CHAPTER 04

ZERO WASTE

THE CITY OF LAKEWOOD and its residents recognize their responsibility to minimize the harmful impacts of waste in order to foster a vibrant and sustainable community. Lakewood envisions a future where the community collaborates with the surrounding region to practice responsible procurement, reuse, and recovery of materials through which jobs are created, business networks grow, and resources are conserved.

GOALS

- Create a culture of zero waste in Lakewood through education, municipal operations, infrastructure, and services.
- Foster sustainable household waste management.
- Foster sustainable commercial waste management.

TARGETS

- Achieve a 60 percent communitywide diversion rate by 2025.
- Achieve an 80 percent diversion rate at the Civic Center by 2025.
- Achieve increased diversion rates for specific municipal facilities (to be established after the completion of Implementation Strategy ZW1-B).
- Achieve a 90 percent diversion rate at City of Lakewood Earth Day and Cider Days events.
- Achieve a 60 percent residential* diversion rate by 2025.
- Achieve a 60 percent construction and demolition diversion rate by 2025.
- Achieve a 60–90 percent diversion rate for priority waste streams**.

* Single-family residences and complexes with eight units or fewer.

** Priority waste streams will be established through Implementation Strategy ZW3-A.

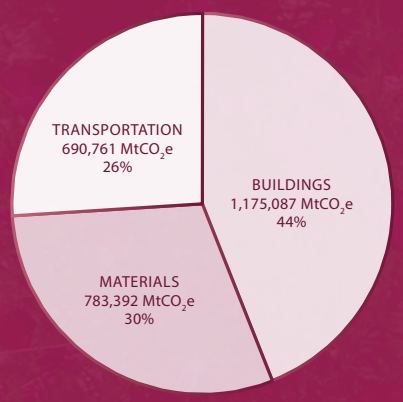
ZERO WASTE: GREENHOUSE GAS EMISSIONS REDUCTION POTENTIAL

BASELINE		
EMISSIONS BY SECTOR – MT CO_2E		
BUILDINGS	1,175,087	44%
MATERIALS	783,392	30%
TRANSPORTATION	690,761	26%
TOTAL GHG	2,649,240	100%

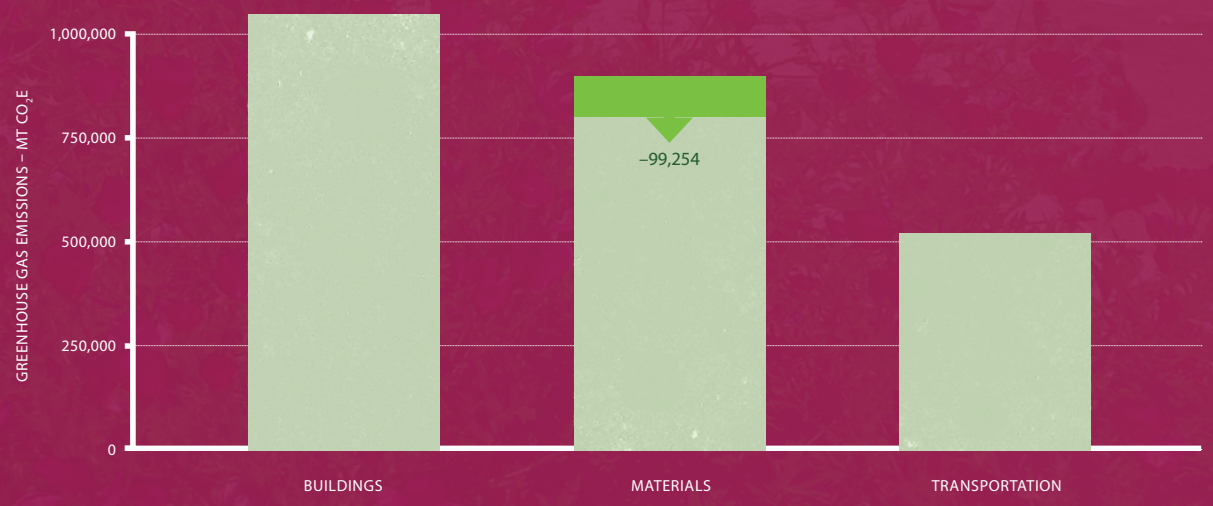
2025 BUSINESS AS USUAL (BAU)			
EMISSIONS BY SECTOR – MT CO_2E			CHANGE
BUILDINGS	1,053,368	42%	– 121,719
MATERIALS	903,600	36%	+ 120,209
TRANSPORTATION	539,165	22%	– 151,596
TOTAL GHG	2,496,133	100%	**–153,107**

2025 AFTER ZERO WASTE STRATEGIES ARE IMPLEMENTED			
EMISSIONS BY SECTOR – MT CO_2E			CHANGE
BUILDINGS	1,053,368	44%	0
MATERIALS	804,346	34%	– 99,254
TRANSPORTATION	539,165	22%	0
TOTAL GHG	2,396,879	100%	– 99,254

2007 BASELINE EMISSION BREAKDOWN



IMPACT OF ZERO WASTE STRATEGIES ON 2025 BUSINESS AS USUAL (BAU)



EACH AMERICAN GENERATES AN AVERAGE OF 4.4 POUNDS OF WASTE PER DAY.

WHAT MANY OF US DON'T REALIZE is that for every pound of waste we produce, 87 pounds of waste have already been generated through the manufacturing of those products.[1] The average American recycles or composts 34 percent of their waste; however, in Colorado the recycling and composting rate, often referred to as the "diversion rate," is just 26.5 percent.[2] Although diversion rates have steadily increased over the past five years, 164 million tons of waste still end up in U.S. landfills and incinerators every year.[3] Increasing our diversion rate to 100 percent would have a significant positive environmental impact, but it would still not address all the waste generated during the manufacturing process.

The flow of material in our society is commonly a one way stream to the dump. Natural resources are extracted from the earth, processed into goods, transported to our communities, consumed, and disposed of in landfills or incinerated into our air. In this model, even before the waste is disposed of, we negatively impact ecosystems, extract nonrenewable resources, and contribute to greenhouse gas emissions through the manufacturing and transportation processes. Waste buried in the landfill contaminates groundwater and soil and releases potent greenhouse gas emissions, including methane, into the air.

