SUSTAINABLE RESOURCE MANAGEMENT PLAN

AN UPDATE TO THE 2010 SOLID WASTE MASTER PLAN

DENVER
THE MILE HIGH CITY

INTRODUCTION

The City and County of Denver is pleased to present the Sustainable Resource Management Plan, an update to the Solid Waste Master Plan for the Mile-High City, and an evolution of the plan first released in 2010.

This updated plan offers a comprehensive view of sustainable materials management strategies across the residential, commercial, construction and demolition (C&D), and industrial waste sectors. It builds upon the success of the 2010 plan that focused heavily on residential solid waste management, to an expanded focus on waste citywide.

In taking a broader, citywide approach to sustainable materials management, with a vision of building a truly circular economy, this plan impacts and relies on cooperation from many partners throughout the city including multiple departments, private sector haulers, commercial businesses, and the community. The success of a citywide sustainable materials management effort is dependent on participation by all of these partners.

This plan update was coordinated by the Office of Climate Action, Sustainability, and Resiliency (CASR) in partnership with the Department of Transportation and Infrastructure (DOTI) and the Department of Public Health and Environment (DDPHE). The plan combines the subject matter expertise of these agencies with select recommendations from LBA Associates, which consulted with DOTI in 2019-2020, and recommendations from the 2020 Climate Action Task Force.

FACT

Glass bottles are recycled right here in Colorado, and recycling saves energy: recycling one glass bottle saves enough energy to power a 100-Watt light bulb for four hours or power a computer for 30 minutes.

PROGRESS SINCE 2010

The City and County of Denver has made commendable progress since 2010 in diverting residential waste from landfill, and in beginning to track commercial waste diversion.

Accomplishments since 2010 include:

- The standardization of residential trash collection to automated carts, removing dumpsters and realizing a decrease of more than 300 pounds of waste per household
- Automatic delivery of recycling carts to homes that had not previously subscribed; 96% of Denver's customers now have recycling carts
- Increasing compost collection subscriptions from 1,600 homes in 2010 to over 30,000 homes in 2022
- Development and implementation of a Hauler Licensing program which collects data on private sector waste and recycling
- Significantly expanded education and outreach, research, and implementation of the 2010 Master Plan recommendations
- Supported expansion of paint recycling
- Expanded infrastructure at the Cherry Creek Transfer Station to increase residential hauling efficiency

THE IMPACT OF THESE EFFORTS DOUBLED THE CITY'S RESIDENTIAL WASTE DIVERSION FROM **13% IN 2010 TO 26% IN 2020.**

WASTE MANAGEMENT IN DENVER: CURRENT STATE

The following tables and charts document Denver's waste volumes and diversion rates per material over time.

Figure 1 illustrates that the city's diversion rate has doubled in the past 10 years. Data from the commercial sector was unavailable prior to the Hauler Licensing requirement.

Table 1 provides the most recent total annual waste volume and diversion per sector.

