

# CITY OF CHICAGO WASTE STRATEGY EXECUTIVE SUMMARY

JULY 2021



Dear Chicagoans,

On behalf of Mayor Lori E. Lightfoot and the City of Chicago, I am thrilled to share with you the 2021 Chicago Waste Strategy. The report is the culmination of a year-long effort to develop a plan and implementation strategy to overhaul the City's traditional waste system and rebuild its overall health and function. The City of Chicago partnered with Delta Institute, a well-respected consulting firm specializing in municipal solid waste management planning, to look at the many interrelated aspects of waste in the City. From municipal structure, operations, policy, procurement, infrastructure, logistics, equity, culture, and funding sources, to the waste streams and materials themselves, the report provides a comprehensive understanding of Chicago's waste ecosystem The project team engaged a range of stakeholders represented by elected officials, City departments, private and nonprofit organizations, and individuals in developing these resources for the City of Chicago.

In 2020, the City of Chicago generated 4.13 million tons of materials. Landfilling and waste processing are a potent source of harmful greenhouse gas emissions, which accelerate climate change. In light of this issue's urgency, we are eager to advance the sixty-three recommendations that are outlined in the report. Our new approach, prioritizing intervention before materials enter the waste stream, will minimize landfilling, improve recycling rates, drive new and innovative approaches for composting and materials reuse, and will bolster new economic opportunities that our communities and residents need now more than ever.

A reimagined waste system is critical to the long-term sustainability of our great city. The City of Chicago is committed to working with our partners, businesses, sister agencies, residents, institutions, and environmental leaders who are committed to achieving a zero-waste future. Thank you for the opportunity to better serve you.



Sincerely,

Angela Tovar Chief Sustainability Officer



# **BACKGROUND & STRATEGY DEVELOPMENT**

Effectively managing materials and waste requires a highly efficient system of interconnected infrastructure and personnel across the public and private sectors. There is an opportunity to improve this system using innovative technology, research, and design, but ultimately this challenge requires a coordinated effort by the City of Chicago, commercial and industrial businesses, institutions, and citizens. Delta Institute has partnered with the City of Chicago to identify and analyze existing data, policies, stakeholders, and impacts of Chicago's waste, recycling, composting, and reuse systems to develop strategies for improvement.

The goal of the City of Chicago Waste Strategy is to identify concrete actions to:

- Decrease waste disposal and associated negative environmental impacts;
- Reduce costs and increase efficiency;
- Maximize economic investment and workforce development opportunities; and
- Address social and environmental justice inequities.

Redesigning how the City manages materials and addressing long-standing environmental justice inequities requires a long-term commitment by many Chicago stakeholders. This holistic strategy represents the first step in that process. This first phase of work provides guidance that accounts for the many perspectives of Chicago's waste and civic stakeholders, addresses budgetary realities, and incorporates other systemic factors to comprehensively prioritize actionable strategies.

The complete City of Chicago Waste Strategy is comprised of the following documents:

- Executive Summary
- Existing Conditions Report
- Waste Characterization and Generation Update Report
- Peer City Analysis
- Materials Management Strategies

Delta Institute is appreciative to the Office of the Mayor for the opportunity to prepare these important strategic recommendations. We would like to thank the University of Illinois at Chicago and Dr. Ning Ai for preparing the Waste Characterization and Generation Update report. Delta Institute would like to give warm appreciation to the more than 90 stakeholders composed of elected officials, City departments, private and nonprofit organizations, and individuals in developing these resources for the City of Chicago.

# **EXISTING CONDITIONS REPORT**

The Existing Conditions Report sets the stage for current and historical waste and recycling programs and services, plans and policies, stakeholders, and related climate, economic, and equity impacts and challenges for the City of Chicago.

Chicago has a strong network of municipal and external stakeholders in the public and private sectors that will be critical partners in implementing materials management strategies. The waste and recycling system is complex and has significant impacts on Chicago's residents, environment, and economy. Recognizing these impacts, as well as the current and potential actors in the system, will support lasting and equitable improvements.



# **WASTE CHARACTERIZATION & GENERATION UPDATE REPORT**

The University of Illinois at Chicago (UIC) supported the Chicago Waste Strategy by conducting data analysis and modeling to project waste generation and characterization for Chicago in 2020. In lieu of a full-scale waste audit, the UIC team provided waste and recycling estimates based on Chicago historical data, along with regional and national datasets. Material-specific trends, innovations, and consumer expenditures were identified and summarized as well.



Figure 1: Chicago Annual Material Generation (2010-2020)

**The City of Chicago generated 4.13 million tons of materials in 2020.** This number is comprised of refuse, recycling, and yard waste collected from low-density (SF) residential buildings with four or fewer units (989,924 tons), high density (MF) residential buildings with five or more units (629,735 tons), institutional, commercial, and industrial (ICI) generators (1,456,708 tons), and construction and demolition (C&D) debris from buildings (1,053,818 tons). C&D debris from roadway construction was not included in this study but is an additional significant source of material generation.

# **PEER CITY ANALYSIS**

The Peer City Analysis Report describes various solid waste management programs, practices, and policies utilized in metropolitan areas across the United States to provide a better understanding of how peer cities have created and implemented innovative solid waste management strategies and help inform decisions about Chicago's materials management system.



# **MATERIALS MANAGEMENT STRATEGIES**

Delta Institute identified implementation opportunities across seven categories from municipal management and policy to the many waste streams that flow through the city. In each of those categories, several potential options for the City are presented to allow for short-term implementation, as well as long-term budgeting, planning, and partnership building. Strategies across all categories are guided by a set of established principles intended to capture City and stakeholder priorities. The Chicago Waste Strategy guiding principles are listed below:

- Reframe Chicago's materials as resources, instead of waste;
- Center equity and environmental justice in program design;
- As the City, identify opportunities for establishing internal and external partnerships;
- Prioritize initiatives with revenue potential, no/low cost, or a positive return on investment when applied at scale;
- Identify opportunities to include goal setting, metrics, and data sharing to demonstrate progress and increase transparency; and
- Equip consumers with the education and tolls needed to drive innovation in evolving waste systems.

### **MUNICIPAL MANAGEMENT & DATA TRACKING**

This section details opportunities for improved municipal management of waste and materials to lead by example, strengthen capacity for citywide programs and initiatives, and improve data collection and management to enforce policies, improve how trends are identified, increase transparency in the process, and build trust among Chicago's residents more efficiently.

Municipal management and data tracking strategies are organized under the following subcategories: **Identifying Opportunities to Lead by Example, Improving Data Tracking and Sharing**, and **Building Municipal Capacity.** 

# SOURCE REDUCTION, REUSE, AND REPAIR

This section highlights impactful, upstream strategies related to source reduction, extending the useful life of materials, and reuse. Preventing materials from entering the waste (or recycling) stream reduces pressure on existing systems and infrastructure maximizes climate benefits, shifts the cultural norms towards circularity and away from traditional disposal models, unlocking potential for economic benefit and improved sustainability.

Source reduction, reuse, and repair strategies are organized under the following sub-categories: **Supporting Material Reuse**, **Opportunities for Source Reduction**, and **Repair and Share**.

### **RESIDENTIAL WASTE REDUCTION**

This section offers strategies to reduce the waste volume and increase diversion rates in recycling, yard waste, and compost programs for Chicagoans in both low-density (single family homes and multifamily buildings with four or fewer units) and high-density (multifamily buildings with five or more units) residences.



Residential waste reduction strategies are organized under the following sub-categories: **Improving Low-Density Residential Waste Diversion and Reducing Contamination**, **High Density Residential Waste Diversion**, **Public Education and Engagement**, and **Preventing Illegal Fly Dumping**.

# ICI (INDUSTRIAL, COMMERCIAL, INSTITUTIONAL) WASTE REDUCTION

This section details opportunities for reduction and diversion of waste is generated by Chicago's ICI (industrial, commercial, and institutional) sector. This sector includes businesses, like restaurants and office buildings; institutions including government, cultural, and educational; and manufacturing and other industrial processes.

ICI waste reduction strategies are organized under the following sub-categories: **Commercial Waste Generation and Hauling, Institutional Partnership Opportunities**, and **Waste System Infrastructure and Industrial Operations.** 

### **ORGANICS & WASTED FOOD**

This section highlights opportunities to reduce organics and food currently sent to landfills in the residential and ICI sectors and bolster markets for finished compost.

Organics and wasted food strategies are organized under the following sub-categories: **Citywide Food Waste Prevention and Food Rescue**, **Organics and Food Scrap Collection for Chicago Residents**, **ICI Food Waste Prevention and Food Scrap Diversion**, and **Compost Market Development**.

### **SPECIALTY MATERIALS**

This section highlights strategies to address materials in Chicago's waste stream that cannot or should not be managed through traditional curbside recycling or composting initiatives including household hazardous waste (HHW), bulk items, electronic waste, pharmaceuticals, textiles, and plastic film.

Specialty materials strategies are organized under the following sub-categories: **Permanent Collection Facilities, High Priority Safe Disposal**, and **High-Volume Specialty Materials Diversion Opportunities.** 

### **CONSTRUCTION & DEMOLITION DEBRIS**

This section provides strategies for diverting materials generated from construction, renovation, demolition, or deconstruction projects through recycling and reuse.

Construction and demolition debris strategies are organized under the following sub-categories: **C&D Debris Diversion** and **Developing Opportunities for Building Material Reuse**.



# **IMPLEMENTATION NEXT STEPS**

There are several activities that the City of Chicago can implement immediately to build momentum and begin processes as it launches longer-term planning, partnership development, and capacity building for major initiatives. The City is already working to reduce waste and improve recycling through initiatives including participating in the NRDC Food Matters Great Lakes cohort to reduce wasted food and implementing a new contract for the Blue Cart recycling program to improve low density residential recycling services and reporting requirements.

# SHORT-TERM PRIORITIES FOR 2021 AND 2022:

### **Policy Review and Exploration**

The City of Chicago seeks to review existing materials management ordinances to identify opportunities to increase impact and conduct initial research for new potential legislation.

- Researching potential for implementing waste hauling zones for commercial waste
- Supporting ambitious statewide extended producer responsibility (EPR) legislation
- Assessing Construction & Demolition Debris (C&D) Recycling Ordinance compliance and identifying opportunities for increased contractor education
- Adjusting the C&D Recycling Ordinance to specify targeted material types and parameters for reuse

### Increasing Opportunities for Community Interventions

The City of Chicago seeks to provide new programs and educational opportunities for Chicago's residents to engage with the materials management system and improve residential diversion.

- Leverage the National Resources Defense Council (NRDC) Food Matters Great Lakes Regional Cohort participation to pilot food waste prevention and recycling programs
- Maintaining clear and consistent messaging around recycling contamination
- Introducing organics drop off locations through seasonal "pumpkin smash" events
- Developing a directory of participating retail take-back options for e-waste and HHW in Chicago
- Establishing a revenue-sharing partnership with a textile recycling company for collection of clothes, shoes, and other textiles otherwise ending up in landfills

### **Strengthening Internal Operations**

The City of Chicago seeks to improve internal operations related to materials management to increase efficiency across departments and improve waste diversion in the City.

- Identifying appropriate Blue Cart to black cart distribution and bin size options
- Improving high density residential recycling ordinance compliance based on 2020 Chicago Office of the Inspector General report findings
- Improving Chicago's existing yard waste collection program and incorporating potential food scrap "ride along" options

Full strategy descriptions for the near-term priorities identified above, along with all other materials management strategies, can be found in the complete report.





# CITY OF CHICAGO WASTE STRATEGY EXISITING CONDITIONS: WASTE IN CHICAGO

JULY 2021



# ACKNOWLEDGEMENTS

The City of Chicago Waste Strategy (comprised of the Materials Management Strategies, Existing Conditions Report, and Peer City Analysis) was prepared by Delta Institute for the City of Chicago. Additionally, the Waste Characterization and Generation Update report was prepared by the University of Illinois at Chicago team, led by Dr. Ning Ai.

The project team would like to recognize the support and contributions made by various elected officials, City departments, private and nonprofit organizations, and individuals in developing these resources for the City of Chicago.

Matthew Allee	Chicago Dept. of Business Affairs & Consumer Protection	Mary Allen	SWANCC
Ernest Alvarado	Chicago Park District	Mort Ames	Chicago Law Dept.
Chris Antonopoulos	Cook County Dept. of Environment and Sustainability	Mike Archey	
Brian Bailey	Zero Waste Chicago	Olga Bautista	Alliance for the Great Lakes
Justin Bland	New York Dept. of Sanitation	Cathy Breitenbach	Chicago Park District
Kristen Brock	Chicago Park District	Mike Brown	Chicago Park District
Alderman George Cardenas	12 <sup>th</sup> Ward Alderman	Susan Casey	Seven Generations Ahead
Dane Christianson	Block Bins	Mary Margaret Cowhey	Land and Lakes/IL Recycling Association
Meegan Czop	Great Lakes Yard	Brendan Daley	Chicago Park District
Luke Dias	Zero Waste Chicago	Lisa Disbrow	Waste Management
Aaron Durnbaugh	Loyola University Chicago	Sarah Edwards	Cook County Dept. of Environment and Sustainability
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Timothy Farnan	Minnesota GreenCorps	Brooke Ferree	Illinois EPA
Aaron Frame	Chicago Dept. of Aviation	Samira Hanessian	Chicago City Council, Cmte on Environ. Protection & Energy
Fay Hartog-Levin		Matt Hedrick	Organix Recycling
John Holm	Pyxera Global	Erlene Howard	Collective Resource Compost
John Hundrieser	Chicago Film Office	Jennifer Jarland	Kane County, IL/IFSC
James Jennings	Illinois EPA	Alex Johnson	Rheaply
Bryan Johnson	City of Madison, WI Streets Dept.	Theresa Johnston	MWRD
Stephanie Katsaros	Bright Beat/Chicago Sustainability Task Force	Moira Kelley	Zero Waste Chicago



# CHICAGO EXISTING CONDITIONS REPORT

Bill Kenney	Lakeshore Recycling Systems	Daniel Kietzer	Materials Marketplace
Barbara Koenen	Chicago Creative Reuse Exchange	Keith Koski	Houston, TX Solid Waste Management Dept.
Renante Marante	Chicago Dept. of Public Health	Jessi Marsh	Food Rescue Hero
Cody Marshall	The Recycling Partnership	Sarah Mason	Houston, TX Solid Waste Management Dept.
Greg Maxwell	Resource Management Companies	Jessica Miller	Illinois EPA
Benjamin Mjolsness		Wilson Mora	Chicago Dept. of Streets and Sanitation
Kristin Mroz-Risse	Minnesota GreenStep Cities	Chris Newman	US EPA Region 5
Alderman Samantha Nugent	39 <sup>th</sup> Ward Alderman	Carter O'Brien	Chicago Recycling Coalition
Erica Ocampo	Sims Metal Management	Esau Orduno	Chicago Dept. of Business Affairs & Consumer Protection
Shantanu Pai	Illinois Sustainable Technology Center	Julian Pastin	Rebuilding Exchange
Jonathan Pereira	Plant Chicago	Matthew Peterson	Chicago Dept. of Transportation
Jon Powell	Closed Loop Partners	Garr Punnett	Rheaply
Eleanor Ray	The Waste Shed	Chris Ronson	Re-TRAC Connect
Peggy Salazar	Southeast Environmental Task Force	Chris Sauve	Chicago Dept. of Streets and Sanitation
Kevin Schnoes	Cook County Dept. of Environment and Sustainability	Jessica Schumacher	US EPA Region 5
Sabina Shaikh	University of Chicago	Terry Sheahan	Chicago Dept. of Public Health
Rick Shipley	Organix Recycling	Maria Silvas	Chicago Textile Recycling
Nathan Smith	Edgewater Environmental Coalition	Deborah Stone	Cook County Dept. of Environment and Sustainability
Sunil Suthar	Illinois EPA	Angela Tovar	City of Chicago Office of the Mayor
Grant Ullrich	Chicago Dept. of Buildings	Amy Uong	Sims Metal Management
Tricia Van Eck	Edgewater Environmental Coalition	Dave Van Vooren	SWANCC
Susan Vescovi	US EPA Region 5	Cristina Villella	Minnesota GreenCorps
Jen Walling	Illinois Environmental Council	Killian Walsh	Edgewater Environmental Coalition
Walter Willis	SWALCO	Ryan Wilson	Metropolitan Planning Council
Craig Wittig	The Recycling Partnership	Kimberly Worthington	Chicago Dept. of Assets, Information, and Services
Elise Zelechowski			



# **MATERIALS MANAGEMENT: KEY TERMS**

#### **Waste Processes**

**Diversion** is the process of keeping waste from landfill through a variety of methods.

To **recycle** is to process waste and convert it into raw materials that can be used in the production of new items. To **reuse** is to find another purpose for materials, such as donating clothing or sharing infrequently used items. To **repair** is to mend an item rather than dispose and/or purchase a new item.