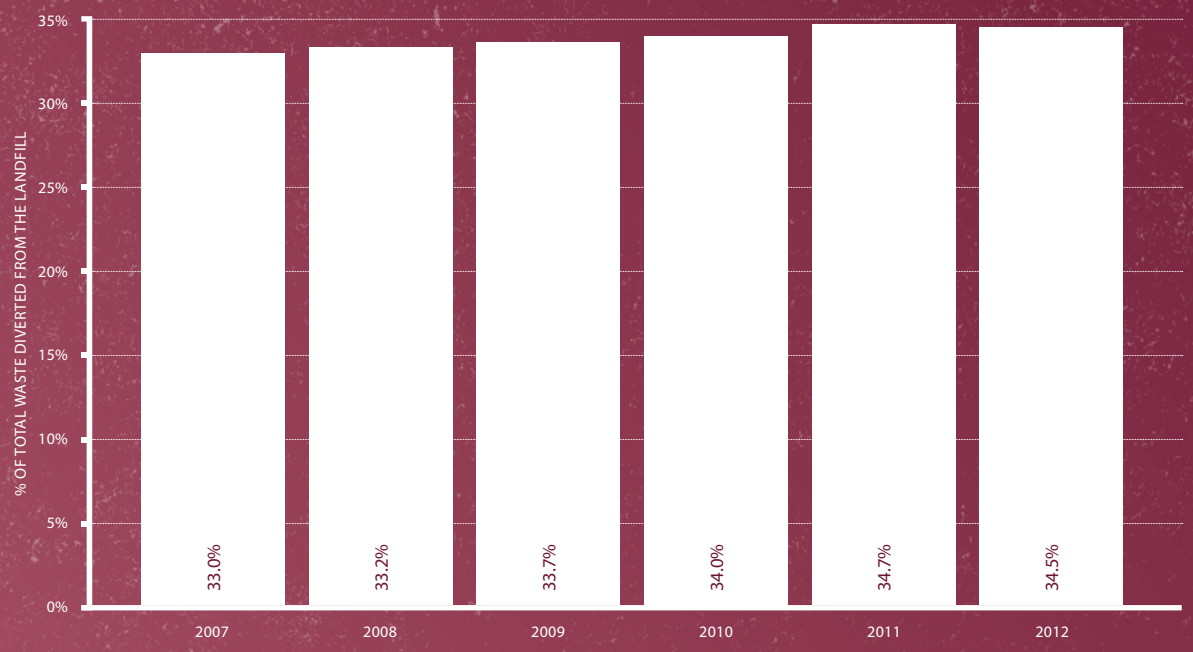
Communities around the country and the world are changing how they think about the flow of materials. Our natural ecosystems provide a healthy and efficient model that functions without creating waste. Outputs from one process, such as decomposing plant matter, provide input for another, such as creating nutrient rich soil for the next crop of plants. Communities are exploring ways to mimic nature's material cycle where used resources are repurposed and given a new life, an approach known as zero waste. Zero waste shifts the focus from simply managing how we dispose of waste to reducing how much we generate and finding value in our used materials.

Moving toward zero waste calls for partnerships within and between communities, businesses, industries, and government. With extensive collaboration, we can address the complexity of addressing diverse waste streams and the presence of hazardous materials in the goods we use daily. The outcomes of zero waste not only reduce negative impacts, but also create economic value through job creation, efficient material use, and industry innovation.

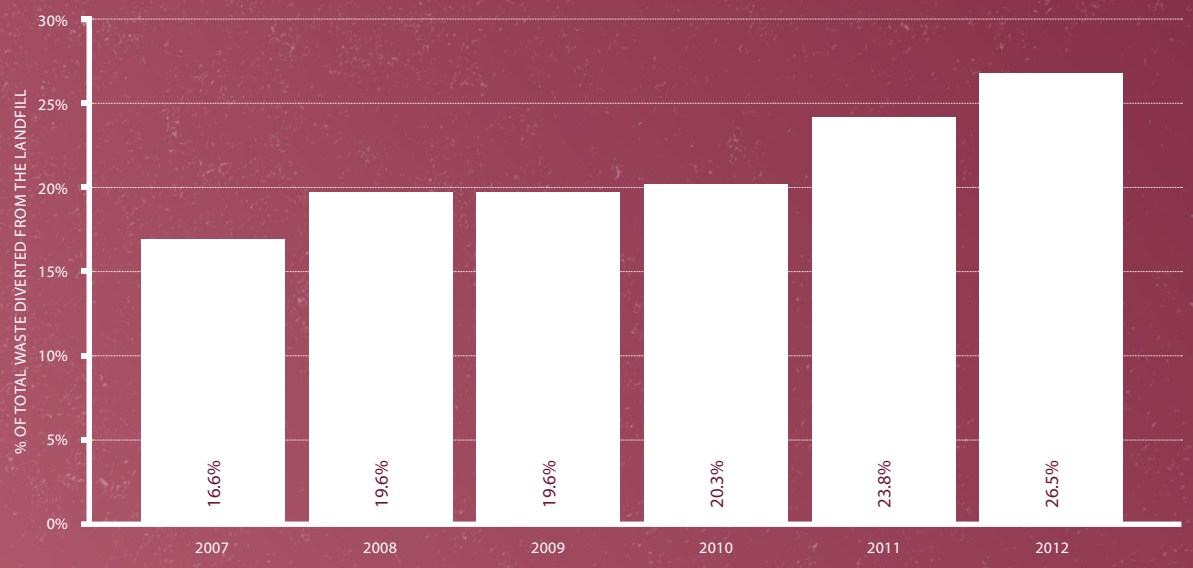
[1] Eco-Cycle. "Zero Waste: The Choice for a Sustainable Community." 2012. http://www.ecocycle.org/zerowaste.
[2] Colorado Department of Public Health and Environment. "Annual Solid Waste Diversion Totals 2007–2013." https://www.colorado.gov/pacific/cdphe/swreports.
[3] U.S. Environmental Protection Agency. "Municipal Solid Waste (MSW) in the United States: Facts and Figures." Last Updated: February 28, 2014. http://www.epa.gov/osw/nonhaz/municipal/msw99.htm.