Figure 1: Waste Diversion 2010-2020

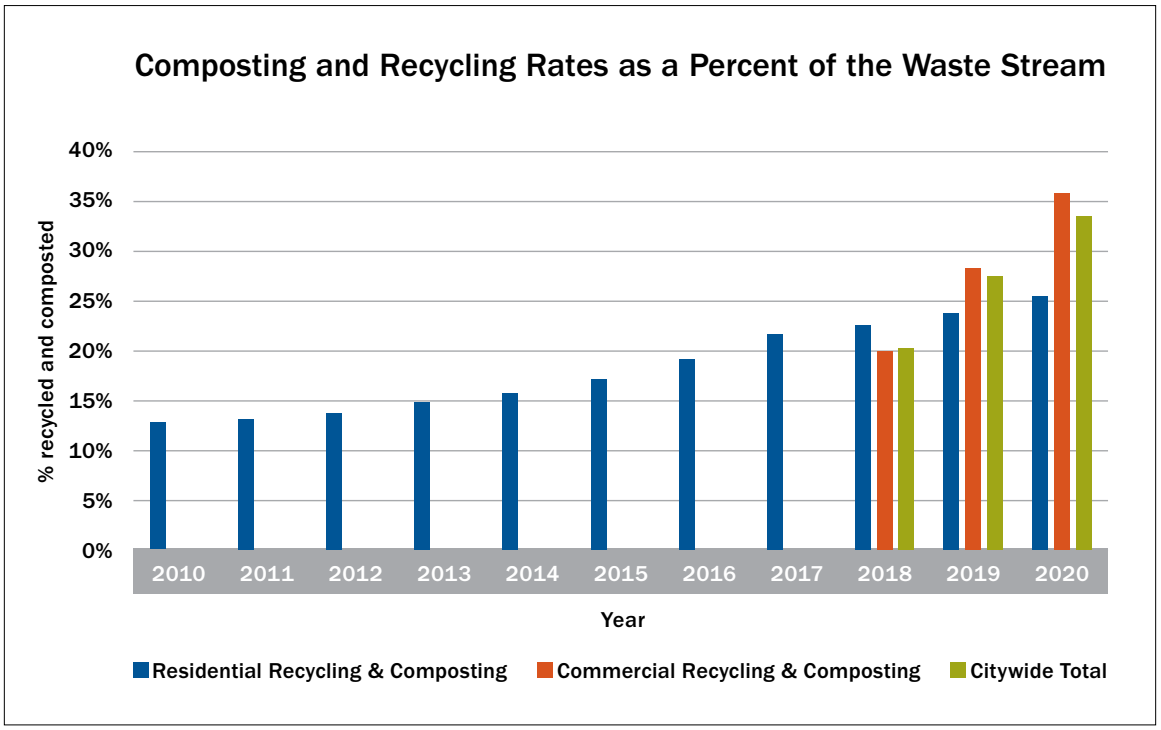

Table 1: Current State of Waste Diversion in Denver, 2020

	TOTAL TONS	% OF TOTAL	% DIVERTED	2020 ACTUAL TONS DIVERTED
Construction and Demolition Debris	486,065	36%	36%	174,983
Industrial, Commercial, Institutional*	621,686	46%	37%	230,024
Residential (single family up to 7 units)	244,919	18%	26%	62,931
Total waste	**1,352,670**		**35%**	**467,938**

** Includes multi-family buildings with 8 units or more*

WASTE MANAGEMENT IN DENVER: FUTURE STATE

Denver must act with urgency to strengthen its sustainable materials management policies, programs, and infrastructure in order to promote principles and practices of a circular economy, centered on equity, to create high-road jobs[1] and develop an economically successful system for managing waste in the city. The Climate Action Task Force identified managing and diverting waste to higher and better uses as a key strategy for reducing GHG emissions with the potential for quick results.

CASR, in partnership with DOTI and DDPHE recommend to divert **50% of all solid waste generated by 2027 and 70% by 2032**. Even accounting for Denver's future growth, achieving a 70% diversion rate will reduce greenhouse gas emissions by nearly 3,000,000 MtCO2e, the equivalent of taking over 600,000 cars off the road.

STRATEGIES

To achieve the vision and goals, Denver has three strategic areas of focus:

POLICY

Reduce landfill waste and increase recycling through innovative programs and policies at the local level, as well as advocate for impactful policies at the state level.

OPERATIONS

Evaluate and improve waste management infrastructure in Denver by fostering partnerships across the metropolitan area in all sectors of waste management and market development to create economically viable waste diversion programs.

ENGAGEMENT

Increase diversion by educating consumers and businesses about sustainable purchasing practices and how to properly manage our individual and collective waste efficiently and effectively.

OUTCOMES

Investing in this plan's vision and implementation strategies will create favorable outcomes, such as

- Moving toward a more circular economy[2]
- Improving efficiencies throughout Denver's waste systems
- Reducing solid waste disposal by encouraging residents and businesses to increase waste diversion through recycling and composting
- Efficiently managing costs

[1] *As defined by the American Sustainable Business Council, high road jobs follow 10 core principles: A high-road workplace will: provide family-friendly benefits, offer flexibility, pay a livable and fair wage, invest in employee growth and development, cultivate inclusion, govern fairly and transparently, engage with communities, manage the supply chain responsibly, drive environmental best practices, and promote health and safety.*

[2] *A circular economy is defined by the Ellen B. MacArthur foundation as "A systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution. It is based on three principles, driven by design: eliminate waste and pollution, circulate products and materials (at their highest value), and regenerate nature."*

- Ensuring access to waste diversion services across all sectors of Denver's business and residential communities
- Reducing methane and other greenhouse gas emissions
- Creating jobs
- Extending the life of the city's landfill
- Beautifying the city's streets, parks, and neighborhoods, and protecting sewers and waterways by eliminating litter

Investing in this vision will enable Denver to achieve its goal of a 70% reduction in total landfilled waste by 2032.