**Compost** is organic matter allowed to decompose so that can then be used as plant fertilizer. **Anaerobic digestion** is a process of decomposition of organic matter without oxygen, producing biogas and compost.

**Food rescue** is the process of collecting food that would otherwise go to waste and redistributing it, often to hunger relief or food insecure individuals.

#### **Materials**

**Municipal solid waste (MSW)** consists of the everyday items discarded in residential, institutional, and commercial settings.

**Household hazardous waste (HHW)** refers to household items that contain corrosive, toxic, ignitable, or reactive ingredients (e.g. lighter fluid, antifreeze, paint thinners). Though HHW is not regulated at the same level as commercial or industrial hazardous waste, many products pose similar risks to human health and the environment and must be managed and disposed of safely.

**Pharmaceutical waste** refers to unwanted, unused and/or expired medications and some of the materials used to store and handle them. These items cannot be included in municipal solid waste due to potential hazardous chemicals within them.

**Electronic waste (E-waste)** consists of items like computers, televisions, and other electronic devices which contain hazardous materials that can pose a threat to the environment and precious metals that can be recycled into new products. Like HHW and pharmaceutical waste, these materials need proper disposal.

**Construction and demolition waste (C&D)** consists of debris from construction and demolition projects. Given the materials included, there is often a high potential for recycling.

**Bulk** refers to any materials that cannot be accepted in regular collection due to their size such as major appliances and mattresses.



#### **Waste Generators**

**Residential** refers to waste and waste streams that come from households. This is often broken down by building size. Low-density residential concerns single family homes and multifamily buildings with four or fewer units, while high-density residential concerns multifamily buildings with more than four units.

**Commercial** refers to waste generated outside of the home in retail and office settings.

**Institutional** refers to waste generated by large organizations like hospitals, schools, universities, and museums.

Industrial refers to waste produced in factory and manufacturing settings.

### **Traditional Waste Infrastructure**

Hauling is the process of collecting and transporting waste materials.

**Transfer stations** are locations where waste materials are collected, processed, and prepared for the next stage of their disposal.

Material Recovery Facilities (MRFs) are locations where recyclable materials are prepared for resale.

**Composting Facilities** are locations where organic material can decompose, producing a material that can be used as a fertilizer.

**Landfills** are locations where materials are brought at the end of their life. Ideally, this is the last location for disposal when other options are not available.



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# BACKGROUND

As increased urbanization and directly correlated city density has accelerated in the second half of the 20<sup>th</sup> century, related support systems require updated strategy and investment. Food, water, energy, transportation, medical care, and other critical infrastructure have evolved to keep residents safer and healthier. As cities grow and change, managing materials and waste continues to be one of those critical services provided by local governments and their partners. To assist in standardizing the basic requirements, policies and laws have been enacted to govern how cities, counties, and states manage waste.

In most cases, waste management is governed, managed, and coordinated as a basic city service. Managing materials from a city of Chicago's size requires a complex and interconnected system that relies on the participation of several actors in the public and private sectors to work properly. Increasingly its costs to our communities and the environment cannot be ignored. The system can be improved with technology, research, and clever design, but ultimately this challenge requires the combined and coordinated efforts of the City of Chicago government, private commercial and industrial businesses, institutions, and citizens to solve.

This document seeks to establish the current conditions of materials management in Chicago in order to identify strategies to decrease waste disposal and associated negative environmental impacts; reduce costs and increase efficiency; maximize economic and workforce development opportunities; and address equity and environmental justice issues.

# WASTE IN THE CITY OF CHICAGO

In the late 1800s, independent trash scavengers were deployed in Chicago to collect waste material for use as landfill to stabilize marshlands at the City's edge for future development. As dumping sites filled to capacity in the mid-1900s, the City shifted to a municipal incineration approach with three major incineration facilities for residential and commercial waste combined with additional on-site waste incinerators for hospitals, schools, and other major institutions. As manufacturing materials shifted to include more plastics and other toxic materials in the 1980s and 1990s, air quality concerns resulted in incineration closures and a shift back to landfills for residential and commercial waste.<sup>1</sup> The movement of waste and materials throughout Chicago is supported by a network of waste and recycling haulers, transfer stations, material recovery facilities (MRFs), and composting facilities. The City of Chicago does not contain any open landfills, so disposal of all materials takes place outside of the city and often outside of the state.

Concurrent with changes to disposal methods, waste management efforts shifted toward developing strategies to reduce the amount of waste generated and divert materials for reuse and remanufacture. Modern waste management systems have evolved to handle the various waste streams differently. For some materials, management and end-of-life destination is dependent on the reuse or recycling potential and value of the material, such as recyclable and biodegradable materials. For other materials, management is dependent on the hazard they may present to the public, such as electronic waste (e-waste) and household hazardous waste (HHW). Reuse and extending the useful life of materials is a historic practice but is made more difficult



with shifts in consumer culture towards excess and convenience and increased manufacture of low-durability goods intended for short-term use.

Though opportunities exist to improve waste management throughout the material life cycle, prioritizing "upstream" initiatives (e.g. waste reduction, reuse, and repair) can increase overall environmental benefit and maintain the economic value of materials. The United States Environmental Protection Agency (EPA) has developed hierarchies for both non-hazardous materials<sup>2</sup> and food waste<sup>3</sup> (Figure 1 and 2 below) to inform waste reduction strategies prioritization and ensure the highest and best use for materials whenever possible.



Figure 2: EPA Food Waste Management Hierarchy



# **CITY OF CHICAGO WASTE GENERATION & CHARACTERIZATION**

An important baseline step in implementing an effective materials management infrastructure is to understand what types of waste are being created, by whom, and how much. Waste generation and characterization refers to the volume of materials entering the waste, recycling, or compost streams, and proportions of specific material categories for each. With the myriad actors and processors involved in a waste system as complex as the City of Chicago's, holistic data for generation and characterization is costly and difficult to acquire.

Most recently, the former Chicago Department of Environment tasked CDM Smith with sampling and analyzing waste data for the 2010 *Waste Characterization Study*.<sup>4</sup> For the development of this document, cost and time constraints prevented an additional full waste characterization study, however, a team of researchers at the University of Illinois at Chicago (UIC) has developed robust models and methodologies to project waste generation and characterization data for 2020.

# WASTE GENERATION TRENDS BY SECTOR

The City of Chicago generated 4.13 million tons of materials in 2020.<sup>5</sup> Though economic conditions result in annual fluctuations, there has been an overall slight increase in waste generation over the last decade.



Figure 3: Chicago Annual Material Generation (2010-2020)

SF: Single family homes (typically with four or fewer units) where waste is collected by the City Department of Streets and Sanitation (DSS). MF: Multi-family homes where waste is collected by private haulers. ICI: Institutional, Commercial, and Industrial. C&D: Construction and Demolition. Data are compiled from various reports from the City of Chicago to the extent possible; incomplete data in city reports are estimated by the UIC team.



Chicago's 4.13 million tons of total material generation in 2020 is comprised of refuse, recycling, and yard waste collected from low-density residential buildings with four or fewer units (989,924 tons), high density residential buildings with five or more units (629,735 tons), institutional, commercial, and industrial (ICI) generators (1,456,708 tons), and construction and demolition (C&D) debris from buildings (1,053,818 tons).<sup>6</sup> C&D debris from roadway construction was not included in this study but is an additional significant source of material generation.

### **RESIDENTIAL DEMOGRAPHICS & GENERATION TRENDS**

Over the past 10 years, Chicago's population has remained stable, declining 0.18 percent from 2010 to 2019. In 2019, the population of the city was 2,693,959.<sup>7</sup> Though a majority of Chicago residential units are in low density buildings (four or fewer units, including single family homes), the proportion residential units in high density buildings (five or more units) is increasing. Between 2010 and 2020, households in low density buildings decreased by 4.5 percent, and households in high density buildings increased by 9.2 percent (Figure 4).



Figure 4: Trend of Housing Units in Chicago (Unadjusted for Vacant Units) 2010-2020

Note: 2010-2019 data from the U.S. Census American Community Survey; 2020 data estimated by the UIC team. Chart by the UIC team.

Normalized per-household and per-capita residential (both high density and low density) material generation is displayed in Figure 6. Overall, residential waste generation has shown a decreasing trend in the last decade, except for 2020 (likely due to impacts of the COVID-19 pandemic).



# **CHICAGO** EXISTING CONDITIONS REPORT



Figure 5: Residential Waste Generation Rates per Household and per Capita (2010-2020)

**Note**: These normalized rates refer to residential waste (generated from SF and MF homes) only. SF waste data are reported by the City. MF waste data are estimated by the UIC team. Data of population and households in Chicago are from the US Census American Community Survey (ACS) 5-year estimates (2010-2019). The 2020 demographics are estimated by the UIC team.

### **ICI WASTE GENERATION & CHARACTERIZATION TRENDS**

Industrial, commercial, and institutional (ICI) generators include restaurants, grocery stores, professional offices, manufacturing sites, schools, universities, and government facilities. In UIC's waste characterization and generation update study, ICI does not include high density residential structures.



Figure 6: Estimated ICI Waste Generation Based on Industry Employment Changes (2010 vs. 2020)

Note: 2010 data from CDM (2010); 2020 data estimated by the UIC team. Chart by the UIC team.



Based on employment and industry data, UIC calculated estimated ICI waste characterization trends between Chicago's 2010 waste characterization study and 2020 (Figure 7). Overall ICI material generation increased over 17 percent from 1.25 million tons in 2010 to 1.46 million tons in 2020. Major material type increases included glass (22.4 percent), organics (19.6 percent), plastic (17.7 percent) and paper (17.3 percent).<sup>8</sup>

### **YARD WASTE GENERATION TRENDS**

Yard waste includes organic material like grass clippings, leaves, and tree trimmings. Annually, approximately 40,000 to 44,000 tons of yard waste are generated from low density residential structures in Chicago, but very little has been collected through 311 pickup requests. Monthly yard waste generation varies seasonally and can be as low as 500 tons in winter months, compared to between approximately 3,900 and 6,700 tons in late spring and early summer, and approximately 4,400 and 8,200 tons in late fall.<sup>9</sup>



Figure 7: Estimated Yard Waste Generation from Low Density Residences in Chicago vs. Volume Collected by Work Orders

**Note**: Monthly yard waste generation volumes for single family homes are estimated by multiplying total material collection by the ratios presented in Table 1. Yard waste collection volume (per work order) is recorded by the City. Chart is produced by the UIC team.



### **DIVERSION & RECYCLING RATES**

When the low diversion rate for Chicago is discussed, it often only focuses on the Department of Streets and Sanitation's residential recycling program. However, looking at Chicago's diversion rate with a broader scope to include waste streams like C&D waste and waste collected from private haulers yields a much higher diversion rate. A 2010 analysis found a 45 percent diversion rate when including these streams.<sup>10</sup> comparing waste When diversion rates between cities, it is important to consider the difference in how the diversion rate is calculated in different cities. San Francisco's 80 percent diversion rate includes materials in C&D waste comparing this figure to diversion rates solely from the Blue Cart program may be creating a false equivalence.<sup>11</sup>

There are multiple ways to measure how materials move through different waste streams, with some methodologies painting different stories about the state of waste. A **diversion rate** typically refers to the percentage of materials collected that are not landfilled relative to the total amount of materials collected. A **recycling rate** refers to the materials to be recycled relative to the total amount collected. A **capture rate** is the weight of all recyclable materials collected for recycling compared to all the recyclables in the waste stream to understand how much of what can be recycled is actually being recycled.

Source: The Recycling Partnership, Start at the Cart, 2018.

## **COVID-19 PANDEMIC DISRUPTIONS**

Since its emergence in spring 2020, the COVID-19 pandemic has significantly disrupted municipal waste services at home and abroad. These disruptions include negative impacts on local economies as well as state and local budgets; a shift in waste characterization and generation trends; and increased pressure and demand imposed on the City's essential, frontline workers. This group includes those responsible for hauling and processing waste materials. There was a 35.2 percent increase in missed pickup complaints to the Department of Streets and Sanitation between 2019 and 2020 for the months of January through December, and a 52.9 percent increase for the months of March through December. These increased complaints came primarily during the summer months.







Figure 8: Monthly missed pickup complaints submitted to 311 from non-Department of Streets and Sanitation sources for 2019 and 2020 (Source: City of Chicago)

Across the county, municipalities have been forced to make difficult decisions in response to these disruptions. In Phoenix, for example, the Public Works Department increased the fee for residential waste and recycling pickup to cover rising household generation rates and to provide personal protective equipment (PPE) to collection employees.<sup>12</sup> In Baltimore, the Public Works Department paused recycling collection from August 2020 to January 2021 due to a reduction in capacity caused by a series of COVID-19 outbreaks among staff.<sup>13</sup> In Austin, Texas, the Austin Resource Recovery temporarily closed the Recycling and Reuse Drop-off Center and paused yard waste and bulk collection to mitigate virus transmission risks and accommodate staffing shortages.<sup>14</sup> Although most reductions in waste and recycling services for residents across the country are expected to be temporary, the pandemic has exposed significant vulnerabilities in existing materials management systems.