HOW MUCH WASTE ARE WE DIVERTING FROM THE LANDFILL?

U.S. MUNICIPAL SOLID WASTE* DIVERSION TOTALS



COLORADO MUNICIPAL SOLID WASTE* DIVERSION TOTALS



*Municipal solid waste includes residential and commercial waste, but does not include industrial, hazardous, or construction waste.

TRENDS AND OPPORTUNITIES

UPSTREAM: WASTE REDUCTION AND GREEN PROCUREMENT

The zero waste approach considers the three phases of a product's lifecycle: upstream, midstream, and downstream. The upstream phase addresses resource extraction and production. Producers can play a large role in this stage through responsible manufacturing processes, reducing toxicity in their products, reducing packaging, and redesigning products that can be cycled back into the materials system. Consumers play an equally important role by consuming less and choosing to purchase from responsible producers. Although there are rarely "green" or "not green" items, purchasers can place items on a spectrum of sustainable production in order to compare items and make the more sustainable choice. Many organizations establish purchasing guidelines that align with their waste diversion targets and other sustainability goals. In 2012, the City of Lakewood adopted a Green Procurement Policy to encourage the purchase of green products throughout City operations.

MIDSTREAM: LONGEVITY AND REUSE

The midstream phase in the zero waste approach addresses how we use our materials. Disposable products are a common and inexpensive choice for many; yet the true cost is rarely represented on the price tag. The use of natural resources, production, transportation, and disposal are all costs of a single disposable item that is rapidly discarded. Plastic bags are a common example; according to the U.S. Environmental Protection Agency, the average American uses 500 plastic bags a year, using each bag for an average of 12 minutes before it is discarded. Choosing products that can be reused over and over again is an easy and effective way of reducing waste.

As our needs change and we no longer find our products useful, there are several alternatives before disposal. The growing sharing economy encourages people to share resources, reducing waste, saving money, and building relationships. These exchange networks can take many forms and happen in many places, including online neighborhood forums, garage sales, thrift stores, and donation sites. If there still is no demand for a product, there might be an opportunity for repurposing. Artists, entrepreneurs, and thrifty households have demonstrated that tires can be turned into chairs, wooden pallets into playgrounds, and leather airline seats into travel bags. Product reuse processes, such as repairs and reclamation, can create between 25 and 300 more jobs than landfilling and incineration.[4] Sharing and repurposing are midstream waste solutions with benefits far beyond our waste diversion goals.

The average American uses 500 plastic bags a year, using each bag for an average of 12 minutes before it is discarded. Choosing products that can be reused over and over again is an easy and effective way of reducing waste.

DOWNSTREAM: RESOURCE RECOVERY

The downstream phase includes all resource recovery operations. Recycling, composting, and waste-to-energy technologies are all ways to recapture the value of our discarded materials. Each of these processes is dependent on having the proper infrastructure and markets to support the redistribution of materials back into the zero waste system. Ensuring the proper facilities are available locally reduces transportation costs for waste haulers and creates jobs in the local economy. Resource recovery is also influenced by the upstream, green procurement process. By choosing products that can be recycled or composted, we are creating the inputs for the resource recovery industry.

Resource recovery is a critical mechanism for reducing community greenhouse gas emissions. Organic waste such as food scraps and yard trimmings that are sent to landfills produce methane, a greenhouse gas that is 72 times more potent than carbon dioxide. Organic waste makes up the largest portion of our current waste stream, resulting in 123 pounds of methane gas emissions for each ton of landfilled municipal solid waste.[5] Composting provides a healthy and economic alternative where recycled organic materials become nutrient-rich soil that can be used to grow new crops or fertilize our landscapes. Organic waste also can be processed into biogas through anaerobic digestion. Biogas can be combusted to generate electricity and heat or processed into fuel.

Each phase of the zero waste approach reduces negative health and environmental impacts and adds value to our economic and natural systems. Zero waste is an approach, vision, and way of life that everyone can participate in to create a vibrant and sustainable future. ■

---

[4] Institute for Local Self-Reliance. *Waste to Wealth: Recycling Means Business*. February 1, 2002. http://ilsr.org/recycling-means-business.

[5] Forster, P., V. Ramaswamy, et al. "2007: Changes in Atmospheric Constituents and in Radiative Forcing." Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Eds. Solomon, S., New York: Cambridge University Press, 2007. pp. 129–234.

ZERO WASTE DRIVERS

Programs, practices, and resources that support and contribute to a zero waste society.

- Producer Responsibility
- Green / Responsible Procurement
- Consumer Values
- Zero Waste Policies / Facilities