PROGRAMS ALREADY UNDERWAY

The City has a number of efforts and programs already underway, including:

- Recycling and composting education efforts citywide
- Promotion and growth in composting collection for Denver residential customers
- The Bring Your Own Bag Program, launched in July 2021, implementing a 10-cent fee for plastic and paper bags provided in retail establishments
- Passage of a waste reduction ordinance in 2021, aimed at reducing the volume of single-use items in food service establishments
- A proposal to implement a fee for waste hauling services for City residential customers, which will encourage waste reduction and provide free composting and recycling to all customers

FACT

Food waste is the most abundant material to divert in the commercial and residential sectors, accounting for 18-25% of the waste stream.

SHORT-TERM TACTICS

The short-term tactics outlined in this plan are foundational to the long-term vision. These tactics will aid in laying the groundwork to support more cost-effective operations and policy development, while increasing public awareness. Implementation of all the recommended tactics are critical to the City's success, as no one tactic alone can achieve the desired goals. It is intended for short-term tactics to be implemented by 2027.

EDUCATION AND ENGAGEMENT

1. Invest in Community Engagement

Investing in education, community engagement and technical assistance are a critical and necessary complement to operational and policy changes that will support and maintain the long-term desired behavior by consumers and businesses. The expected outcomes of a robust education and engagement effort include:

- Creating social norms around recycling and waste diversion
- Saving money for the city and commercial/multi-family building owners by reducing landfill costs
- Generating support for waste related policies
- Leading with equity
- Encouraging private investment in waste diversion systems
- Increasing capture of divertible materials

[3] *This category includes multi-family residential buildings with eight units or more.*

- Increasing operational efficiencies by reducing contamination
- Removing barriers for residents of multi-family and tenants of commercial buildings to divert their waste
- Establishing trust in the waste diversion system by providing consistent and on-going public education

A report by The Recycling Partnership, "Pay it Forward: How Investment in Recycling will Pay Dividends", recommends that cities invest at least $10 per household unit per year in educational programs to achieve success. For Denver, this would make the optimal budget for educational programming $3 million. Currently, the three agencies collaborating on this plan (CASR, DOTI, and DDPHE) spend money on educational efforts. The three agencies will continue to collaborate on efforts to maximize their educational budgets and seek additional funding as needed, to achieve that budget goal.

SUSTAINABLE WASTE MANAGEMENT INFRASTRUCTURE

It is critical to recognize that infrastructure to manage waste is a key foundational need for the City to increase its own waste diversion, promote a circular economy and ensure economically viable waste diversion options for all haulers. To accomplish this, Denver shall seek to:

1. Invest in a Comprehensive Infrastructure Needs Assessment

This assessment will evaluate needs across each sector of waste including residential, commercial, food waste and other organics, construction and demolition debris, and hard-to-recycle materials. The assessment of infrastructure shall include Denver-operated, privately-operated, and regional facilities, collection and transportation, and end market needs.

2. Invest in weekly recycling collection

This plan recommends changing every-other-week residential recycling collection to weekly residential collection to fully capture all recyclable materials. Consumer preferences have changed, with more bulk purchases and deliveries, which has led to a significant increase in cardboard waste. Weekly pick up will alleviate the need for additional recycling carts which take up valuable yard or garage space and reduce the amount of waste going to landfill on extra trash collection days.

FACT

It takes just 60 days from the time you recycle your aluminum can until it returned to the grocery store shelf as a new can, and aluminum cans can be recycled over and over again.