For many Chicagoans, the pandemic has shifted much of the waste generation from offices and restaurants to homes.<sup>15</sup> Lakeshore Recycling Systems estimates a 20 to 30 percent increase in residential waste generation in their Chicagoland service areas due to COVID-19.<sup>16</sup> Chicago's Blue Cart program has also seen an overall increase in volume compared to 2019. UIC modeled expected low-density residential waste and recycling generation based on historical trends to determine variance in 2020 (Figures 12 and 13). The dashed lines represent predicted generation, and the solid lines represent actual collection tonnage. Both waste and recycling generation were higher than predicted in 2020, 8.8 percent and 10.2 percent, respectively.<sup>17</sup>



# **CHICAGO** EXISTING CONDITIONS REPORT



Figure 9: Low Density (4 or Fewer Units) Residential Refuse Volume

**Note**: Quarterly data are aggregated from monthly data recorded by City on waste collected by the Department of Streets and Sanitation (DSS) from residences (single-family homes/ apartments/condominiums/ townhomes with 4 or fewer units). Time-series modeling and chart are produced by the UIC team.



Figure 10: Low Density (4 or Fewer Units) Residential Recycling Volume

**Note:** 2018 variance is a result of service disruptions due to a fire at a Chicago area recycling facility. Quarterly data are aggregated from monthly data recorded by City on waste collected by the Department of Streets and Sanitation (DSS) from residences (single-family homes/ apartments/condominiums/ townhomes with 4 or fewer units). Time-series modeling and chart are produced by the UIC team.



Commercial and institutional waste generators have also been impacted by the pandemic and economic recession. Restaurants and food businesses significantly shifted to carry out and delivery services, resulting in an increased reliance on single-use polystyrene and plastic packaging and serviceware. Chicago's Plastic Free Waters ordinance, proposed in January 2020, has been put on hold to avoid additional burden on restaurants working to adapt to pandemic conditions.<sup>18</sup>

Hospitals and other essential institutions and businesses have also required a massive increase in single-use personal protective equipment (PPE) to prevent the spread of COVID-19. George Washington University Hospital in Washington has estimated that their facility is generating two to three times the typical amount of typical medical waste, including PPE, since the start of the pandemic.<sup>19</sup>



# WASTE IN CHICAGO: EXISTING SERVICES

Chicago's waste materials are managed by the City, private businesses, and nonprofit organizations in a variety of ways depending on material type and material generator. Chicagoans currently interact with the existing waste system through residential waste and recycling collection, commercial materials management at their place of employment or businesses they patronize, and potentially additional programs for donation, recycling, or safe disposal of materials. This section includes a summary of existing materials management programs available in Chicago through the City, nonprofit organizations, and private businesses.

### **RESIDENTIAL WASTE & RECYCLING**

### Low Density Residential (Four or fewer units)

Household waste and recycling is managed by the Department of Streets and Sanitation (DSS) for low-density residences - single family homes and multifamily buildings with four or fewer residential units. These Chicago residents are served by the Blue Cart recycling program as well as grid garbage collection. For garbage collection, Chicago is divided into eight sanitation districts (Figure 11) to reduce truck deployment and increase efficiency.<sup>20</sup> Over 620.000 residential units (around half of all residential units in Chicago) are served by DSS for garbage collection at a cost of \$9.50 per residential unit per month.<sup>21</sup>

The 2020 budget for DSS allocated over \$44 million for disposal (tipping fees) of



Figure 11: Figure 12: Map of sanitary districts (for grid garbage collection) (Source: City of Chicago)

approximately 850,000 tons of residential garbage.<sup>22 23</sup> This amount exclusively covers disposal and does not include collection or labor costs, and the garbage collection fee for residents does not cover the cost of DSS-collected garbage.

For recyclable materials, low-density residences in the City of Chicago are served by the City's Blue Cart program. Blue Cart eligible residences are divided into six Service Areas - four areas (Service Areas 1, 3, 5, and 6) are serviced by private contractors and two areas (Service Areas 2



and 4) are serviced by the City of Chicago Department of Streets and Sanitation. As of June 2021, the privately contracted areas are serviced by Lakeshore Recycling Systems (LRS).<sup>24</sup>

DSS also manages two permanent drop-off locations for recyclable materials located in the Far North Side and Near South Side.

Once collected, Chicago's recyclables are sent to **transfer stations** and **material recovery facilities (MRFs)** for sorting and baling for resale and remanufacturing. Non-recyclable materials (contamination) in the recycling stream are either refused at the collection site or separated from recyclable materials to be landfilled. High contamination rates strain recycling equipment and lessen the value of recycled commodities.

The City collects data each month tracking the total tonnage and diversion rate of materials collected through the Blue Cart program. From 2015 to 2020, there was an average of over 75,000 tons of materials collected each month; an average of 9 percent of which was diverted from landfills.<sup>25</sup>

Blue Cart recycling performance varies across the six service areas (Figures 12 and 13). While some service areas show relatively consistent performance over time, there is a general trend of declining performance across all areas.<sup>26</sup>



Figure 1313: Blue Cart Program Performance by Chicago Waste Service Figure 14: Blue Cart Service Area Map, City of Chicago DSS Region. Data provided by the City of Chicago; Chart by the UIC team.



Between 2013 (when the Blue Cart program for low density residential buildings significantly expanded) and 2020 (the emergence of the COVID-19 pandemic), refuse generation per household (left axis in Figure 14) remained relatively stable. Per household recycling generation (right axis in Figure 14) decreased until 2018, when the City launched community campaigns to boost residents' participation in recycling and to reduce contamination.<sup>27</sup>



Figure 14: Low Density (4 or Fewer Units) Refuse and Commodity Collection Trends per Household (2009-2020)

**Note**: Refuse and commodity volume from low density residential buildings are recorded by the City. Per household rates and chart are produced by the UIC team. 12-month moving averages are adopted to address the seasonal effects.

### **High Density Residential**

High density residential structures - buildings with five or more units - are not serviced by the City and must contract independently with private companies for recycling and garbage collection. Private companies and high-density residential buildings are not required to report their rates for garbage collection service, but a sampling conducted by DSS estimated that five- to six-unit buildings in Chicago typically pay between \$60 and \$80 per month for a two-yard dumpster container. This is equivalent to between \$10 and \$16 per residential unit per month.<sup>28</sup>

### INDUSTRIAL, COMMERCIAL, & INSTITUTIONAL (ICI) WASTE & RECYCLING

Industrial, commercial, and institutional (ICI) generators including high-density residential buildings (five or more units), restaurants, grocery stores, professional offices, manufacturing sites, schools, universities, and government are all required to coordinate private waste and recycling collection.



Under the Chicago Recycling Ordinance, private haulers are required to keep detailed records on the volume of recyclables collected and where it is delivered. Information is to be submitted to the city by the end of February each year. These numbers are used to inform diversion and total waste numbers from this waste collection.<sup>29</sup>



Private Hauler Materials Collected and Report Response Rate, 2010-2015

Figure 15: Total materials collected by reporting private haulers and response rates of private haulers from 2010 to 2015. Response rate is calculated as the number of private waste haulers expected to respond compared to those that do. Response rate data was not available for 2015 (Source: City of Chicago).



Figure 16: Recycling rate for reporting private waste haulers from 2010 to 2015 (Source: City of Chicago)



As indicated in the previous section, high-density residential buildings (buildings with five or more units) are required by the Chicago Recycling Ordinance to contract with a private company to provide recycling containers and collection service to residents.<sup>30</sup> In 2020, the Office of the Inspector General (OIG) conducted an audit of commercial and high-density residential buildings to determine if DSS enforcement adequately managed non-compliant buildings. The audit highlighted opportunities for improvement in enforcement of the approximately 500,000 households and 60,000 businesses due to staff capacity and technology constraints, data gaps, and diffused enforcement mechanisms across departments.<sup>31</sup>

### **ORGANICS & WASTED FOOD**

Yard waste collection is available to Chicago residents through the 311-request program.<sup>32</sup> DSS previously provided regularly scheduled collection service but switched to a request model due to staff capacity constraints and limited resident participation. The request-based yard waste program diverted over 1,100 tons of yard waste from landfills in 2019 but has caused frustration for residents with limited communication and accidental pick up with garbage collection.<sup>33</sup>

Food scrap pickup services are available to residents and businesses through several private companies and nonprofits which offer subscription composting services. A list of companies offering subscription food scrap collection can be found in Appendix B. Additionally, companies like Block Bins provide larger containers secured with a combination lock for multi-family buildings or neighbors to share.<sup>34</sup> Organizations like the Illinois Food Scrap Coalition and Zero Waste Chicago also offer guidance for Chicagoans interested in composting at home with backyard compost bins or vermicompost (worms). At home methods do not reach the temperature of industrial composting, so are not appropriate for items like meat, bones, and some compostable serviceware.<sup>35 36</sup>

Since 2014, Chicago Public Schools (CPS), in partnership with Seven Generations Ahead and Lakeshore Recycling Systems, has been expanding a commercial composting pilot program to reduce organic waste, improve purchasing, and provide waste diversion education to CPS students, faculty, and staff. The program has expanded to 14 CPS schools and (prior to the COVID-19 pandemic conditions) resulted in over 2,500 pounds of materials diverted from landfills every day.<sup>37</sup>

### **SPECIALTY MATERIALS**

Chicago's 311 non-emergency service line is available to residents for further waste and recycling requests. Yard waste and bulk items can both be requested for pickup through 311, and illegal fly dumping or litter can be reported for clean up through 311 as well.<sup>38</sup>

There are also city and privately provided services to support additional waste streams such as electronic, pharmaceutical, and otherwise hazardous or difficult-to-recycle waste.



# CHICAGO EXISTING CONDITIONS REPORT



Figure 17: Recycling sites for various materials in Chicago as compiled by the Illinois Environmental Protection Agency (Illinois EPA). Some locations may accommodate multiple recycling waste streams. There are additional sites that accept pharmaceutical waste; they are associated with hospital systems and Walgreens pharmacies and not shown on this map (Source: Illinois EPA)

**Household hazardous waste (HHW):** Hazardous household chemicals can be disposed of at the Household Chemicals and Computer Recycling Facility (HCCRF)<sup>39 40</sup> located on Goose Island. Additionally, retail stores offer residents limited opportunities for collection of some special materials, typically limited to batteries, compact fluorescent lamps (CFLs), and automotive fluids.

The Household Chemicals and Computer Recycling Facility (HCCRF) is a 24,00 sq. foot permanent site operated by the City. HCCRF construction was funded in collaboration between the Illinois EPA, Illinois Department of Commerce and Economic Opportunity (DCEO), Illinois Clean Energy Fund, and the City.



**Electronics (E-waste):** E-waste is also accepted at the HCCRF. In 2020, the Chicago Department of Public Health and Department of Streets and Sanitation introduced a pilot program offering rotating e-waste drop off service at district sanitation offices. Additionally, select electronics retailers accept e-waste, but may have different requirements on what can and cannot be accepted.<sup>41</sup>

In 2019 the statewide Consumer Electronics Recycling Act (CERA) manufacturer program went into effect, requiring a minimum number of e-waste collection locations in each participating Illinois County (including Cook County).<sup>42</sup> A "clearinghouse" of electronics manufacturers are required to provide and fund safe disposal of electronics once collected by the Chicago Department of Public Health.<sup>43</sup>

**Pharmaceutical waste:** The Chicago Department of Public Health (in partnership with the Chicago Police Department) provides for pharmaceutical disposal at police stations across the city.<sup>44</sup> In addition, there are secure drop off sites located at hospital centers, select pharmacies, and at water reclamation plants managed by the Metropolitan Water Reclamation District of Greater Chicago (MWRD).<sup>45</sup>

**Polystyrene foam:** Foam packaging and food service containers are not accepted in Blue Cart bins or City drop off locations. Dart Container Corporation offers free drop off collection at 7575 S. Kostner Avenue for all polystyrene foam except for packing peanuts, which can often be reused for shipping.<sup>46</sup>

**Shredded paper:** Shredded paper is not accepted in Blue Cart bins because it clings to and contaminates other items and does not respond to recycling equipment like whole paper.<sup>47</sup> The City, Aldermen, and other organizations sponsor events for personal document shredding and collection (or collection of pre-shredded paper) for residents. Community shredding events were placed on hold during COVID-19, but private companies offer confidential document shredding services.<sup>48</sup> Shredded paper can often also be included in organics collection for composting.

In 2016, the City of Chicago established a **\$0.07 fee on plastic checkout bags** (replacing an initial plastic bag ban) to encourage reusable bag use and reduce generation of plastic film. **Plastic Film:** Flexible plastic film, including plastic bags and common packing materials, can become tangled and damage recycling equipment, and is not accepted in Blue Cart bins. Recyclables placed in Blue Carts should also not be bagged.<sup>49</sup> This material can be recycled if collected separately, and several Chicago grocery stores and businesses host collection sites for plastic film. A list of participating businesses by zip code can be found at PlasticFilmRecycling.<sup>50</sup>

### **CONSTRUCTION & DEMOLITION DEBRIS**

Construction and Demolition (C&D) Debris is the material generated during construction, demolition, and renovation activities. Nationally, EPA estimated 600 million tons of C&D debris was generated in 2018, the largest share of which came from roads and bridges.<sup>51</sup> C&D debris



includes dirt and aggregate, lumber, bricks, concrete and asphalt, drywall, plumbing and electrical fixtures, doors and windows, flooring, roofing shingles, and carpet, among other materials.

Based on building permit data, UIC estimated annual C&D debris generated from construction, renovation, and demolition activity for residential and non-residential buildings (Figure 18). Construction activities and associated waste generation decreased during and after the 2007/2008 financial crisis and in 2020 due to the COVID-19 pandemic. In typical recent years, C&D debris generation from buildings in Chicago has remained around 1.3 to 1.4 million tons per year.<sup>52</sup>



Figure 18: C&D Waste Volume from Buildings (2007-2020)

**Note:** Building permit data are extracted from the City of Chicago Data portal. Modeling and chart are produced by the UIC team. The method of building C&D waste estimates was built upon the 2009 Market Analysis of Construction and Demolition Material Reuse in the Chicago Region study by Weber, Kaplan, and Sokol.

The composition of C&D debris generated has evolved over recent years. Between 2010 and 2015, the proportions of general refuse and steel have decreased, and the proportions of asphalt, concrete, and wood have increased (Figure 19).