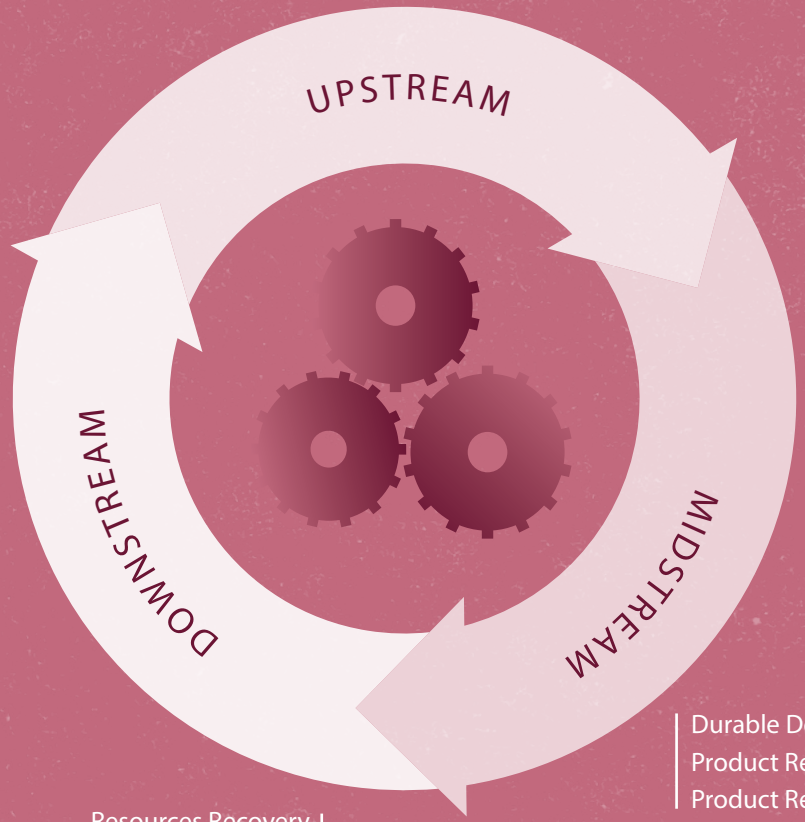
ZERO WASTE OUTPUTS

Social, economic and environmental benefits from a zero waste society.

- Jobs
- Energy Recovery
- Industry Innovation
- Sharing Economy
- Environmental Health

ZERO WASTE CYCLE

Product Design
Responsible Resource Extraction
Clean Manufacturing
Manufacturing From Recycled Materials



Durable Design
Product Reuse / Repair
Product Repurposing

Resources Recovery
Recycling
Composting
Waste-To-Energy / Energy Recapture

GOAL **ZW1**

CREATE A CULTURE OF ZERO WASTE IN LAKEWOOD THROUGH EDUCATION, MUNICIPAL OPERATIONS, INFRASTRUCTURE, AND SERVICES.

TARGETS

- Achieve a 60 percent communitywide diversion rate by 2025.
- Achieve an 80 percent diversion rate at the Civic Center by 2025.
- Achieve increased diversion rates for specific municipal facilities (to be established after the completion of Implementation Strategy ZW1-B).
- Achieve a 90 percent diversion rate at City of Lakewood Earth Day and Cider Days events.

OBJECTIVES & INDICATORS

- **OBJECTIVE:** Encourage the adoption of zero waste thinking with regard to the production, use, and disposal of resources.
  - INDICATOR: Number of residents engaged through zero waste outreach and education campaigns
- **OBJECTIVE:** Work toward zero waste in City facilities, operations, and events.
  - INDICATOR: Number of City facilities that offer recycling and composting collection
- **OBJECTIVE:** Increase the availability of facilities and specialized services to support reuse and resource recovery.
  - INDICATOR: Participation at special collection events
  - INDICATOR: Volume of material collected at Quail Street Recycling Center
  - INDICATOR: Volume of hazardous material collected at Rooney Road Recycling Center

CITY SPOTLIGHT

ZERO WASTE AT LAKEWOOD HERITAGE CENTER

THE LAKEWOOD HERITAGE CENTER'S (LHC) 20th Century Museum and festival grounds is home to the City's large community events. The LHC approach to zero waste has been a gradual, but continuous effort. Beginning in 2008 with the creation of waste sorting stations at large community events like the Sounds Exciting concert series, Cider Days, and Heritage Days, LHC has looked for ways to provide an overall reduction in waste. These events, which on average attract 5,000, 8,500, and 800 patrons respectively, are viewed as chances to serve museum visitors by implementing larger scale sustainable practices. By reducing our operational footprint and educating the Lakewood community about reducing theirs, we have an opportunity to cultivate awareness and foster change.

At both the Sounds Exciting concert series and Heritage Days, sorting stations with recyclable, compostable, and landfill containers have been very successful from the start. On average, 75 percent of each event's waste is recycled and composted each year. Unfortunately, Cider Days, which draws a substantially larger crowd, did not experience the same immediate success. After a couple of unsuccessful years with a mix of attended and unattended sorting stations, LHC decided the only way to create a meaningful difference in waste diversion was to hand sort every bag generated over a two day period. In order to achieve this goal, a large-scale hand sorting station was created and routinely staffed by a team of employees and volunteers. During the first year in 2011, sorters filled a 20 cubic yard container with recyclable materials and estimated that 75-80 percent of the total volume of material generated at the event was diverted from the landfill. That same year, 4,000 pounds of compostable material made up mostly of apple mash and wood shavings, generated from the event's cider pressing and saw mill demonstrations, were donated for pig feed and landscaping purposes. In 2014, LHC added additional composting to the Cider Days waste reduction efforts. The event was attended by 10,500 patrons, the biggest crowd in the event's history. The hand-sorting station collected 7,045 pounds of compostable/repurposed materials and 280 pounds of recyclable materials. Of the total waste generated, 84 percent was composted, 3 percent was recycled, with just 13 percent of waste going to the landfill.

In addition to special events, LHC practices zero waste in its day-to-day operations. The facility has integrated kitchen compost containers for staff/volunteer use and began composting organic waste generated from four large on-site flower and vegetable gardens in 2013 within a series of bins constructed of recycled palettes. The LHC compost bins have become a valuable tool for educating our visitors during events, tours and summer camps regarding the benefits of composting and organic gardening. The compost generated as part of this system is placed back in to our gardens annually and provides a nutrient-rich soil amendment more effective and safer than anything commercially available.

Many visitors at LHC share their appreciation of our endeavors toward waste reduction and the education that they use to become greener at home. Together, through these large- and small-scale efforts, LHC has witnessed firsthand the significant impacts a zero-waste approach has made and, as a result, continues to seek to improve, enhance, and expand our efforts. ▪

IMPLEMENTATION STRATEGIES

ZW1-A ZERO WASTE OUTREACH AND EDUCATION CAMPAIGN

Develop sector-specific outreach materials and educational campaigns to promote zero waste concepts and resources. Specifically:

- Develop campaigns for the municipal organization, single-family residences, multifamily residences, businesses by sector, and construction and development;
- Identify opportunities to provide zero waste education, including City employee orientation and HOA and business association meetings;
- Use City events as opportunities for public outreach and to demonstrate leadership;
- Create standards for clear and consistent zero waste messaging, including bin signage, colors, design, placement, and terminology that makes it easy to participate;
- Customize and distribute information on resource recovery facilities in Lakewood, including Rooney Road Recycling Center, Quail Street Recycling Center, and private collection sites;
- Develop and distribute specific recycling resource lists by sector; and
- Utilize City website and other communication channels to provide information to residents, businesses, and waste haulers on communitywide zero waste goals and related municipal policies.

