third-class Mail	-					NA
Newspaper	549		491	58		NA
Office Paper	288		260	28		NA
Phonebooks	-					NA
Textbooks	-					NA
Dimensional Lumber	7,493		1,801	5,692		NA
Medium-density Fiberboard	-					NA
Food Scraps	9,127	NA	NA	3,106		6,021
Yard Trimmings	1,152	NA	NA	41		1,111
Grass	-	NA	NA			
Leaves	-	NA	NA			
Branches	-	NA	NA			
Mixed Paper, Broad	2,059	NA	1,492	567		NA
Mixed Paper, Resid.	-	NA				NA
Mixed Paper, Office	-	NA				NA
Mixed Metals	1,964	NA	1,870	94		NA
Mixed Plastics	1,995	NA	1,725	270		NA
Mixed Recyclables	1,458	NA	1,266	192		NA
Mixed Organics	9,703	NA	NA	3,592		6,111
Mixed MSW	-	NA	NA			NA
Carpet	1,238		746	492		NA
Personal Computers	226		212	14		NA
Clay Bricks	-		NA		NA	NA
Concrete[1]	5,424	NA	4,544	880	NA	NA
Fly Ash[2]	-	NA			NA	NA
Tires[3]	18		14	4		NA

Please enter data in short tons (1 short ton = 2,000 lbs.)
Please refer to the User's Guide if you need assistance completing this table.

[1] Recycled concrete used as aggregate in the production of new concrete

[2] Recycled fly ash is utilized to displace Portland cement in concrete production.

[3] Recycling tires is defined in this analysis as retreading and does not include other recycling activities (i.e. crumb rubber applications).

3. To estimate the benefits from source reduction, EPA usually assumes that the material that is source reduced would have been manufactured from the current mix of virgin and recycled inputs. However, you may choose to estimate the emission reductions from source reduction under the assumption that the material would have been manufactured from 100% virgin inputs in order to obtain an upper bound estimate of the benefits from source reduction. Select which assumption you want to use in the analysis.

- (●) Current Mix
- ( ) 100% Virgin

4a. The emissions from landfilling depends on whether the landfill where your waste is disposed has a landfill gas (LFG) control system. If you do not know whether your landfill has LFG control, select "National Average" to calculate emissions based on the estimated proportions of landfills with LFG control in 2004. If your landfill does not have a LFG system, select "No LFG Recovery" and go to question 5. If a LFG system is in place at your landfill, select "LFG Recovery" and click one of the indented buttons in 4b to indicate whether LFG is recovered for energy or flared.

- ( ) National Average
- (●) LFG Recovery
- ( ) No LFG Recovery

4b. If your landfill has gas recovery, does it recover the methane for energy or flare it?

- (●) Recover for energy
- ( ) Flare
- ( ) Not Applicable

4c. If your landfill has gas recovery, what is the efficiency of the system?
The national analysis assumes a gas collection system efficiency of 75%. If you do not know what the efficiency of your system is, you may want to use 75% as a default.

Landfill Gas Collection System Efficiency:	60%

5a. Emissions that occur during transport of materials to the management facility are included in this model. You may use default transport distances, indicated in the table below, or provide information on the transport distances for the various MSW management options.

○ Use Default Distances
◉ Provide Information

5b. If you have chosen to provide information, please fill in the table below.
Distances should be from the curb to the landfill, combustor, or material recovery facility (MRF).
***Please note that if you chose to provide information, you must provide distances for both the baseline and the alternative scenarios.**

Management Option	Default Distance (Miles)	Distance (Miles)
Landfill	20	35
Combustion	20	0
Recycling	20	7
Composting	20	32

6. If you wish to personalize your results report, input your name & organization, and also specify the project period corresponding to the data you entered above.

Name	
Organization	

Project Period	From		to	

7. Please select between displaying units in metric tons of carbon equivalent (MTCE) and metric tons of carbon dioxide equivalent ($MTCO_2E$).

○ MTCE
◉ MTCO2E

8. Check the button below to see results in units of energy consumption (million BTU) and equivalencies (e.g., cars off the road).

☐ Energy Consumption (million BTU)

Congratulations! You have finished all the inputs.
A summary of your results awaits you on the sheet(s) titled "Summary Report."
For more detailed analyses of GHG emissions, see the sheet(s) titled "Analysis Results."

GHG Emissions Analysis -- Summary Report

Version 9.01 (3/09)

GHG Emissions Waste Management Analysis for
Prepared by:
Project Period for this Analysis: 01/00/00 to 01/00/00

GHG Emissions from Baseline Waste Management ($MTCO_2E$): (4,078)

Commodity	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	59	-	NA	2
Steel Cans	-	312	-	NA	13
Glass	-	1,613	-	NA	65
HDPE	-	165	-	NA	7
LDPE	-	2,186	-	NA	89
PET	-	182	-	NA	7
Corrugated Cardboard	-	1,113	-	NA	(80)
Newspaper	-	549	-	NA	(568)
Office Paper	-	288	-	NA	311
Dimensional Lumber	-	7,493	-	NA	(5,473)
Food Scraps	NA	9,127	-	-	3,827
Yard Trimmings	NA	1,152	-	-	(558)
Mixed Paper, Broad	-	2,059	-	NA	(218)
Mixed Metals	-	1,964	-	NA	80
Mixed Plastics	-	1,995	-	NA	81
Mixed Recyclables	-	1,458	-	NA	(279)
Mixed Organics	NA	9,703	-	-	(1,664)
Carpet	-	1,238	-	NA	50
Personal Computers	-	226	-	NA	9
Concrete	-	5,424	NA	NA	220
Tires	-	18	-	NA	1

GHG Emissions from Alternative Waste Management Scenario ($MTCO_2E$): (48,502)

Commodity	Tons Source Reduced	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total $MTCO_2E$
Aluminum Cans	-	54	5	-	NA	(738)
Steel Cans	-	284	28	-	NA	(510)
Glass	-	885	728	-	NA	(219)
HDPE	-	132	33	-	NA	(184)
LDPE	-	1,928	258	-	NA	(3,287)
PET	-	147	35	-	NA	(227)
Corrugated Cardboard	-	1,060	53	-	NA	(3,303)
Newspaper	-	491	58	-	NA	(1,435)
Office Paper	-	260	28	-	NA	(711)
Dimensional Lumber	-	1,801	5,692	-	NA	(8,583)
Food Scraps	NA	NA	3,106	-	6,021	119
Yard Trimmings	NA	NA	41	-	1,111	(238)
Mixed Paper, Broad	NA	1,492	567	-	NA	(5,339)
Mixed Metals	NA	1,870	94	-	NA	(9,831)
Mixed Plastics	NA	1,725	270	-	NA	(2,619)
Mixed Recyclables	NA	1,266	192	-	NA	(3,689)
Mixed Organics	NA	NA	3,592	-	6,111	(1,816)
Carpet	-	746	492	-	NA	(5,377)
Personal Computers	-	212	14	-	NA	(482)
Concrete	NA	4,544	880	NA	NA	(8)
Tires	-	14	4	-	NA	(26)

Total Change in GHG Emissions: (44,424) $MTCO_2E$

This is equivalent to…		
Removing	**8,137**	Passenger Cars from the Roadway Each Year

Note: a negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

a) For explanation of methodology, see the EPA report:
Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (EPA530-R-06-004)
-- available on the Internet at http://epa.gov/climatechange/wycd/waste/downloads/fullreport.pdf (5.6 Mb PDF file).

b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.