# **CHICAGO** EXISTING CONDITIONS REPORT



Figure 19: C&D Waste Composition (2010-2015)

Note: Data are provided by the Delta Institute and the City; Data aggregation and chart by the UIC team.

Chicago's C&D Site Waste Ordinance requires construction, demolition, and renovation contractors to track C&D debris generated on project sites and recycle at least 50 percent of material generated. Compliance forms including generation and recycling tonnage, as well as material types are required to be submitted to the Chicago Department of Public Health (CDPH) with a signed affidavit from the C&D recycler(s).<sup>53</sup> As a resource for Chicago contractors, CDPH provides a list of over 40 C&D recyclers in the Chicago area.<sup>54</sup> The Construction and Demolition Recycling Association (CDRA) also maintains a nationwide directory of C&D recyclers and material-specific guidance for diversion options.<sup>55</sup> Chicagoland is also home to several building material reuse and salvage facilities, a list of which can be found in Appendix B.

Particularly for large construction projects, there are opportunities for on-site reuse of C&D debris, which prevents cost and emissions impacts of both disposal and transport. O'Hare Airport's Modernization Program developed a Balanced Earthwork Plan (BEP) to keep the majority of the 26 million cubic yards of soil handled throughout the project onsite. The Chicago Department of Aviation (CDA) estimates the BEP has prevented 850,000 truck trips and 97,000 tons of associated CO2 emissions. CDA also estimated that 99 percent of all C&D debris (beyond soil) have been recycled and diverted from landfills.<sup>56</sup>



# **CHICAGO WASTE STAKEHOLDERS**

### **CITY OF CHICAGO DEPARTMENT MAP**

The City of Chicago is an expansive organization with more 30,000 employees comprising more than 30 departments.<sup>57</sup> Many of these departments have a role in materials management in some capacity, and a holistic waste strategy will require participation and coordination between each of them.

### **Office of the Mayor**

Mayor Lori E. Lightfoot's office, in partnership with the City Council, provides overarching leadership to direct City departments and guide inter-departmental efforts, including Chicago's Waste Strategy.<sup>58</sup>

Additionally, the role of Chief Sustainability Officer is housed within the Office of the Mayor, providing leadership for environmental and climate initiatives.

### **City Council**

Each of Chicago's 50 wards is represented by an elected Alderman in City Council, the City's legislative body. City Council and its committees are responsible for proposing and voting on City ordinances, resolutions, and orders, as well as elevating concerns and priorities of constituents.<sup>59</sup> Materials management policy strategies are developed by the City Council in partnership with the Mayor's Office and City departments.

The City Council Committee on Environmental Protection and Energy specifically holds jurisdiction over legislation relating to waste collection and disposal, recycling and reuse, and other environmental quality issues.<sup>60</sup>

### **Department of Streets & Sanitation (DSS)**

DSS is responsible for a broad range of City services including street operations and traffic services, forestry, graffiti removal, pest management, and sanitation. The Bureau of Sanitation is specifically responsible for collecting garbage from low-density residences, managing the Blue Cart recycling program (including collection for two of six low-density residential service areas), collecting yard waste upon request, enforcing high-density residential and commercial compliance with the Chicago Recycling Ordinance, planning and implementing street sweeping, and providing technical support for city-wide materials management and waste reduction programs.<sup>61</sup>

DSS also manages nine District Sanitation offices and supports District and Ward superintendents who manage services and requests locally.<sup>62</sup>

### Chicago Department of Public Health (CDPH)

CDPH manages health and safety programs for the City including environmental permitting and inspections, responding to illegal dumping reports, and managing programs for hazardous material (including household hazardous waste, electronic waste, unused pharmaceuticals, and



others) collection and disposal. CDPH is the permitting entity for Chicago materials management facilities including landfills, transfer stations, recycling facilities, and temporary C&D rock crushing sites.<sup>63</sup>

In partnership with DSS, CDPH manages rotating electronic waste drop off events for residents, most recently located at DSS District Sanitation offices.<sup>64</sup>

#### **Business Affairs and Consumer Protection (BACP)**

BACP's responsibilities include licensing businesses and enforcing Chicago's Municipal Code.<sup>65</sup> Related to materials management, BACP issues licenses and renewals for private scavenger vehicles (waste and recycling collection trucks). BACP is also responsible for enforcement of compliance with materials management legislation, including single use plastic bag tax implemented in 2017.<sup>66</sup>

#### Department of Assets, Information, and Services (AIS)

AIS, formerly called the Department of Fleet and Facility Management (2FM) manages the City's physical and technological assets and the department's Environmental Health and Safety Bureau provides environmental support and consulting around sustainability planning, solid waste disposal, brownfield management (including former landfill sites), and C&D debris management.<sup>67</sup>

#### **Chicago Department of Transportation (CDOT)**

CDOT is responsible for public way infrastructure, including providing permits for commercial refuse containers and C&D roll off containers.<sup>68</sup>

#### Department of Planning and Development (DPD)

DPD manages planning efforts for the City including land use and zoning, sustainability planning, and historic preservation.<sup>69</sup> DPD also oversees the Chicago Sustainable Development Policy Handbook, through which new development projects must meet sustainability standards through a menu of options, including 80 percent C&D debris diversion during construction.<sup>70</sup>

### Office of Budget and Management (OBM)

The OMB implements the City's annual budget, which informs department operations, and plans for capital improvement projects for infrastructure upgrades.<sup>71</sup>

#### **Department of Finance**

Chicago's Finance Department is responsible for collection and disbursement of City revenues including residential garbage collection fees for low-density residences and Chicago's single use plastic bag tax.<sup>72</sup>

#### **Department of Procurement Services (DPS)**

DPS is the City's authority for contracting, certification, and compliance for vendors, including waste management and diversion vendors.<sup>73</sup>



#### **Department of Law**

Chicago's Law Department provides legal counsel. Aviation, Environmental, Regulatory (AER) attorneys provide specific guidance for environmental regulations including waste disposal and C&D debris diversion.<sup>74 75</sup>

#### Department of Cultural Affairs and Special Events (DCASE)

DCASE manages Chicago's cultural and artistic endeavors including large events and festivals, film and television productions, and City farmers markets that provide opportunities for significant waste diversion and education.<sup>76</sup>

#### Chicago Department of Aviation (CDA)

CDA administers all aspects of O'Hare and Midway Airports, including development of a sustainable airport manual that includes waste prevention and diversion best practices for airports.<sup>77</sup>

#### Former Department of Environment (DOE)

Following the dissolution of Chicago's Department of Environment in 2012, several initiatives related to waste reduction and sustainable materials management were distributed to other departments, including those listed above. Mayor Lightfoot has indicated that reforming the Department of Environment is a priority for her administration.<sup>78</sup>

### **CHICAGO WASTE STAKEHOLDERS**

Understanding, and ultimately leveraging, the roles and resources presented by the myriad stakeholders working directly within and adjacent to Chicago's waste management will be a key component of any strategy adopted by the City of Chicago. As such, this section provides an overview of key stakeholders in the waste system. Though this strategy is intended for the City of Chicago and City departments, entities from the private, public, and non-profit sectors will be critical partners in reimaging Chicago's materials management system. This section is meant to provide an overview and examples of the stakeholder network in question, but it is by no means exhaustive.

#### **Chicago Stakeholders**

This subsection describes stakeholders that are currently involved in materials management within Chicago's city limits. Detailed information on the Municipal Department and City Council stakeholders can be found in the previous section.

#### Non-City Agencies

Several non-city agencies work closely with the City of Chicago to administer policies and programs throughout the city. Each agency interacts with the city's materials management system at different points and contributes to its success. These agencies include:



- Chicago Park District, an agency whose mission it is to enhance the quality of life in Chicago by providing recreation and leisure opportunities through safe and inviting parks and facilities that prioritize the needs of children and families.<sup>79</sup> The Park District engages with the waste system by managing waste and recycling in Chicago's parks, implementing programs to reduce waste in their programs and camps, and partnering with DSS on innovative programs like Christmas tree recycling collection.
- Chicago Public Schools (CPS), an agency whose mission it is to provide a high-quality public education for every child in Chicago.<sup>80</sup> CPS manages waste and recycling services for 642 schools,<sup>81</sup> including a compost collection pilot program to reduce and divert cafeteria food waste.
- Chicago Public Library (CPL), an organization whose mission is to provide access to information, ideas and knowledge through books, programs and other resources.<sup>82</sup> CPL has hosted innovative Repair Cafes and other programs to better manage Chicago's materials.

#### Nonprofit Organizations

Nonprofit organizations are important stakeholders within Chicago's materials management system. The goals of these organizations vary significantly but broadly encompass research, advocacy, and performance-improvement oriented activities. Some of the active nonprofits in Chicago (among many others) include:

- Edgewater Environmental Coalition, a coalition of community members and environmental stewards. Bringing a green voice to local challenges, we empower people to build and maintain a more sustainable future through action, organizing, education, and advocacy;<sup>83</sup>
- Southeast Environmental Task Force, an organization whose mission it is to inform and educate all members of the southeast Chicagoland community, including residents, businesses, and leaders, in areas related to the improvement of the neighborhood's environment;<sup>84</sup>
- Plant Chicago, an organization working to make our cities healthier and more efficient by developing and sharing the most innovative methods for sustainable food production, energy conservation and material reuse;<sup>85</sup> and
- Chicago Recycling Coalition, an organization that champions environmentally and fiscally sound management of solid waste through research, education, and advocacy, emphasizing waste reduction, reuse, recycling, composting, and buying recycled.<sup>86</sup>

#### Academic Institutions

Schools, both of higher education and within Chicago Public Schools, are embedded securely within Chicago's materials management system as waste generators. Additionally, universities and colleges are a source of research that drives innovation and provides a deeper understanding of the system. There are many public, private and for-profit higher education institutions operating in Chicago, including community colleges, city colleges, independent colleges, universities, graduate schools and other institutions offering professional programs.


#### **Private Sector Practitioners**

Of course, the commercial entities that are contracted to fulfill materials management objectives are an important group of stakeholders. This group includes any business that derives profit from the materials management system. These entities include, but are not limited to, the numerous waste hauling, recycling and composting businesses that are active within the system.

#### **Cook County and Chicagoland Region Organizations**

Several organizations are actively engaged in planning, implementation, and information sharing within Cook County and the Chicagoland Region. These groups are represented by members that come from the private, public, and nonprofit sectors and include (but are not limited to):

- Cook County Dept of Environment and Sustainability, a governmental agency with a mandate to enforce county ordinances, implement cooperative agreements, administer grants, and otherwise monitor, permit, and plan for activities related to the environment;<sup>87</sup>
- Metropolitan Mayors Caucus, a membership-based organization that provides a forum for Chicagoland's 275 municipalities to regularly collaborate on matters of public policy;<sup>88</sup>
- Illinois Counties Solid Waste Management Association, nonprofit professional association for local level solid waste management professionals and other interested parties;<sup>89</sup> and
- Seven Generations Ahead, a nonprofit organization that works with local government, community and private sector leaders to help communities make the changes they need to build a healthy and sustainable future.<sup>90</sup>

#### State of Illinois

Stakeholder groups that engage in materials management-related activities across the state often serve as funders, regulators, and advocates within the system. These entities drive policy and coordinate action that involves many of the stakeholder groups described above.

- Illinois EPA, a state regulatory and enforcement agency whose mission it is to safeguard environmental quality, consistent with the social and economic needs of the State, to protect health, welfare, property and the quality of life;<sup>91</sup>
- Illinois Environmental Council, a statewide nonprofit advocacy organization that coordinates over 90 affiliate member organizations to share resources, mobilize supporters and respond quickly to the most pressing issues facing the environment in Illinois;<sup>92</sup>
- Illinois Food Scrap Coalition, a statewide nonprofit organization whose mission it is to advance diversion and composting of organics in Illinois through advocacy, program implementation, market and business development, policy, and outreach;<sup>93</sup>
- Illinois Recycling Association and Foundation, two statewide sibling organizations created to address issues that rise to the level of needing legislative action and provide educational literature, events, tours, networking opportunities, webinars and more on a statewide basis, respectively;<sup>94</sup>
- Illinois Sustainable Technology Center, an organization within the University of Illinois system that integrates applied research, technical assistance, and information services



to advance efforts in the areas of pollution prevention; water and energy conservation; and materials recycling and beneficial reuse;<sup>95</sup>

- Illinois Product Stewardship Council, a statewide coalition of public and private entities including local governments, state governments, businesses, environmental groups, NGOs, solid waste agencies, associations, and individuals in Illinois;<sup>96</sup> and
- Statewide Materials Management Advisory Committee, a committee, created in 2019 by Governor Pritzker, which is responsible for investigating current recycling and solid waste practices and recommending options to the General Assembly to divert wastes from Illinois landfills.<sup>97</sup>

#### **National Organizations**

Lastly, agencies and organizations working across the country have the unique ability to leverage a wide-reaching network of practitioners, policy makers, and advocates that crosses state lines.

- U.S. Environmental Protection Agency, a federal regulatory and enforcement agency that provides grants, conducts environmental studies, sponsors partnerships between private, public and nonprofit entities, and publishes scientific information;<sup>98</sup>
- Natural Resources Defense Council, a national nonprofit, membership-based organization that partners with businesses, elected officials, and community organizations to address natural resources concerns;<sup>99</sup>
- Build Reuse, a national nonprofit organization that encourages the recovery, reuse, and recycling of building materials in the United States;<sup>100</sup>
- The Recycling Partnership, a national organization that puts private dollars to work in communities to protect resources and empower sustainable action in materials management systems;<sup>101</sup>
- National Recycling Coalition, a national non-profit organization focused on promoting and enhancing recycling in the United States with a network of more than 6,000 members extending across waste reduction, reuse, recycling, and composting;<sup>102</sup> and
- ReFED, a national nonprofit dedicated to ending food loss and waste across the U.S. food system by advancing data-driven solutions.<sup>103</sup>



## **ECONOMIC IMPACTS**

How Chicago manages materials also has significant economic impacts including costs of collection, processing, and disposal on a city-wide scale, job creation potential, and missed value and opportunities in materials currently sent to landfills.

Tipping fees - direct costs associated with depositing waste at landfills - present an opportunity for cost savings if overall waste production was reduced. In 2020, the average municipal solid waste (MSW) tipping fee in Illinois was \$51.71 per ton and \$47.85 per ton in the Midwest region. Between 2016 and 2020, the Environmental Research and Education Foundation (EREF) reported an average year-over-year increase of 5.6 percent for tipping fees in the Midwest. Landfill tipping fees are impacted by land costs as well as landfill size, public or private ownership, and landfill density and competition.<sup>104</sup>

MSW landfill tipping fees in the Midwest (average of \$47.85 per ton) are not the lowest in the country but are significantly lower than disposal fees in the Pacific (average of \$72.03 per ton) and Northeast regions (average of \$68.69 per ton). In the Midwest region in 2020, Missouri had the highest average statewide tipping fees at \$67.91 per ton and Indiana (where much of Chicago's waste is landfilled) had the lowest at \$36.27 per ton.