ZW1-B MUNICIPAL FACILITY ZERO WASTE PROGRAMS

Develop customized zero waste strategies for new and existing municipal facilities based on the type of use and users, waste characteristics, and unique constraints. Specifically:

- Assess facilities to understand the range of services provided, types of facility users, and potential for waste reduction and diversion;
- Prioritize facilities for zero waste program implementation;
- Conduct waste characterization studies to determine the specific composition and quantity of waste generated;
- Identify opportunities to minimize waste generation and increase diversion rates through enhanced services or infrastructure;
- Set diversion targets when appropriate;
- Identify budget requests required for implementation;
- Implement enhanced services and infrastructure, provided appropriate resources are allocated;
- Develop educational and behavioral change strategies;
- Identify on-site leaders and mechanisms for communication to support implementation; and
- Track effectiveness and concerns in order to adjust the program as necessary to ensure success.

ZW1-C GREEN PROCUREMENT PROGRAM

Expand the City's green procurement program for the preferential purchase of green products and services and provide guidance for implementation. Specifically:

- Identify the potential environmental, economic, and social benefits of sustainable procurement practices;
- Establish a set of criteria, specific to product or service categories, that can be used to identify preferred products and services. Consider impacts on the environment, human well-being, energy use, greenhouse gas emissions, natural resources, and support of local businesses;
- Assess existing purchases and contracts to identify opportunities to transition to more sustainable products or services;
- Set a threshold for an acceptable cost increase for sustainable alternatives and consider establishing requirements for purchases to be assessed for compatibility with City sustainability goals if they are 1) over a certain dollar amount or 2) from specifically identified product or service categories;
- Continue to host regular green procurement training sessions for City staff and green procurement vendor fairs to learn about sustainable products and services;
- Provide customized support to City departments to support implementation of the green procurement program.

CITY SPOTLIGHT

RECYCLING SERVICES

THE CITY OF LAKEWOOD offers a variety of recycling services for its residents and employees. Since 1993, the City has provided single-stream recycling in City offices, recreation centers, community and art centers, and at the Heritage Center. Education and employee initiative support strong participation from users, resulting in approximately 300 tons of recycled materials each year from City facilities. The City also recycles shredded paper, which requires a separate sorting and bailing process and in 2014, launched compost service at the Lakewood Civic Center.

The City provides several recycling services for the Lakewood community and is continuously seeking ways to improve and expand operations. The Quail Street Recycling Center is open seven days a week and accepts common recyclable materials. Since the reopening of the Quail Street Recycling Center in early 2012, more than 3,000 tons of materials have been recycled, and in 2013 300 cars used the facility every day. The City also contributes funding and operational support to the Rooney Road Recycling Center (RRRC), which accepts household hazardous waste, chemicals, and electronics. The RRRC is owned and operated by a coalition of cities and towns in Jefferson County and provides a safe, responsible option for recycling hazardous materials. The City also provides Community Cleanups, which are special events that give residents an affordable opportunity to get rid of bulk items, electronics, and other household waste. ■

ZW1-D MUNICIPAL ZERO WASTE TOOLS

Develop resources and tools for City employees and facility users to support zero waste events, meetings, and operations. Specifically:

- Expand the green vendor list of businesses that provide products and services consistent with the City's zero waste goals;
- Provide model contract language and vendor agreements;
- Create a list of green products that meet the City's green procurement criteria and can be reused, recycled, or composted;
- Assemble facility-specific zero waste toolkits for events and meetings that provides step-by-step instructions, relevant signage, messaging standards, and additional materials and resources; and
- Provide customized support to City departments for green purchasing and other opportunities to reduce waste.

ZW1-E REUSE AND RESOURCE RECOVERY FACILITIES

Assess existing resource recovery facilities and infrastructure for capacity and material limitations in order to expand opportunities for landfill diversion. Specifically:

- Inventory existing public and private facilities to identify waste streams collected and processing capacity;
- Identify waste streams with insufficient recovery facilities;
- Identify funding opportunities and resources to address limitations and expand service; and
- Utilize the facility, waste stream, and budget assessments to prioritize investments in resource recovery facilities. Consider:
  - Expanding the level of service at City facilities, including Quail Street Recycling Center and Rooney Road Recycling Center;
  - Developing additional recycling drop-off sites and material recovery facilities (Example: City of Boulder CHaRM: Center for Hard to Recycle Materials);
  - Maintaining existing or expanding regular community cleanups and special collection events;
  - Facilitating additional collection sites for thrift stores and other charitable reuse outlets on private and public locations, ensuring the credibility of the collection organizations; and
  - Partnering with businesses to safely collect hard-to-recycle and hazardous materials related to their products and services. (Example: Paint Care, Colorado Paint Stewardship Program).

ZW1-F YARD WASTE COLLECTION SITE AND SERVICES

Establish a collection site and provide supportive services to divert yard waste from landfills and generate revenue for expanded recycling and sustainability services. Specifically:

- Identify and secure a location of sufficient size to accommodate a slash collection operation, as well as accommodate additional future recovery operations, such as food composting or a materials recovery facility;
- Identify the management process for the slash collection operation and establish operational responsibilities, collection and drop fees, and a revenue agreement to support operating costs and to generate additional revenue for expanded recycling and sustainability services; and
- Provide community and neighborhood-level yard waste collection events on an ongoing and consistent schedule (specific implementation steps for residential organic waste collection can be found in ZW2-B). Consider including special collection events as an operational responsibility of the site manager.