POLICY

Smart policies are needed to support operations and educational efforts to reduce waste. Many peer cities of similar size have strong waste diversion policies that could serve as a model for Denver. By 2024 the City shall seek to:

1. Pass a Universal Waste Reduction Ordinance (UWRO)

Denver's commercial[3] and construction sectors collectively account for more than 80% of Denver's total waste stream, with a diversion rate of only 36%, and thus represent a sizeable opportunity for increased waste diversion. This plan recommends a comprehensive policy that provides a time and tiered approach to achieve desired waste diversion results. A UWRO would establish:

- Short term foundational work to support long-term policies
- Diversion requirements for commercial and multi-family buildings
- Diversion requirements for Construction and Demolition debris
- Phased implementation to allow for growth and acceptance, quality service, and operational excellence

2. Revise the Equal Space Ordinance

Many commercial buildings in Denver lack adequate space for sorting waste at the point of collection (i.e., the loading dock). The current provision in the Building and Fire Code for the City and County of Denver (Section 420.11.5) should be strengthened to ensure adequate space in new construction buildings.

3. Explore the efficacy of a cardboard disposal ban

Cardboard is widely recognized as a high-quality recyclable that is acceptable in all curbside and drop-off center collections, and in commercial collections, and is a commodity that consistently has positive market value. Despite wide-spread access to recycling, it is estimated that 47% of cardboard is sent to landfill from the residential waste stream and 57% from the commercial waste stream. A disposal ban would:

- Prohibit disposal and collection of cardboard in waste receptacles
- Provide education to Denver businesses and residents
- Lay the groundwork for future disposal bans such as food waste

A disposal ban is not a landfill ban, but rather emphasizes the role of the consumer in placing their cardboard in the proper container. Ideally, the combination of weekly recycling service plus the universal waste ordinance will significantly reduce the amount of cardboard being landfilled.

LEADING BY EXAMPLE

The City and County of Denver will lead by example, both in the management of waste in its facilities and in the services provided to its customers, who are approximately 60% of all households in the city.

1. Implement a fee for residential waste hauling services by 2023.

A volume-based pricing structure incentivizes waste diversion, often referred to as Pay as You Throw (PAYT). A volume-based pricing program provides trash, recycling, and composting to all customers, and charges a fee based on the size of the refuse cart; the smaller the cart, the lower the fee. This type of program is a key foundation to equalizing the waste systems between DOTI's customers and the private sector and will result in consistent waste diversion. A volume-based fee for waste service will:

- Increase diversion of organic waste by providing compost carts to all customers
- Create an economic incentive to reduce waste and reuse materials
- Encourage residents to take advantage of special services and opportunities to reduce and recycle, including hard to recycle materials
- Enable the City to pursue new policies that maximize waste diversion in the private sector

2. Increase waste diversion at City facilities

The post-pandemic return to the workplace is an ideal opportunity to create new systems and procedures for waste disposal that maximize diversion. Efforts in City operations should be comprehensive to include:

- Advanced recycling and composting efforts
- A focus on hard to recycle materials
- Food waste reduction in facilities and at city-sponsored events
- Sustainable purchasing practices to advance end of life materials management
- Developing sustainable infrastructure and maintenance plans for city-funded facilities and projects

3. Diversify Funding Sources

Currently, the city's General Fund is the sole source of funding for all functions of waste management described in this plan: transfer stations, trucks, labor, program administration, education and outreach, special events, etc. The new Fee on Disposable Bags will provide a modest amount of funding for educational programs, but only through 2023 when the state's ban on plastic bags is expected to greatly reduce that funding stream. As the city grows, it should explore funding opportunities to provide stability through economic downturns and other events which impact solid waste operations without necessarily reducing service demands. Such opportunities could include public/private partnerships, revising the Hauler Licensing program, and a volume-based pricing structure for SWM customers, among others.

LONG-TERM TACTICS

The long-term tactics outlined in this plan are dependent upon the foundational short-term tactics. These long-term tactics work to significantly enhance the City's ability to divert more waste than it does today. These tactics are critical to meeting the goal of advancing from the current citywide diversion rate of 35% to a 50% rate, and then to 70% or higher.

Long-term tactics include:

- Infrastructure to support increased landfill diversion by the commercial sector
- Ability to increase landfill diversion, improve cost-effectiveness and raise public awareness
- Support for regional and state collaboration around increased waste processing capacity and end markets for materials

Long-term recommendations should be implemented from 2027 to 2032. Some recommendations may not be completed until after the current planning period. Implementation of all the recommended tactics are critical to the City's success, as no one tactic alone can achieve the desired goals.