Source: EREF, Analysis of MSW Landfill Tipping Fees: 2020 In addition to tipping fees, Illinois charges a state surcharge of \$2 per ton and/or \$0.95 per cubic yard. Smaller landfills pay a set annual fee regardless of tonnage or volume. This generates approximately \$20 million dollars annually, of which the state requires \$2 million per year to go towards the state's Hazardous Waste Fund. The remaining \$18 million per year is included in the Solid Waste Management Fund managed by the Illinois Environmental Protection Agency (IEPA) to support program activities.<sup>105</sup>

Increased material diversion through reuse and recycling has potential to create more jobs than would be created through disposal. A 2011 report by The Tellus Institute compared jobs per 1,000 tons of material for activities associated with disposal and diversion including collection, processing, remanufacturing, landfilling, and incineration. Job production for diversion varied across material types, but all materials demonstrated increased job creation for diversion. The study found that reaching a national diversion rate of 75 percent for MSW and C&D debris by 2030 would create 1.5 million jobs beyond 2008 employment numbers for diversion and disposal.<sup>106</sup>

Additionally, commodity materials in landfills represent a lost opportunity for Chicago's economy. The Illinois Commodity/Waste Generation and Characterization Study Update published in 2015 calculated the market value of recyclable materials, including subcategories of paper, plastic, glass, and metal, that were ending up in landfills. The study found that the value of these materials was more than \$360 million.<sup>107</sup>

Though this study was based on 2014 market values, which have been impacted by several factors including international policies (most notably, China's 2018 National Sword policy), these materials still represent significant missed value for Illinois and Chicago.



### **CONTAMINATION & GLOBAL COMMODITY MARKET DISRUPTIONS**

Chicago's complex materials management and waste infrastructure is further impacted by policies and activities around the globe. The waste and recycling industry has seen several years of market-based disruptions on an international scale. For example, an increase in contamination rates, caused by the presence of non-recyclable materials (e.g. plastic film, organics) in recycling streams, is a major contributor to local sorting issues and international regulatory noncompliance.

Current recycling technology and equipment cannot appropriately process materials like plastic bags and can halt operations and result in damage to processing facilities when included in curbside recycling streams. Additionally, soiled materials (e.g. greasy pizza boxes, food containers that have not been emptied) can lessen the quality of the entire recycling stream, making it difficult to sell the materials for remanufacturing.<sup>108</sup> Recycling processors like Resource Management Companies have reported significant increases in processing costs paired with decreases in material value as contamination rates rise (Figure 20).



Figure 20: Recycling Contamination Cost in 2017. Source: Presentation by Greg Maxwell, Resource Management Companies

In the early 2000s, the U.S. began selling and shipping much of the domestically collected recyclable materials to mills in China for processing. This market allowed for municipalities to offset costs of collection and education incurred by recycling programs. In 2018, China



implemented the National Sword policy that placed restrictions on the types of scrap material that can be imported and placed rigorous contamination standards on accepted materials.<sup>109</sup>

As a result of this significant market shift, municipalities and companies in all 50 states have made difficult decisions including increasing the cost of recycling collection, reducing or halting collection services for residents, and landfilling recyclable materials.<sup>110</sup>

Mixed plastic has been particularly difficult to effectively recycle since the implementation of the National Sword policy. In Illinois, organizations like Keep Northern Illinois Beautiful and Southern Recycling have accumulated a stockpile of sorted and baled plastic without a buyer. Keep Northern Illinois Beautiful reported seven tons of plastic stored in their Rockford, Illinois facility<sup>111</sup> and Southern Recycling in Carbondale, Illinois held 200 tons of baled plastic as of 2019.<sup>112</sup>

In 2017, The Recycling Partnership sampled Blue Carts from a pilot area of nearly 4,500 household to determine baseline contamination rates. The study found that slightly over a quarter of material placed in Blue Cart bins is unrecyclable contamination, including recyclable materials in plastic bags (Figure 21).<sup>113</sup>



### Contamination Rates in Recycling

Figure 21: Baseline contamination rates found in Blue Cart, Source: The Recycling Partnership, "It's All You, Chicago" Report



## **ENVIRONMENTAL IMPACTS**

Materials management programs and policies have broad impacts on the overall environmental health of a community. Strategies that encourage a reduction in source materials entering waste streams, reuse, and recycling not only prevent those materials from ending up in landfills but also mitigate the environmental impacts of these practices.

Specifically, the transportation and processing of waste materials and the extraction of virgin materials for manufacturing and other industrial uses are resource intensive practices that significantly contribute to climate change. However, the negative impact of these practices on the global climate can be reduced by adopting sustainable transportation and processing strategies and lessening our reliance on virgin material extraction. For example, making cans from recycled aluminum requires 95 percent less energy and generates 90 percent less GHG emissions than virgin stock.<sup>114</sup>

EPA's Waste Reduction Model (WARM) is a tool that calculates impacts of changing waste disposal methods in greenhouse gas emissions, energy savings, and economic benefits. WARM can account for 60 different kinds of waste streams commonly found in municipal solid waste streams and several different disposal mechanisms, including waste reduction.<sup>115</sup>

WARM can be used to understand the impacts of historical waste diversion activities on emissions and the effects of future activities on emissions. In 2020, 86,477 tons of recyclable materials were collected through Blue Cart. The diversion of this material from landfill reduced emissions by 248,035 MTECO<sub>2</sub>, the equivalent of removing emissions from 52,661 cars annually. Figure 6 shows the estimated ICI waste for 2020. If 100 percent the paper, beverage containers, plastic, glass, metal, and organics identified here were recycled or composted as opposed to going to landfill, the emissions savings would equate to 2,441,346 MTECO<sub>2</sub>. Realistically, much of this material was probably not recycled or composted, but even diverting 10 percent of this material would have an emissions reduction of 244,134 MTECO<sub>2</sub>. For 2015 C&D waste (Figure 18), material recycled equates to 3,243,264 MTECO<sub>2</sub> in prevented emissions that would have occurred if the materials were landfilled instead.

Though landfills may be the safest and most appropriate waste management approach for some materials, landfill space is a limited resource. The Chicago Metropolitan Region has seen a decrease in the number of active landfills in recent years. In 2004, there were eight active landfills in the region, and as of 2020, there are only four: Veolia ES Zion Landfill in Zion, Countryside Landfill in Grayslake, Laraway Recycling and Disposal Facility in Joliet, and Prairie View Recycling and Disposal Facility in Wilmington.<sup>116</sup> These four landfills had an average life expectancy of 12.4 years respectively as of January 2020 (Figure 22). There are no active landfills in Chicago or Cook County.<sup>117</sup>



#### Life Expectancy of Region 2 Landfills



Figure 22: Remaining life expectancy for the four landfills located in Region 2 (Northeastern Illinois) (Source: Illinois Landfill Disposal Capacity Report)

In addition to landfills in Illinois, Chicago's waste is disposed across state lines in Indiana. In 2019, over 2.6 million tons of waste generated in Cook County (including the city of Chicago) were sent to six landfill locations in Indiana (Figure 23).<sup>118</sup> These six landfills had an average life expectancy of 26.4 years as of 2014.119



Figure 23: Waste received by Indiana landfills from Cook County (including City of Chicago) (Source: Complete Solid Waste Quarterly Report Database, 2011-2019)



## **PUBLIC HEALTH & ENVIRONMENTAL JUSTICE**

Neighborhoods on the south and west sides of Chicago have been disproportionately affected by the impacts of disposal methods on air quality and the location of waste management infrastructure. In addition to disproportionate environmental burden, these communities also typically have less access to other important services which compounds the negative impacts even further (e.g. transportation, health services, food, green space and others). As such, the systems and infrastructure through which waste travels are highly consequential both in terms of public health and environmental justice.



Figure 24: Map of waste disposal infrastructure overlaid with the City's Air Quality and Health Index (Source: City of Chicago Dept of Public Health)



In 2020, the Chicago Department of Public Health (CDPH) assessed air quality (including ozone, particulate matter, traffic volume, proximity to Superfund Program sites, proximity to hazardous waste sites) and health data (including prevalence of asthma and other health issues, concentration of elderly and children, income, educational attainment, employment, race and ethnicity, and others) to index vulnerabilities to air pollution at the census block level across the City.<sup>120</sup> Though some impacts of the waste management system are captured through represented data like traffic, particulate matter, and hazardous waste site proximity, it is evident that much of the current and historical waste infrastructure of the City is located in and near highly vulnerable populations (Figure 24).

Community organizations like the Southeast Environmental Task Force (SETF) experience impacts of both historical waste disposal (e.g. concentration of now-closed landfill sites) and current materials management infrastructure (e.g. scrap metal and large composting facilities).<sup>121</sup>

In addition to the impacts of the waste normal system, communities are also impacted by "fly dumping," the discarding or dumping of any waste materials on private or public property without a CDPH permit.<sup>122</sup> Materials discarded in this way typically have a greater likelihood of toxicity or nuisance. Fly dumping can be reported for the City's 311 service for cleanup. Concentration of 311 reports of fly dumping by ward can be seen in Figure 25.

As Chicago moves toward a materials management system that prioritizes waste reduction and economic opportunity, historical and future environmental justice issues must be prioritized as part of the new system.



Figure 25: Fly dumping 311 requests by ward submitted to DSS from non-DSS sources in 2020 (Source: City of Chicago)



## **EXISTING POLICY OVERVIEW**

The following table outlines the various policies that affect waste management within the city. Waste management is subjected to policies outlined specifically for Chicago, but also falls under the jurisdiction of policies covering the state of Illinois and federal policies. County-level policies concerning all of Cook County may also affect waste management. However, many Cook County policies are limited in scope to suburban and unincorporated areas, excluding the city proper.

In addition to the legislation included below, goals to improve materials management and increase diversion rates in the City of Chicago align with both State of Illinois and federal initiatives. In 2019, Illinois Governor J.B. Pritzker established the Statewide Materials Management Advisory Committee, composed of representatives from government, industry, academia, and education, to recommend statewide practices to increase diversion from landfills.<sup>123</sup> The work of the committee is ongoing but will include recycling improvement recommendations. At the federal level, in 2020 the EPA announced an updated goal to reach a 50 percent recycling rate by 2030.<sup>124</sup> Currently, the EPA estimates that 23.6 percent of MSW is recycled and 8.5 percent is composted at the national level.<sup>125</sup>

## FEDERAL POLICIES

Name	Date	Category	Summary
Resource Conservation and Recovery Act (RCRA)			Authorizes the EPA to oversee the management of hazardous waste
42 U.S.C. §6901 et seq.	1976	Waste Reduction	Creates a framework for the management of non-hazardous waste
Bill Emerson Good Samaritan Food Donation Act	1006	Waste Peduction	Reduces liability to encourage the donation of
	1550	Waste Reduction	
Save Our Seas 2.0			Creates requirements and incentives to reduce
Public Law No: 116-224	2020	Waste Reduction	plastic waste in waterways

Several pieces of materials management legislation have been proposed and referred to federal committees, aimed at expanding food recovery and donation, improving food labeling, reducing plastic usage, and expanding recycling infrastructure and education.<sup>126</sup><sup>127</sup>

## **STATE OF ILLINOIS POLICIES**

Name	Date	Category	Summary
Environmental Protection Act	1970	Landfill Regulation	Provides overarching legislation on the protection and restoration of the environment
415 ILCS 5/1 et seq.			Regulates disposal of waste items and the operation of waste facilities



			Establishes issuance of permits and funds for waste management work
			Imposes various fees on both retail and landfills Amendments to EPAct banned the disposal of yard waste, lead-acid batteries, waste tires, white goods, used oil into landfills
Solid Waste Management Act/Fund 415 ILCS 20/1 et seq.	1986	Waste Reduction	Establishes waste management hierarchy from volume reduction at the source to disposal in landfill facilities
			Sets out requirements for recycled commodities
			Requires state-supported colleges to develop waste management plans
Solid Waste Planning and Recycling Act	1988	Waste Reduction	Requires all Illinois counties and city of Chicago to develop a management plan with 25% of municipal waste generated to be recycled
415 ILCS 15/1 et seq.			
Mercury Thermostat Collection Act	2010	Hazardous Household Waste	Prohibits the disposal of mercury-switch thermostats in landfills
415 ILCS 98			
Safe Pharmaceutical Disposal Act	2010	Pharmaceuticals	Prohibits disposal of unused medication into public wastewater and septic systems
210 ILCS 150			Allows for unused medicine collection municipal and county facilities
Compost Dropoff HB0437	2015	Food Scraps/Organics	Allows collection of organics for composting at temporary and permanent sites
PCB Disposal HB1326	2015	Household Hazardous Waste	Restricts disposal of waste from gas plants and polychlorinated biphenyl waste to protect the Mahomet Aquifer
Food Donations HB5530	2016	Food Scraps/Organics	Allows food donations from schools and government facilities to avoid landfill
Consumer Electronics Recycling Act (CERA)	2017	E-Waste	Establishes system for recycling and reusing of unwanted electronic devices
415 ILCS 151			Sets convenience standard for the minimum number of collection locations in each county
Bulk Containers	2019	Waste Reduction	Allows for the use of personal containers for bulk foods at retailers
HB3440			



Amendment to Illinois Food, Drug and Cosmetic Act			
State Action on Waste HB3068	2019	Waste Reduction	Requires the state to develop a comprehensive waste plan
Amendment to Solid Waste Planning and Recycling Act			agencies with specific reduction goals

## CITY OF CHICAGO POLICIES - MUNICIPAL CODE

Name	Date	Category	Summary
Checkout Bag Tax	2017	Recycling	Imposes a \$0.07 tax per checkout bag used, paid by the user
Chapter 3-50			
Plastic Bag and Film Plastic Recycling Chapter 7-30	2017	Recycling	Requires an in-store bag recycling program and availability of reusable bags for purchase at groceries and pharmacies
<u>Construction and</u> <u>Demolition Site Waste</u> <u>Recycling Ordinance</u> <sup>i</sup> 11-4-1905 et seq.	2007	C&D Debris	Keep track of the amount of C & D debris that is generated on project sites; Recycle at least 50% of the recyclable debris that is generated; Submit a Recycling Compliance Form to the Department of Public Health at the end of each project, along with an affidavit from the waste hauler or recycler.
Reduction and Recycling Program Chapter 11-5	2017	Recycling	Requires property owners to provide source- separated, single-stream recycling Defines acceptable and unacceptable waste for those to whom this ordinance applies, they must make materials available upon request by the city Requires collection provider to provide designated recycling containers, to post requirements and collection procedures, and to educate consumers on proper recycling

<sup>&</sup>lt;sup>i</sup> A similar Cook County policy also regulates construction and demolition site waste. The <u>Cook County</u> <u>Demolition Debris Diversion Ordinance</u> requires demolition contractors to recycle 70% of debris from projects in suburban and unincorporated areas. 5% of demolition debris from residential projects should go towards reuse.