SUPPORTING STRATEGIES

COLLABORATION	▪ Work with nearby jurisdictions to expand opportunities for resource recovery and landfill diversion. ▪ Collaborate with local businesses and community organizations to support collection, special events, and outreach.
EDUCATION & PROMOTION	▪ Identify opportunities to introduce the concept of zero waste into area schools and institutions. ▪ Recognize leadership in zero waste efforts by employees, residents, and businesses through the Sustainability Awards and other City communication channels. ▪ Promote City zero waste initiatives.
TOOLS & TECHNOLOGY	▪ Utilize digital and mobile technology to facilitate zero waste behavior, such as location based services, crowdsourced material exchange, and resource directories. ▪ Develop tracking software and reporting standards for collecting waste diversion data.
RESEARCH & TRACKING	▪ Research funding streams to expand zero waste services and infrastructure, including grants, advertising, and sponsorships. ▪ Research best practices and emerging material reuse and recovery technologies.

CROSSCUTTING STRATEGIES

SUSTAINABLE BUSINESS HUB SE1-E | P. 61	▪ Ensure zero waste educational materials and strategies are transferrable and share with local businesses. ▪ Identify opportunities for enhanced business services through collection of hard-to-recycle materials.
SUSTAINABLE NEIGHBORHOODS CC1-D | P. 102	▪ Work with neighborhoods to identify zero waste "experts" in each neighborhood to answer questions and provide guidance for zero waste initiatives. ▪ Share zero waste educational materials with neighborhoods.

TABLE ZW1-1: STRATEGY BENEFITS

STRATEGY	ENVIRONMENTAL BENEFITS		ECONOMIC BENEFITS		SOCIAL BENEFITS	
	GHG REDUCTION POTENTIAL	ECOSYSTEM HEALTH	SELF-RELIANCE	HOUSEHOLD BENEFITS	COMMUNITY COHESION	PUBLIC HEALTH
ZW1-A: Zero Waste Outreach and Education Campaign		■■■	■■	■	■	■■
ZW1-B: Municipal Facility Zero Waste Programs		■■■	■■	⊘	■	■■
ZW1-C: Green Procurement Program		■■■	■■	■	■	■■
ZW1-D: Municipal Zero Waste Tools		■■	■■	⊘	■	■■
ZW1-E: Reuse and Resource Recovery Facilities		■■■	■■	■	■	■
ZW1-F: Yard Waste Collection Site and Services		■■■	■■	■	■	■■

<5,000 $MtCO_2e$ Greenhouse Gas Emissions ~10,000 $MtCO_2e$ Greenhouse Gas Emissions

■■■ High ■■ Medium ■ Low ⊘ Does Not Apply

TABLE ZW1-2: STRATEGY FEASIBILITY

STRATEGY	CITY OF LAKEWOOD			COMMUNITY	
	UPFRONT COSTS	ONGOING COSTS	PAYBACK / REVENUE POTENTIAL	FINANCIAL BENEFIT FOR RESIDENTS	FINANCIAL BENEFIT FOR BUSINESSES
ZW1-A: Zero Waste Outreach and Education Campaign	$	✓	–	✓	✓
ZW1-B: Municipal Facility Zero Waste Programs	$$$	✓	✓	–	–
ZW1-C: Green Procurement Program	$	✓	✓	✓	✓
ZW1-D: Municipal Zero Waste Tools	$	–	–	–	–
ZW1-E: Reuse and Resource Recovery Facilities	$$$$	✓	✓	✓	✓
ZW1-F: Yard Waste Collection Site and Services	$$$$	✓	✓	✓	✓

$** < 50,000 **$$** = 50,000–100,000 **$$$** = 100,000–1,000,000 **$$$$ > 1,000,000

GOAL **ZW2**

FOSTER SUSTAINABLE HOUSEHOLD WASTE MANAGEMENT.

TARGET

- Achieve a 60 percent residential* diversion rate by 2025.

OBJECTIVES & INDICATORS

- **OBJECTIVE:** Minimize the amount of waste sent to landfills from single-family residences and complexes with eight units or fewer.
  - INDICATOR: Residential diversion rate (eight units or fewer)
  - INDICATOR: Percentage of residents with recycling/composting services
  - INDICATOR: Percentage of residents who compost at home
- **OBJECTIVE:** Minimize the amount of waste sent to landfills from residences with more than eight units.
  - INDICATOR: Residential diversion rate (more than eight units)
  - INDICATOR: Percentage of multifamily residences with recycling/composting services

* Single-family residences and complexes with 8 units or fewers

IMPLEMENTATION STRATEGIES

ZW2-A RESIDENTIAL CURBSIDE RECYCLING AND WASTE DIVERSION

As an immediate priority, present City Council with potential programs and policies for residential waste haulers that address the inclusion of recycling services in collection contracts, minimize impacts to neighborhoods from traffic and noise, and explore the use of variable rate collection systems where the cost of service is based on the volume of trash generated. Specifically:

- Assess the current waste hauling operations within the city, costs and types of services offered, companies providing hauling services, scheduling and number of vehicles operating, and the social, environmental, and economic benefits and impacts;
- Conduct a communitywide, residential waste composition study to determine the mix and volume of waste streams and the current landfill diversion rate for the community;
- Launch a formal residential outreach process to introduce potential programs and policies. Collect feedback and identify resident needs and concerns;
- Launch a formal waste hauler outreach process to introduce potential programs and policies. Collect feedback and identify hauler concerns and business impacts, including costs, logistical limitations, vehicle requirements, collection route efficiency, likely rate structures, existing contractual obligations, licensing processes, and implementation timing;
- Utilize the community assessment, waste characterization study, public and waste hauler outreach outcomes, and best practices to develop a set of potential program or policy recommendations; and
- Present recommendations to residents, haulers, City staff, and City leadership to collect comments, refine proposed program or policy details, and implement.

CONCEPT

PAY-AS-YOU-THROW

PAY-AS-YOU-THROW (PAYT) is a trash collection program where the cost of service reflects how much you throw away and provides incentives for you to recycle. There are several models of PAYT programs; most include free, unlimited recycling services to encourage more recycling and less trash. This model can reduce household costs and help the community reduce the volume of waste ending up in landfills, which causes air and water pollution.

Similar to utilities, such as electric and water, PAYT systems require that charges are based on the services provided to each household. For example, some models offer three sizes of trash cans to residents. Those who choose the smallest size pay the least, and the price increases with the can size. Simply put, the less you throw away, the less you pay.