FACT

Cardboard boxes can be recycled at least seven times and can be used to make new packaging boxes.

EDUCATION

1. Continued Investment in Education and Community Engagement

Evaluate the success of the short-term investments in education and community outreach and establish a long-term goal to continually fund education and outreach for the next five-year period. The investment will depend on the community and the policies established and is expected to decline slightly as the City transitions from the launch phase into a maintenance period.

INFRASTRUCTURE

1. Assess the Regional Composting Capacity

Compostable organic waste (primarily food and yard debris) makes up about 35% of the residential and commercial waste stream. The City would like to increase diversion of organic waste from landfill, but expanding composting efforts is limited by the capacity of existing processors to accept more materials, the cost to transport the materials for composting, the disincentive created by low landfill tipping costs, and contamination of the collected materials which increases processing cost and decreases market value. From 2014 to 2020, the tons of organic waste composted in Colorado increased by nearly 50%. This growth is expected to accelerate in the future. To create a viable closed loop system for composted organics, it is necessary to support actions that increase demand for these compost products. The City can facilitate or lead work around securing more composting capacity in the region by:

- Developing regional partnerships
- Pursuing grant funding
- Forecasting facility needs and determining financial feasibility
- Implementing programs to increase organics recovery
- Contribute to the development of end markets for finished compost products, such as requiring the use of compost in landscape installations and construction projects

2. Assess the Regional C&D Processing Capacity

Construction and Demolition waste accounts for almost 40% of the total waste stream in Denver. The short-term tactics in this plan will have laid the foundation to begin recycling C&D waste, however, the regional capacity to divert this waste is crucial and currently lacking. This tactic will likely need regional and even state-level partners to be achievable. This recommendation may require a multi-pronged approach of evaluating and expanding infrastructure through collection and facility infrastructure, and possibly additional policy. To increase C&D waste diversion, the City shall:

- Assess material volumes by type (i.e., brick, block, concrete, rebar)
- Explore the city's role as a participant in large scale C&D processing infrastructure as a financially viable economic alternative to landfilling
- Consider policies that support deconstruction, diversion, and reuse of building materials

3. End-Market Development

Denver is well-positioned to incentivize the circular economy by becoming a purchaser of recycled and recaptured waste materials. For example, DOTI can used crushed aggregate in its roadway and sewer projects, and the Department of Parks & Recreation can use compost throughout its vast properties. To make waste diversion economically viable, there must be end markets for the diverted waste material. Denver can support this work with:

- Data and expertise to support new and existing businesses
- Staff expertise dedicated to end-market development
- An initial focus on large quantity material

LEADING BY EXAMPLE

1. Reimagine Residential Extra-Trash Collection Services

The City should consider either reducing extra trash services for its customers, and/or implementing a fee for this prime service. Doing this would:

- Encourage the use of existing reuse and recycling programs for items such as furniture, mattresses, electronics, and other durables
- Incentivize utilization of the composting service to divert yard debris and branches
- Encourage residents to consider materials management when making purchasing decisions

CONCLUSION

This update establishes new and enhanced citywide diversion goals, and presents several initiatives to achieve those goals. This is a comprehensive plan where all tactics must be implemented to achieve the goals. This update calls for a foundational investment to lay the groundwork for future programs. It is important to lay the foundation for future diversion and continue to move programs and policies forward over time. Due to low landfill disposal costs and the lack of existing waste regulation statewide, Denver recognizes that achieving a 70% waste diversion goal by 2032 is a large undertaking and may be beyond reach without supportive policies both locally and at the state level.

NEXT STEPS

As the next steps to implementation, Denver shall:

- Continue to implement the programs and initiatives currently underway or planned
- Prioritize the short- and long-term tactics of this plan, especially those that require legislative or regulatory change from policymakers
- Begin processes to implement new policy; stakeholder task forces are recommended
- Establish a timeline for each project to ensure the deadlines outlined in this document are met
- Collaborate regionally and nationally to develop partnerships to support efforts
- Refine cost estimates and proposals for short- and long-term options as potential implementation becomes possible