Requires private waste haulers to notify customers on recycling requirements, acceptable materials, and collection process

Requires private waste haulers to record annual total tonnage, facilities delivered to, percentage of waste delivered to each facility with records to be kept for a period of three years

## CITY OF CHICAGO PROPOSED POLICIES

Name	Date Proposed	Category	Summary
Call for Dept. of Public Health to Reestablish Residential Electronics Recycling Pilot Program	2019	E-Waste	Reestablish the Residential Electronics Recycling Program and expand to allow drop off at City buildings Designate a minimum number of drop off locations for wards
Polystyrene Container Ban & Single-Use Plastic Bag Ban 11-4-4010 11-4-4020	2020	Waste Reduction	Chain stores cannot provide single-use plastic bags or polystyrene containers Carryout bags provided must be reusable, recyclable, or compostable
Ordinance Requiring Recycling and Composting for Special Events Section 1. Chapter 10-8-	2020	Recycling Food Scraps/Organics	Event organizers must plan for and provide
Plastic-Free Water Ordinance Chapter 7-60	2020	Waste Reduction	Limits the use of single-use plastics within restaurants
Call for Hearing(s) on Commercial and High- Density Residential Recycling Program	2020	Recycling	Call to convene a joint hearing to review the enforcement of the Commercial and High-Density Residential Recycling Program



## **APPENDIX**

### **APPENDIX A: PLAN REVIEW**

The City of Chicago is well-positioned to undertake a holistic and targeted waste strategy implementation process. Existing planning documents and studies, including those listed below, have emphasized the need for an effective strategy and support improvements to materials management practices to achieve citywide goals.

#### Sustainable Chicago 2015 Action Agenda

#### Published in 2012

The Sustainable Chicago 2015 Action Agenda highlighted challenges and opportunities related to:

- Economic Development and Job Creation;
- Energy Efficiency and Clean Energy;
- Transportation Options;
- Water and Wastewater;
- Parks, Open Space, and Healthy Food;
- Waste and Recycling; and
- Climate Change.

Goals related to waste and recycling included Goal 20: Increase Access to Recycling and Improve Policies to Promote Waste Reduction and Reuse and Goal 21: Incorporate Standard Green Practices in All City Operations.<sup>128</sup>

A summary report on progress made and recommended next steps toward Sustainable Chicago goals was published in 2015. Highlights included the completion of the city-wide curbside recycling rollout through the Blue Cart program and implementation of the grid-based garbage pick up structure; the launch of the Recycle by City educational resource; the adoption of a compost ordinance in support of urban agriculture initiatives, and a major infrastructure reuse initiative through the 606 trail development project.<sup>129</sup>

The report also outlined priorities for next steps beyond 2015 which included improving high density residential and commercial recycling; expanding public engagement and messaging (specifically "go bagless") to reduce







plastic film contamination; and increasing the use of recycled content in infrastructure projects.<sup>130</sup>

#### **City of Chicago Sustainable Operations Plan**

#### Published in 2015

One outcome of the Sustainable Chicago 2015 Action Agenda was the 2015 Sustainable Operations Plan, providing specific guidance for City facilities. Materials management-related goals include improving waste and recycling; conserving natural resources and diverting waste from landfills; transitioning City processes to paperless systems; and diverting 75 percent of municipal C&D debris.

The plan includes recommendations for all employees, and tailored strategies for facility operations staff, managers, and engineers. The plan also includes sustainability strategies specifically for fleet managers and staff involved with design and construction of City facilities.<sup>131</sup>



#### **Chicago Climate Action Plan**

#### Published in 2008

The Chicago Climate Action Plan introduced greenhouse gas (GHG) emissions reductions targets for the City - 25 percent by 2020 and 80 percent by 2050. GHG emissions mitigation is critical to preventing the most devastating impacts of a changing climate. The Climate Action Plan includes recommendations for:

- Energy Efficient Buildings;
- Clean and Renewable Energy Sources;
- Improved Transportation Options;
- Reduced Waste and Industrial Pollution; and
- Adaptation.

Though solid waste management directly generates less GHG compared to sectors like energy and transportation, improvements to the materials management system can

have powerful climate impacts. Actions related to materials management in this plan include





reducing waste sent to landfills through reduction, recycling, and reuse, and capturing and phasing out harmful refrigerants.<sup>132</sup>

#### Healthy Chicago 2025

#### Published in 2020

The Healthy Chicago 2025 Roadmap seeks to highlight opportunities to improve public health and develop anti-racist programs and policies in Chicago to address environmental justice issues and the racial life expectancy gap.

Recommendations related to the environment and addressing disproportionate pollution burdens include further refinement of the Air Quality and

Health Index, creation of an environmental equity working group, assessment of cumulative pollution impacts, and new legislation around land use, environmental regulation and enforcement, and community engagement.<sup>133</sup>



#### Waste Characterization Study

#### Published in 2010

Chicago's former Department of Environment tasked a consultancy firm with sampling and analyzing 2008-2009 disposal data to develop waste generation and composition estimates for the City.

The firm, CDM Smith, recommended that the City of Chicago prioritize the following five material types for diversion impact:

- Food Scraps; •
- Paper;
- Construction & Demolition Debris;
- Plastics: and
- Textiles.

The firm also recommended that the City update estimates annually and conduct a waste characterization study every five years.<sup>134</sup>





#### **Chicago Waste Diversion Study**

#### Published in 2010

In addition to the Waste Characterization Study, the former Department of Environment also tasked CDM Smith to develop a Waste Diversion Study to calculate current diversion and material capture rates, and estimate the maximum possible diversion based on material composition.

The study found that if Chicago reached diversion rates similar to those in peer cities (including New York, NY, Seattle, WA, Columbus, OH, and others), DSS-collected residential could increase from 8 to 43 percent, private-collection diversion could increase from 19 to 42 percent and rates for construction and demolition operations could increase from 65 to 67 percent. These improvements would bring the City's overall diversion rate from 45 to 57 percent.<sup>135</sup>





## **APPENDIX B: EXISTING CHICAGO WASTE INFRASTRUCTURE & ORGANIZATIONS**

The following are a series of tables summarizing various aspects of the City's existing waste infrastructure including recycling sites for specialty materials, waste management facilities, food scrap pickup services, and building materials reuse organizations.

This table contains information on sites for composting, medication disposal, and electronics in Chicago as identified by the Illinois EPA. There are additional opportunities to recycle medication with larger chain pharmacies and some hospital systems. Some items, such as CRT televisions, may not be accepted at certain sites. This information corresponds with the map in Figure 17.

RECYCLING SITES FOR SPECIALTY MATERIALS <sup>136</sup>					
Name	Address	City	Postal Code	Telephone	Items Accepted
Altgeld Sawyer	2501 N	Chicago	60647		Composting
Corner Farm	Sawyer Ave				
Harbor View Compost Facility	2000 E 122nd St-a	Chicago	60633	(847) 825-5000	Composting
Calumet Water Reclamation Plant	400 E 130th St	Chicago	60628		Medication
Cook County Building	120 N Clark St	Chicago	60602		Medication
Cook County Criminal Court Building	2650 S California Ave	Chicago	60608		Medication
Metropolitan Water Reclamation District Main Office Building	100 E Erie St	Chicago	60611		Medication
Saint Anthony Hospital	2875 W 19th St	Chicago	60623		Medication
Rexall Drugs	1000 N Western Ave, Suite 1	Chicago	60622	(773) 486-4000	Medication
Roger Pharmacy	131 East 47th St	Chicago	60653	(773) 624-0010	Medication
Halsted Pharmacy	1460 N Halsted, Suite 101	Chicago	60642	(312) 624-9400	Medication
Kedzie-Madison Drugs	3179 W Madison St	Chicago	60612	(773) 722-2630	Medication
Lawndale Christian Health Center	3256 West 24th St	Chicago	60623	(773) 843-3000	Medication
Lawndale Christian Health Center	3860 W Ogden Ave	Chicago	60623	(773) 843-3000	Medication
Ballin Pharmacy	3330 N Lincoln Ave	Chicago	60657	(773) 348-0030	Medication
New England Pharmacy	6918 W Archer Ave	Chicago	60638	(773) 586-2230	Medication
Well Future Pharmacy, LLC	1442 S Michigan Ave	Chicago	60605	(312) 589-7620	Medication



Chicago Police	2150 North	Chicago	60647	(312) 744-8290	Medication
Department 14th	California				
District	Avenue				
(Shakespeare)	0.450.144		60610	(010) 744 5000	<b>NA</b> 11 11
Chicago Police	2452 West	Chicago	60618	(312) 744-5983	Medication
Department (Area 3)	Beimont				
Obiere Delier	Avenue		60610	(010) 746 0006	
Chicago Police	3151 West	Chicago	60612	(312) 746-8386	Medication
Department (Area 4)	Harrison				
Chicago Dolico	Street	Chicago	60600	(212) 747 0266	Madiaatian
Department (Area 1)	STUT South	Chicago	00009	(312) /4/-8300	Medication
Department (Area T)	Avonuo				
Chicago Polico	5555 Woot	Chicago	60620	(212) 746 9605	Modication
Department (Area 5)	Grand Avenue	Chicayo	00039	(312) 740-0003	Medication
Chicago Police	727 East	Chicago	60628	(212) 7/7-8210	Medication
Department (Area 2)	111th Street	Chicayo	00020	(312) 747-0210	Medication
Chicago Police	7040 \$	Chicago	60637	(312) 747-8201	Medication
Department	Cottage Grove	omcago	00007	(012) 747 0201	Wedleation
Department	Ave				
Chicago Police	1718 S State	Chicago	60616	(312) 745-4290	Medication
Department	St	ormougo	00010	(012) / 10 1270	medication
Chicago Police	2255 Fast	Chicago	60617	(312) 747-7851	Medication
Department	103rd St	ornougo	00017	(012) / 1/ /001	medication
Chicago Police	7808 S	Chicago	60620	(312) 745-3617	Medication
Department	Halsted				
Chicago Police	1438 West	Chicago	60636	(312) 747-8223	Medication
Department	63rd St	5			
Chicago Police	3420 West	Chicago	60629	(312) 747-8730	Medication
Department	63rd St	Ŭ			
Chicago Police	3120 S	Chicago	60608	(312) 747-8227	Medication
Department	Halsted	-			
Chicago Police	3315 W Ogden	Chicago	60623	(312) 747-7511	Medication
Department	Ave				
Chicago Police	1412 S Blue	Chicago	60608	(312) 746-8396	Medication
Department	Island				
Chicago Police	5701 W	Chicago	60644	(312) 743-1440	Medication
Department	Madison				
Chicago Police	5151 N	Chicago	60630	(312) 742-4480	Medication
Department	Milwaukee				
	Ave				
Chicago Police	4650 N	Chicago	60630	(312) 742-4410	Medication
Department	Pulaski Rd				
Chicago Police	1160 N	Chicago	60610	(312) /42-5870	Medication
Department	Larrabee St				
Chicago Police	850 W	Chicago	60613	(312) /44-8320	Medication
Department	Addison St	Ohiss	(0(05	(010) 740 074 4	Madiantia
Unicago Police	5400 N	Unicago	60625	(312) /42-8/14	iviedication
Department		Objects	60640	(010) 745 0740	Madiaatian
Chicago Police	1900 W	Unicago	00043	(312) /45-0/10	iviedication
Department	ivionterey Ave			1	



Chicago Police	6464 N Clark	Chicago	60626	(312) 744-5907	Medication
Household	1150 N North	Chicago	60642	(312) 744-3060	Electronics Medication
Chemicals &	Branch Street	ornougo	00012	(012) / 11 0000	
Computer Recycling					
Facility					
Best Buy	1000 W North	Chicago	60642	(312) 988-4067	Electronics, Household
,	Ave	5			Batteries
Best Buy	2100 N Elston	Chicago	60614	(773) 486-0142	Electronics, Household
	Ave	Ũ			Batteries
Best Buy	555 W	Chicago	60607	(312) 733-6635	Electronics, Household
	Roosevelt Rd	-			Batteries
Best Buy	875 N	Chicago	60611	(312) 397-2143	Electronics, Household
	Michigan Ave	-			Batteries
Goodwill Industries	1201 W	Chicago	60607	(312) 563-1187	Electronics
SEW/Metro Chicago	Washington				
	Blvd				
Goodwill Industries	9321 S	Chicago	60643	(773) 344-3380	Electronics
SEW/Metro Chicago	Western Ave				
Staples	111 North	Chicago	60602	(312) 641-1213	Electronics
	Wabash Ave.				
Staples	1130 South	Chicago	60607	(312) 588-0924	Electronics
	Canal Street				
The Salvation Army	2151 W Devon	Chicago	60659	(800) 182-1285	Electronics
The Salvation Army	2270 N	Chicago	60614	(800) 182-1285	Electronics
	Clybourn				
The Salvation Army	2941 N	Chicago	60634	(800) 182-1285	Electronics
	Central Ave				
The Salvation Army	3301 W	Chicago	60618	(800) 182-1285	Electronics
	Montrose Ave				
The Salvation Army	4052 W Grand	Chicago	60651	(800) 182-1285	Electronics
	Ave.		60640	(000) 100 1005	
The Salvation Army	4315 N	Chicago	60613	(800) 182-1285	Electronics
	Broadway				
The Columbian Armsu	AVE.	Chicago	60654	(000) 100 1005	Fleetrenice
The Salvation Anny		Chicago	00004	(800) 182-1285	Electronics
The Solvation Army	5712 W/	Chicago	60651	(000) 102 1205	Flootropics
The Salvation Army	Chicago Ave	Chicago	00051	(000) 102-1203	Electronics
The Salvation Army	6/3/ W 63rd	Chicago	60638	(800) 182-1285	Flectronics
The Salvation Army	St	Chicago	00030	(000) 102-1203	Liectionics
Stanles	4610 North	Chicago	60640	(773) 769-0536	Flectronics
otupico	Clark Chicago	onicago	00040	(773)7030000	Licetronics
AVA Recycling	6259 S Kedzie	Chicago	60629	(773) 776-7000	Flectronics
(Martrov Electronics)	Ave	omougo	00025	(//0)//0/000	Licotronico
AVA Recycling (Pro-	5019 W	Chicago		(773) 729-2062	Electronics
Technology	Lawrence Ave	Sinougo		(	
Professionals)					
AVA Recycling (Air	242 S State St	Chicago	60604	(312) 877-8775	Electronics
Tec Wireless)		5	_		



	1			
410 S Clark St	Chicago	60605	(708) 932-4233	Electronics
			(,	
5732 N	Chicago	60646	(773) 594-9807	Electronics
070211	omougo	00040	(110) 004 0001	Licotronico
Milwaukee				
Av(0				
Ave				
7545 W	Chicago	60634	(773) 637-1244	Electronics
/ 0 10 11	omougo	00001	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Electronice
Addison St				
	410 S Clark St 5732 N Milwaukee Ave 7545 W Addison St	410 S Clark StChicago5732 N Milwaukee AveChicago7545 W Addison StChicago	410 S Clark StChicago606055732 N Milwaukee AveChicago606467545 W Addison StChicago60634	410 S Clark St   Chicago   60605   (708) 932-4233     5732 N   Chicago   60646   (773) 594-9807     Milwaukee   Ave   60634   (773) 637-1244     7545 W   Chicago   60634   (773) 637-1244     Addison St   60634   60634   60634



The following table contains information compiled by the City of Chicago on former landfill sites, recycling facilities, transfer stations, and waste handling facilities in and neighboring Chicago. This information corresponds with the map in Figure 24.