The two common ways of implementing PAYT are through a City ordinance or contracting with haulers. In both scenarios, haulers coordinate services to increase efficiency, which lowers hauling costs and significantly reduces the wear and tear on City streets. PAYT has also been shown to be the most effective way to increase recycling and can increase recycling volume by more than 50 percent .

Residents have expressed a strong demand for recycling solutions in Lakewood. In the City of Lakewood 2013 Citizen Survey, 94 percent of residents agreed that curbside recycling should be a standard option in residential trash services and that the City should investigate strategies for increased recycling. PAYT is one option to respond to resident demand and meet City waste diversion goals. ▪

LEARN MORE ABOUT PAY-AS-YOU-THROW:

http://www.epa.gov/osw/conserve/tools/payt
http://www.epa.gov/osw/conserve/tools/payt/top13.htm

ZW2-B RESIDENTIAL ORGANIC WASTE

Provide opportunities for residents to divert organic waste from landfills. Specifically:

- Facilitate access to a yard waste collection site and associated services; ZW1-F | P. 79
- Support community yard waste collection events on an ongoing and consistent schedule in order to increase ease of participation;
- Explore opportunities to support resident-initiated, neighborhood-scale yard waste collection events through financial or operational support;
- Assess feasibility of curbside collection of yard and food waste through waste hauler requirements, voluntary neighborhood-organized collection programs, and other strategies; and
- Connect residents with opportunities to learn how to effectively compost organic waste at home.

ZW2-C MULTIFAMILY RECYCLING AND COMPOSTING

Assist multifamily developers, owners, managers, and homeowner associations in implementing recycling and composting programs in residential developments. Specifically:

- Assess waste collection systems for multifamily properties including types of waste collected, costs, site constraints, and other limitations to providing recycling and compost collection;
- Conduct a communitywide, multifamily residential waste composition study to determine the mix and volume of waste streams and the current landfill diversion rate for multifamily properties;
- Develop policies and site plan requirements that minimize barriers to recycling and composting;
- Develop a suite of strategies, policies, and behavior-change programs to address challenges of implementing recycling and composting programs; and
- Promote strategies and provide consulting services to assist multifamily developers, owners, managers, and homeowner associations to implement strategies and programs.

SUPPORTING STRATEGIES

COLLABORATION	▪ Work with residents to regularly review needs, concerns, and opportunities related to residential waste. ▪ Work with haulers to convey the City's sustainability goals, requirements, and processes for waste diversion, including data collection, efficient operations, and proper disposal.
EDUCATION & PROMOTION	▪ Educate residents on sustainable household purchasing and disposal that reduces waste through source reduction, reuse, recycling, and composting. ZW1-A | P. 76 ▪ Promote opportunities and locations (public and private) to properly dispose of hazardous, bulk, and other hard-to-recycle items. ▪ Develop ongoing and seasonally specific outreach to residents.
TOOLS & TECHNOLOGY	▪ Utilize or customize digital search tools that identify resource recovery outlets. ▪ Encourage the use of neighborhood-level online platforms that facilitate reuse and material exchange.
RESEARCH & TRACKING	▪ Research best practices for residential waste diversion. ▪ Track waste collection costs, diversion rates, and number of City service requests related to residential waste collection.

CROSSCUTTING STRATEGIES

SUSTAINABLE NEIGHBORHOODS CC1-D | P. 102	▪ Work with neighborhoods to assist in public outreach efforts for proposed residential waste programs. ▪ Work with neighborhoods to pilot waste diversion programs including household organic waste collection.

TABLE ZW2-1: STRATEGY BENEFITS

STRATEGY	ENVIRONMENTAL BENEFITS		ECONOMIC BENEFITS		SOCIAL BENEFITS	
	GHG REDUCTION POTENTIAL	ECOSYSTEM HEALTH	SELF-RELIANCE	HOUSEHOLD BENEFITS	COMMUNITY COHESION	PUBLIC HEALTH
ZW2-A: Residential Curbside Recycling and Waste Diversion	🍃🍃🍃🍃🍃	■■	■	■	⊘	■■
ZW2-B: Residential Organic Waste	🍃	■■■	■	■	⊘	■■
ZW2-C: Multifamily Recycling and Composting	🍃🍃	■■■	■	■	⊘	■■

🍃 <5,000 $MtCO_2e$ Greenhouse Gas Emissions 🍃 ~10,000 $MtCO_2e$ Greenhouse Gas Emissions

■■■ High ■■ Medium ■ Low ⊘ Does Not Apply

TABLE ZW2-2: STRATEGY FEASIBILITY

STRATEGY	CITY OF LAKEWOOD			COMMUNITY	
	UPFRONT COSTS	ONGOING COSTS	PAYBACK / REVENUE POTENTIAL	FINANCIAL BENEFIT FOR RESIDENTS	FINANCIAL BENEFIT FOR BUSINESSES
ZW2-A: Residential Curbside Recycling and Waste Diversion	$	✓	✓	✓	–
ZW2-B: Residential Organic Waste	$	✓	–	✓	–
ZW2-C: Multifamily Recycling and Composting	$	✓	–	✓	–

$** < 50,000 **$$** = 50,000–100,000 **$$$** = 100,000–1,000,000 **$$$$ > 1,000,000

GOAL **ZW3**

FOSTER SUSTAINABLE COMMERCIAL WASTE MANAGEMENT.

TARGET

- Achieve a 60 percent construction and demolition diversion rate by 2025.
- Achieve a 60–90 percent diversion rate for priority waste streams*.

OBJECTIVES & INDICATORS

- **OBJECTIVE:** Minimize the amount of commercial waste sent to landfills.
  - INDICATOR: Commercial landfill diversion rates
  - INDICATOR: Number of restaurants and grocery stores participating in food composting programs
- **OBJECTIVE:** Add value to Lakewood's economy through materials exchange and recovery.
  - INDICATOR: Number of individuals employed at reuse and resource recovery businesses
- **OBJECTIVE:** Minimize the amount of construction and demolition (C&D) material sent to landfills.
  - INDICATOR: C&D landfill diversion rates

* Priority Waste Streams will be established through Implementation Strategy ZW3-A.