WASTE DISPOSAL INFRASTRUCTURE <sup>137</sup>						
Name	Address	City	Facility Type			
122nd Street Landfill - Land		Chicago	Former Landfill			
and Lakes						
138th Street - Land and		Dolton	Former Landfill			
		Chicago	Former Londfill			
CID Lanutini Devrteen Londfill		Chicago				
	1050 11 41 -+ 0+	Chicago	Pormer Landilli			
4 Ist Street Recycling Facility	1350 W 41st St	Chicago				
A & A Midwest	4050 S Wentworth Ave	Chicago	Recycling Facility			
A Metals Scrap Inc.	9301 S Baltimore Ave	Chicago	Recycling Facility			
AA Chicago Metal Group Corps.	4430 W 14th St	Chicago	Recycling Facility			
Abco Metal	1020 W 94th St	Chicago	Recycling Facility			
Adelman'S Truck & Equipment	3033 E 106th St	Chicago	Recycling Facility			
Aero Auto Parts	6339 S Wentworth Ave	Chicago	Recycling Facility			
Again Auto, Llc	1300 N Kostner Ave	Chicago	Recycling Facility			
Akat Scrap Metal, Inc.	12100 S Stony Island Ave	Chicago	Recycling Facility			
All American Recycling, Inc.	11900 S Cottage Grove Ave	Chicago	Recycling Facility			
Alpha Metals Corporation	341 N California Ave	Chicago	Recycling Facility			
American Metals Co	5580 N Lynch Ave	Chicago	Recycling Facility			
American Metals Company	2420 W Cermak Rd	Chicago	Recycling Facility			
Antek Madison Plastics	8822 S Dobson Ave	Chicago	Recycling Facility			
Archer Paper And Metals Co	4619 S Knox Ave	Chicago	Recycling Facility			
Azcon Corporation	13733 S Avenue O	Chicago	Recycling Facility			
Barry's Metals	820 W Cermak Rd	Chicago	Recycling Facility			
Biltmore Metals	813 W Cermak Rd	Chicago	Recycling Facility			
Bionic Auto Parts	4655 W North Ave	Chicago	Recycling Facility			
Brickyard Metals Co.	6449 W Grand Ave	Chicago	Recycling Facility			
Bridgeport Metals Racine Yard	3802 S Racine Ave	Chicago	Recycling Facility			
C & B Scrap Metal Inc.	3649 S Albany Ave	Chicago	Recycling Facility			
C&B Scrap Metal, Inc.	3104 S Homan Ave	Chicago	Recycling Facility			
Central Metal Recycling, Llc	5618 W Fillmore St	Chicago	Recycling Facility			
Cermak C&D Inc.	1001 W Cermak Rd	Chicago	Recycling Facility			
Chicago Industrial Catalytic	4427 W 45th St	Chicago	Recycling Facility			
Chicago Rail And Port	3250 E 106th St	Chicago	Recycling Facility			
Chicago Scrap Iron And Metal	4555 W Grand Ave	Chicago	Recycling Facility			



CHK Holdings LLC	3333 W Harrison St	Chicago	Recycling Facility
Christy Webber Class V	2900 W Ferdinand St	Chicago	Recycling Facility
Chuangyi Metals Corp.	3939 S Karlov Ave	Chicago	Recycling Facility
Continental Paper Grading Co.	1623 S Lumber St	Chicago	Recycling Facility
Cronimet Corporation	3219 E 106th St	Chicago	Recycling Facility
Cruz Recycling	240 N Harding Ave	Chicago	Recycling Facility
Darling Ingredients Inc.	3443 S Lawndale Ave	Chicago	Recycling Facility
Eco Green Recycling Inc.	1965 W Pershing Pl	Chicago	Recycling Facility
Edco Recycling Llc	8224 S Vincennes Ave	Chicago	Recycling Facility
El Paso Auto Parts, Inc.	3245 S Kostner Ave	Chicago	Recycling Facility
Elemento S.A. Inc.	3252 W 31st St	Chicago	Recycling Facility
Elg Metals, Inc	10301 S Muskegon Ave	Chicago	Recycling Facility
Emesco Marine Services	12100 S Stony Island Ave	Chicago	Recycling Facility
Englewood Auto Parts	620 W 59th St	Chicago	Recycling Facility
Ez Tree Recycling, Inc	7050 S Dorchester Ave	Chicago	Recycling Facility
Family Recycling Center, Inc.	1851 S Clinton St	Chicago	Recycling Facility
Frank's West Side	3001 S Kedzie Ave	Chicago	Recycling Facility
Freddy's Auto Recycling, Inc	4146 W Division St	Chicago	Recycling Facility
Gen Iron West	4600 W Division St	Chicago	Recycling Facility
GII, LLC - Clifton #1	1909 N Clifton Ave	Chicago	Recycling Facility
GII, LLC - Kingsbury	1800 N Kingsbury St	Chicago	Recycling Facility
GII, LLC - North Ave	1066 W North Ave	Chicago	Recycling Facility
GII, LLC - Yard 2	1909 N Clifton Ave	Chicago	Recycling Facility
GII, LLLC - Magnolia	1441 N Magnolia Ave	Chicago	Recycling Facility
Green Electronics Solution	3950 S Karlov Ave	Chicago	Recycling Facility
Green Metal Distribution, Inc	4325 S Halsted St	Chicago	Recycling Facility
Greenway Resource Recovery	2100 S Kilbourn Ave	Chicago	Recycling Facility
Gus Recycling Services	1334 N Kostner Ave	Chicago	Recycling Facility
Haborview - Or Composting LLC	2000 E 122nd St	Chicago	Recycling Facility
HHW Recycling Facility	1150 N North Branch St	Chicago	Recycling Facility
Huron Paper Stock	2545 W Fulton St	Chicago	Recycling Facility
Industrial Metal Enterprises	901 N Kilpatrick Ave	Chicago	Recycling Facility
J & S Metals, Inc	4700 W Belmont Ave	Chicago	Recycling Facility
J R Metals, LLC	4157 W Kinzie St	Chicago	Recycling Facility
Jay Ben Scrap	2910 W Carroll Ave	Chicago	Recycling Facility
Jayben Scrap Metal	6301 S Bell Ave	Chicago	Recycling Facility
JJ Metal Recycling	1111 W 47th Pl	Chicago	Recycling Facility
Larcker's Recycling Services	4400 W 45th St	Chicago	Recycling Facility
Loop Paper Recycling	2401 S Laflin St	Chicago	Recycling Facility
Mahzel Metals, Inc	325 N Elizabeth St	Chicago	Recycling Facility



Marcell's Paper and Metal Inc.	4221 W Ferdinand St	Chicago	Recycling Facility
Maryland Pig of Illinois	12901 S Stony Island Ave	Chicago	Recycling Facility
Mccoy Auto Parts	2301 S Pulaski Rd	Chicago	Recycling Facility
Metal Management - Artesian	350 N Artesian Ave	Chicago	Recycling Facility
Metal Management Midwest, Inc	2500 S Paulina St	Chicago	Recycling Facility
Metal Management Midwest, Inc	9331 S Ewing Ave	Chicago	Recycling Facility
Metal Recycles Here LLC	3711 S California Ave	Chicago	Recycling Facility
Mid-America Paper Recycling Co	3865 W 41st St	Chicago	Recycling Facility
Midway Recycling	5787 S Archer Ave	Chicago	Recycling Facility
Napuck Salvage Of Waupaca	11600 S Burley Ave	Chicago	Recycling Facility
Napuck Salvage of Waupeca, LLC	11610 S Avenue O	Chicago	Recycling Facility
Newtech 3159	3159 W 36th Pl	Chicago	Recycling Facility
Nickleson Industrial Services	8501 S Baltimore Ave	Chicago	Recycling Facility
Northwest 1 Trucking and Metal	3200 S Kedzie Ave	Chicago	Recycling Facility
Northwest 1 Trucking, Inc	2749 S Whipple St	Chicago	Recycling Facility
On State Recycling	5807 S State St	Chicago	Recycling Facility
Optimus Recycling	11363 S Corliss Ave	Chicago	Recycling Facility
Pilsen Recycling, Inc	2513 S Artesian Ave	Chicago	Recycling Facility
RDI Inc.	3333 W 36th St		Recycling Facility
RDI Inc.	4101 W 42nd Pl	Chicago	Recycling Facility
Recycling Services, Inc	3301 W 48th Pl	Chicago	Recycling Facility
Regency Technologies	11600 S Burley Ave	Chicago	Recycling Facility
Reliable Asphalt Grand Avenue	4613 W Grand Ave	Chicago	Recycling Facility
Reserve Marine Terminals	11600 S Burley Ave	Chicago	Recycling Facility
Resource Center - Npv	5801 N Pulaski Rd	Chicago	Recycling Facility
Riverfront Recycling Center	nt Recycling Center 222 E 135th Pl		Recycling Facility
Robbins Auto Salvage	bbins Auto Salvage 5845 S Seeley Ave		Recycling Facility
S & G Auto Parts	7500 S Ashland Ave		Recycling Facility
Safran Metals	1679 N Elston Ave	Chicago	Recycling Facility
San Pancho Auto Parts	10333 S Commercial Ave	Chicago	Recycling Facility
Sarabia Auto Parts	7423 S Loomis Blvd	Chicago	Recycling Facility
Seaton Trucking	6229 S Hoyne Ave	Chicago	Recycling Facility
Serlin Iron & Metal Co	1800 N Kilbourn Ave	Chicago	Recycling Facility
Service Battery, Inc.	2048 W Hubbard St	Chicago	Recycling Facility
Sim's Rail Yard Facility	3200 E 96th St	Chicago	Recycling Facility
South Chicago Iron And	1313 W 74th St	Chicago	Recycling Facility
Metal		Ŭ	



South Lawndale Metals, Inc.	3344 S Lawndale Ave	Chicago	Recycling Facility
South Shore Recycling, Inc	11600 S Burley Ave	Chicago	Recycling Facility
Standard Auto Parts	3018 E 95th St	Chicago	Recycling Facility
Stockyards Materials	4031 S Ashland Ave	Chicago	Recycling Facility
Strategic Materials, Inc	10330 S Woodlawn Ave	Chicago	Recycling Facility
T&Z Metals, Inc.	4009 W Parker Ave	Chicago	Recycling Facility
The Plant	1400 W 46th St	Chicago	Recycling Facility
Torrence Auto Wreckers	9601 S Torrence Ave	Chicago	Recycling Facility
Tower Alloys, Inc.	330 N California Ave	Chicago	Recycling Facility
Tri-State Metal	1745 W Fulton St	Chicago	Recycling Facility
Universal Scrap Metals, Inc	321 N Artesian Ave	Chicago	Recycling Facility
Universal Scrap Metals, Inc.	2500 W Fulton St	Chicago	Recycling Facility
U-Pic-A-Part	3250 S St Louis Ave	Chicago	Recycling Facility
U-Pull It, Inc	4555 W North Ave	Chicago	Recycling Facility
USA Recycling Prof. Inc.	7601 S Kedzie Ave	Chicago	Recycling Facility
Windy City Metal	4617 W Division St	Chicago	Recycling Facility
64th & State	6330 S. State St.	Chicago	Transfer Station
Heartland Recycling	6201 W Canal Bank Rd	Forest View	Transfer Station
Hooker Street Transfer	1500 W. Division	Chicago	Transfer Station
Laramie	3815 S. Laramie	Stickney	Transfer Station
Northwest Sorting Center	700 N. Kilbourn Ave.	Chicago	Transfer Station
Planet Recovery	1859 W. Carroll St.	Chicago	Transfer Station
Shred-All	1234 W. 43rd St.	Chicago	Transfer Station
Tri State	13903 S Ashland	Riverdal e	Transfer Station
1300 W Exchange LLC	1300 W Exchange Ave	Chicago	Waste Handling Facility
34th St. MRRF	3757 W 34th St, Chicago, Il	Chicago	Waste Handling Facility
64th Street Transfer Station	16 W 64th St	Chicago	Waste Handling Facility
CID Transfer Station	13707 S Jeffery Ave	Chicago	Waste Handling Facility
Clean Harbors - 42nd St	1445 W 42nd St	Chicago	Waste Handling Facility
Department of Water Management	3901 S Ashland Ave	Chicago	Waste Handling Facility
Groot/6747 N Elmhurst		Chicago	Waste Handling Facility
Land and Lakes Transfer St	1258 E 138th St	Chicago	Waste Handling Facility
Lindahl Brothers, Inc.	3301 S California Ave	Chicago	Waste Handling Facility
Liquid Environmental Solutions	12123 S Stony Island Ave	Chicago	Waste Handling Facility
Loop Transfer - Laflin	2401 S Laflin St	Chicago	Waste Handling Facility
Medill MRRF	1633 W Medill Ave, Chicago, Il	Chicago	Waste Handling Facility
Northwest MRRF	750 N Kilbourn Ave	Chicago	Waste Handling Facility
Ozinga - Lumber Street	2255 S Lumber St	Chicago	Waste Handling Facility
Planet Recovery Transfer Sta	1800 W Carroll Ave	Chicago	Waste Handling Facility

Ravenswood Disposal	200 N Talman Ave	Chicago	Waste Handling Facility	
Services				
Reliable - Grand Ave	4613 W Grand Ave	Chicago	Waste Handling Facility	
Reliable - Laflin	2501 S Laflin St	Chicago	Waste Handling Facility	
Reliable Asphalt/Materials	3741 S Pulaski Rd	Chicago	Waste Handling Facility	
S. Kedzie Rec & Transfer Fac	4837 S Kedzie Ave	Chicago	Waste Handling Facility	
Shred-All Recycling Facility	1231 W 42nd St	Chicago	Waste Handling Facility	
Stockyard Materials	4031 S Ashland Ave	Chicago	Waste Handling Facility	
Vulcan Materials Co - Rock	3900 S Racine Ave	Chicago	Waste Handling Facility	
Cru				
Waste Management Hooker	1500 N Hooker St	Chicago	Waste Handling Facility	
34th St. MRRF	3757 W 34th St	Chicago	Waste Handling Facility,	
		_	Transfer Station	
Calumet Transfer	2040 E 106th St	Chicago	Waste Handling Facility,	
			Transfer Station	
Lakeshore Recycling	3152 S California Ave	Chicago	Waste Handling Facility,	
Systems			Transfer Station	
Medill MRRF	1633 W Medill Ave	Chicago	Waste Handling Facility,	
			Transfer Station	



The following table contains information concerning food scraps pickup service providers operating within Chicago as compiled by the Illinois Food Scraps Coalition (IFSC).