IMPLEMENTATION STRATEGIES

ZW3-A COMMERCIAL WASTE ASSESSMENT AND PRIORITIZATION

Assess commercial waste systems to identify gaps in resource recovery facilities and prioritize the development of programs and policies. Specifically:

- Conduct a commercial waste characterization study to determine the mix and volume of waste streams, gaps in resource recovery facilities, and current landfill diversion rates;
- Identify priority waste streams based on volumes generated and environmental impact;
- Inventory existing resource recovery infrastructure; and
- Establish landfill diversion targets for priority waste streams.

ZW3-B COMMERCIAL WASTE DIVERSION PROGRAMS AND POLICIES

Develop commercial waste diversion programs and policies that support responsible disposal choices, enhance efficiency, minimize environmental impacts, and convert waste into valuable products. Specifically:

- Identify best practices and prioritize the development of programs, policies, and regulations to support landfill diversion of priority waste streams. Specific assessments may include cardboard, styrofoam, food waste, and single-use bags;
- Provide customizable tools and materials, technical assistance, financing mechanisms, behavior-change strategies, and other resources for priority waste streams;
- Identify and secure funding and grant opportunities to be used to subsidize program costs and provide technical assistance to businesses;
- Develop formal business and community outreach programs when considering adoption of commercial waste management regulations; and
- Employ a targeted outreach strategy to promote available resources to businesses.

ZW3-C CONSTRUCTION AND DEMOLITION WASTE

Adopt construction and demolition (C&D) waste diversion requirements and provide supportive materials for businesses. Specifically:

- Assess C&D regulations and requirements adopted by other municipal governments to determine efficacy, costs of implementation, and impact on the local economy;
- Develop requirements for C&D waste diversion through a municipal ordinance. Consider requirements for project-specific diversion rates, mandated waste management plans, and on-site posting to support compliance; and
- Develop resources to support adopted regulations, including materials exchange networks and directories of businesses providing recycled construction materials and C&D material recovery services.

COMMUNITY SPOTLIGHT

SUSTAINABILITY: LEARNING FROM NEIGHBORING COMMUNITIES

SUSTAINABILITY is an Arvada recycling company with a mission to create meaningful work for people who have developmental disabilities, a segment of our society that faces an over 70 percent unemployment rate. The company combines a passion for the environment and recycling with an understanding that every human being is unique and has something to offer the community and the planet.

SustainAbility opened in July 2012 as a result of a private public partnership led by the City of Arvada. The founders of SustainAbility recognized the need and demand for expanded recycling services in the city. The center offers free, single-stream recycling and accepts a variety of hard-to-recycle items. The company's innovative business model is shaped by the abilities of its employees, including meticulously disassembling electronics and transforming furniture material scraps into eco-friendly bags.

Through creativity and collaboration, the Arvada community found a way to reduce its waste footprint and fill employment demands for a unique population. SustainAbility is a true model of sustainability, incorporating environmental, social, and economic concepts to create a stronger community. ■

SUSTAINABILITY

SUPPORTING STRATEGIES

COLLABORATION	▪ Work with recyclers that employ populations with developmental disabilities. ▪ Work with U.S. Green Building Council and Construction & Demolition Recycling Association to expand resources and best practices. ▪ Work with nonprofit organizations to support tax-deductible donations of surplus and used construction and commercial materials.
EDUCATION & PROMOTION	▪ Educate businesses on sustainable purchasing and disposal that reduces waste through source reduction, reuse, recycling, and composting. ZW1-A | P. 76 ▪ Promote alternatives to traditional demolition of buildings, including renovation and historic preservation.
TOOLS & TECHNOLOGY	▪ Develop or utilize existing online resources to facilitate the exchange of surplus and used construction and commercial materials.
RESEARCH & TRACKING	▪ Track economic benefits resulting from reuse and recycling services and companies. ▪ Research and track new types of construction materials to understand zero waste impacts.

CROSSCUTTING STRATEGIES

SUSTAINABLE BUSINESS HUB SE1-E | P. 61	▪ Incorporate zero waste concepts into the green business certification program. ▪ Utilize participating businesses to pilot commercial waste management programs. ▪ Help businesses develop zero waste management plans and provide toolkits to support efforts.
SUSTAINABLE NEIGHBORHOODS CC1-D | P. 102	▪ Encourage participating neighborhoods to support local businesses demonstrating zero waste principles.

TABLE ZW3-1: STRATEGY BENEFITS

STRATEGY	ENVIRONMENTAL BENEFITS		ECONOMIC BENEFITS		SOCIAL BENEFITS	
	GHG REDUCTION POTENTIAL	ECOSYSTEM HEALTH	SELF-RELIANCE	HOUSEHOLD BENEFITS	COMMUNITY COHESION	PUBLIC HEALTH
ZW3-A: Commercial Waste Assessment and Prioritization	🍃	■■	■■	⊘	⊘	■
ZW3-B: Commercial Waste Diversion Programs and Policies	🍃🍃🍃🍃🍃	■■■	■■	■	■	■■
ZW3-C: Construction and Demolition Waste	🍃	■■■	■■	⊘	■	■■

🍃 <5,000 $MtCO_2e$ Greenhouse Gas Emissions 🍃 ~10,000 $MtCO_2e$ Greenhouse Gas Emissions

■■■ High ■■ Medium ■ Low ⊘ Does Not Apply

TABLE ZW3-2: STRATEGY FEASIBILITY

STRATEGY	CITY OF LAKEWOOD			COMMUNITY	
	UPFRONT COSTS	ONGOING COSTS	PAYBACK / REVENUE POTENTIAL	FINANCIAL BENEFIT FOR RESIDENTS	FINANCIAL BENEFIT FOR BUSINESSES
ZW3-A: Commercial Waste Assessment and Prioritization	$$	–	–	–	–
ZW3-B: Commercial Waste Diversion Programs and Policies	$	✓	–	–	✓
ZW3-C: Construction and Demolition Waste	$	–	–	–	✓

$** < 50,000 **$$** = 50,000–100,000 **$$$** = 100,000–1,000,000 **$$$$ > 1,000,000