FOOD SCRAPS PICKUP SERVICE PROVIDERS <sup>138</sup>				
Name	Service Area	Type of Service	Website	
Advanced Disposal	northern Cook County	Commercial pick up only	advanceddisposal.com	
Block Bins LLC	Chicago	Commercial and residential pick up	blockbins.com	
Collective Resource Compost	Chicago north of 155, North & Northwest Suburbs	Subscription for commercial and residential pickup - all food waste is taken to a commercial compost facility	<u>collectiveresource.us</u>	
Flood Brothers	Chicago and northern Illinois	Commercial pickup	floodbrothersdisposal.com	
Healthy Soil Compost LLC	Belmont to 63rd and Western to the Lake	Commercial and residential pickup, bicycle pickup – all food waste	healthysoilcompost.com	
Lakeshore Recycling Systems	Chicago and near north suburbs	Commercial pickup	Irsrecycles.com	
Midwest Material Management Compost	Chicago and suburbs	Commercial pickup only	mwcompanies.com	
Organix Recycling	All Illinois	Commercial pickup only	organixrecycling.com	
Republic Services	City of Chicago, east of Harlem Avenue	Commercial pickup only	republicservices.com	
Resource Center	Chicagoland – Western Spring at the west; Evanston at the north; Southern border of Chicago	Commercial and residential pickup	theresourcecenterchicago.org	
Roy Strom	Chicago, West Cook County, Western DuPage County	Commercial and residential pickup	roystrom.com	
The Ground Rules / Social Ecologies	City of Chicago – downtown, near north, near south and near west side	Commercial and residential pickup	socialecologies.net	
Urban Canopy	Service boundary is I- 290, I-294, Cicero, I- 55	Subscription for commercial and residential pickup - veggie scraps, egg shells, coffee grounds, spoiled fruit and other compostables	theurbancanopy.org/compost- club	





Waste Management	Chicago and the surrounding suburbs	Commercial and residential pickup	wm.com
WasteNot Compost	Chicago only – downtown, west, and north neighborhoods	Subscription for commercial and residential pickup – all food waste	wastenotcompost.com



The following table contains information on organizations who accept construction and demolition materials for reuse as compiled by the Illinois EPA.

BUILDINGS MATERIALS REUSE ORGANIZATIONS <sup>139</sup>					
Name	Address	City	Postal Code	Telephone	Website
Vulcan Materials	3910 S	Chicago	60609	773-890-	
	Racine			2360	
Lakeshore	3152 S	Chicago	60608	773-579-	
Recycling Systems	California			0100	
	Ave				
GreenWay	2100 S	Chicago	60623	773-522-	
Resource Recovery	Kilbourn Ave			0025	
Salvage One	1840 W	Chicago	60622	312-733-	http://www.salvageone.com
-	Hubbard St	_		0098	
ReBuilding	1740 W	Chicago	60614	773-252-	http://www.rebuildingexchange.com
Exchange	Webster Ave			2234	



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# Chicago Waste Generation and Characterization Update 2010-2020

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Project Lead: Ning Ai, Ph.D.

Associate Professor, Dept. of Urban Planning and Policy Research Associate Professor, Inst. for Environmental Science and Policy

Team Members:

Junjun Zheng PhD Candidate Urban Planning and Policy Matt Rundquist Master of Urban Planning and Policy Candidate Taylor Gendel Master of Urban Planning and Policy Candidate


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### **AUTHOR CONTRIBUTIONS**

Project planning, study design, and report preparation: Ai; data processing, modeling, and charts: Zheng; data analysis and interpretation: Ai and Zheng; review of peer region solid waste plans, literature on construction and demolition waste, e-waste, and textile wastes: Gendel and Ai; literature review on organic waste, glass, and plastics: Rundquist and Ai; bibliography management: Zheng.

### DISCLAIMER

This report reflects the most accurate information at the best of authors' knowledge. This does not represent the opinions or statements from the City of Chicago, Delta Institute, or the University of Illinois at Chicago. When there is information discrepancy across data references, the information directly released from the City of Chicago or original citations should be used.

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# **EXECUTIVE SUMMARY**

In partnership with the Delta Institute for a 2020 Chicago Waste Strategy Study, the team at the University of Illinois at Chicago (UIC) was tasked with developing a profile about Chicago waste generation and characterization. Because a full-scale waste audit was not feasible in 2020, the UIC team was directed to provide estimates for 2020 based on Chicago historical data, along with regional and national datasets. Material-specific trends, innovations, and consumer expenditures were to be identified and summarized as well.

During the five-week project period (1/25/2021-2/26/2021), the UIC team performed qualitative and quantitative analyses of national, regional, and City reported data, academic research, industry surveys and reports, and well-regarded industry magazines as well as major news outlets. Table ES-1 summarizes the key findings and recommendations. Here are a few highlights:

- In 2020, the City of Chicago generated an estimated amount of 4.13 million tons of waste from residences, institutional/ commercial/industrial (ICI) sectors; and building construction and demolition (C&D) activities. Overall, there is an increase in waste generation in the last decade. Yearly fluctuations of waste generation volume seem to respond to economic conditions.
- In normalized measures (per capita or per household), Chicagoans generate more waste at home than residents in peer cities or regions (e.g., New York City and California). There are potentials for source reduction from Chicago residences.
- After the Chicago Blue/Black Cart Program expanded from limited coverage to citywide implementation, commodity volume collected per household for recycling decreased, which suggests the increases in recycling participation did not keep up with the City's recycling program expansion. The decreasing trend of recycling performance turned around in 2018, when the City launched community campaigns to boost residents' participation in recycling and to reduce contamination. Reported data demonstrate that community education programs matter.
- Pandemic conditions have changed not only the waste quantity but also composition and location. While the locations of waste generation have shifted towards residences, residents' lack of recycling information and options (e.g., food waste, masks, and packaging from online shopping) may have contributed to the increases in residential waste generation volume in 2020.

- Multi-family residential units in Chicago increased steadily in the last decade. Given many documented challenges of MF residential recycling nationwide (e.g., NYC Bureau of Waste Prevention, Reuse and Recycling, 2001), additional resources and educational programs may be needed to advance residential recycling goals in Chicago.
- About 522,510 tons of organic waste are estimated to be generated in Chicago every year, including 245,260 tons from single-family (SF) residential, 81,250 tons from MF residential, and 196,000 tons from ICI sectors. Implementing source separation of 75% of organic waste from SF homes would boost landfill diversion rate by 18.6%.
- Light-weighting material trends (e.g., glass and electronic products) discourage recycling when using the traditional approach of measuring material and waste management by weight (tonnage) only. Additional studies are needed to assess the impacts of light-weighting trends.
- The availability and quality of waste stream data vary by generation activity (sector) and by service provider, which presents great barriers to understand the overall waste stream in Chicago. For both planning and community education purposes, consistency, clarity, and transparency, as well as enforcement of waste data reporting are important.

Importantly, data interpretation of numerical results should note the context and limitations. The tonnage is not and should not be regarded as the single metric to measure waste performance or impacts, for multiple reasons (e.g., material light-weighting trend and varying life cycle impacts across material classes). For cross-region or time-series analysis, it is inappropriate to compare the waste volume estimates in this study to the national average or other regions' data in which municipal solid waste (MSW) is defined or measured differently. For example, the United States Environmental Protection Agency, the US EPA, excludes C&D waste from the national MSW estimates. In contrast, the 2010 Chicago Waste Characterization Study and 2010 Chicago Diversion Study present a broader scope of C&D waste estimates than this study. Due to data constraints, the C&D volume estimates in this study include building C&D waste only; other C&D waste (e.g., from road and bridge construction and maintenance activities) are excluded. In addition, pandemic years, such as 2020, can be outliers and may not be suitable as a benchmark for decennial planning.

Key Findings	Recommendations
In 2020, the City of Chicago generated an estimated amount of 4.13 million tons of waste from residences, institutional/ commercial/industrial (ICI) sectors; and building construction and demolition (C&D) activities. Overall, there is an increase in waste generation in the last decade. Yearly fluctuations of waste generation volume seem to respond to economic conditions.	<ul> <li>Caution should be given when interpreting data under pandemic conditions or using 2020 data as a benchmark for decennial planning.</li> <li>Tonnage is not and should not be used as the single metric to measure material and waste management program performance.</li> </ul>
The availability and quality of waste stream data vary by generation activity (sector) and by service provider.	Consistency and enforcement of data reporting is needed.
Higher volume of refuse and commodities were collected by the Chicago from single-family (SF) residential homes in 2020, compared to 2019 and predicated value in 2020 from time-series modeling.	• While the locations of waste generation have shifted towards residences during pandemic conditions, education programs for City residents can be particularly important.
Multi-family (MF) residential units in Chicago steadily increased between 2010 and 2020, so did residential waste.	• Given many documented challenges of MF residential recycling nationwide (e.g., NYC Bureau of Waste Prevention, Reuse and Recycling, 2001), additional resources and educational programs may be needed to advance residential recycling goals in Chicago.
On average, each Chicago resident generates a little over 3 pounds (lbs) of waste per day at home, or a little under 3,000 lbs of waste per year for each Chicago household. Compared to other peer cities and regions (e.g., NYC and California), residential waste generation rates in Chicago are higher (NYC Department of Sanitation, 2018; CalRecycle, 2021).	There are potentials for source reduction from Chicago residences.
After the Chicago Blue/Black Cart Program expanded from limited coverage to city-wide implementation, commodity volume collected per household for recycling decreased, which suggests the increases in recycling participation did not keep up with the City's recycling program expansion. The decreasing trend of recycling performance turned around in 2018, when the City launched community campaigns to boost residents' participation in recycling and to reduce contamination.	• Community education programs matter.

### Table ES-1: Key Findings and Recommendations (1 of 3)

Key Findings	Recommendations
Blue Cart program performance varies across the six service regions in the City.	• Additional data and further analysis (e.g., demographics, public vs. private operations, market development, macroeconomic conditions) are needed to explore cost-effective and region-specific strategies to improve recycling performance.
About 522,510 tons of organic waste are estimated to be generated in Chicago every year, including 245,260 tons from SF residential, 81,250 tons from MF residential, and 196,000 tons from ICI sectors. Implementing source separation of 75% of organic waste from SF homes would boost landfill diversion rate by 18.6%.	<ul> <li>Implementing organic waste diversion programs has great potential to increase the diversion rates in Chicago.</li> </ul>
Total employment in Chicago increased 2010-2018; employment in the Restaurant and Food industry had the fastest growth, by 28.29%. Consumer expenditure on Food away from Home increased 18.24%. Reported increases in food waste generation in the Illinois outpaced diversion efforts (CDM Smith, 2015).	<ul> <li>Increasing food waste volume and possible changes of generation location requires further analysis and proactive planning for food scrap as a target stream in Chicago.</li> </ul>
Among different material classes generated from ICI sectors, Glass increased the largest, by 22.44% (from 37,389 tons to 45,779 tons).	• Increases in glass waste (despite the light-weight trend) in Chicago, the heavy weight of glass, and possible contamination of broken glass for profitable commodity items in the single-stream recycling suggests that glass waste should be another target for waste diversion program in Chicago.
The composition of C&D waste in the City changed over time. Between 2010 and 2015, the shares of C&D refuse and steel out of the total C&D waste decreased; the shares of asphalt, concrete, and wood increased. Information after 2015 is not available or consistent for a comparison.	• Enforcement is needed for waste data reporting. Consistency and clarity in the reporting forms are important.
Building C&D waste generation in Chicago is estimated to be at 1.31-1.42 million tons annually. Additional information is needed for a reliable estimate for C&D waste from other activities (e.g., road and bridge construction and maintenance).	<ul> <li>Besides building C&amp;D waste, more specifics are needed for other types of C&amp;D waste in the Chicago city ordinance.</li> </ul>

### Table ES-1: Key Findings and Recommendations (2 of 3)

Key Findings		Recommendations
Fast fashion and synthetic fabrics have presented challenges for textile waste management. Uses and discards of masks have significantly increased during pandemic conditions. Statewide, Illinois (CDM Smith, 2015) saw increases in textile recovery/diversion rate increased from 2.0% in 2008 to 19.0% in 2014. Clothes and lines are not accepted by the Chicago Blue Cart program.	•	New programs for textile reuse and diversion may be needed to address the lagging performance of textile waste management.
The amount of MSW generated per dollar spent is decreasing (US EPA, 2020). Light- weighting trends of electronic products discourage manufacturers from recycling, given that the Illinois legislation is based on the weight of electronics sold (Ruppenthal, 2017). Light-weighting of bottles has offset an increase in bottle uses (Association of Plastics Recyclers, 2019; Rue, 2018).	•	Light-weighting material trends present an important confounding factor for the traditional approach of measuring material and waste management by weight (tonnage) only. Additional studies are needed to assess the impacts of light- weighting trends.
Nationwide, some materials showed opposite trends of recycled volume and recycling rates. For example, the recycled volume of metal and textile increased but the recycling rates dropped in the last decade (US EPA, 2020).	•	Multiple metrics (instead of one single metric of waste tonnage or recycling rate) should be analyzed. Environmental life cycle impacts and socioeconomic impacts should be also considered on a case-by- case basis.
Pandemic conditions changed not only the waste volume but also composition and location. Documented increases in waste from home renovation projects and packaging materials from takeout food and online shopping, but lack of recycling knowledge from residents (Cruden, 2020; Porter and Holder, 2020).	•	Additional efforts and resources are needed to support residential recycling during pandemic conditions.

### Table ES-1: Key Findings and Recommendations (Continued, 3 of 3)

Note: All waste volumes are in US short tons.

## **1. Introduction**

In partnership with the Delta Institute for a 2020 Chicago Waste Strategy Study, the team at the University of Illinois at Chicago (UIC) was tasked with developing a profile about Chicago waste generation and characterization. The UIC team had four specific tasks during the five-week project period (1/25/2021-2/26/2021):

- Task 1: Estimate annual overall waste generation in 2020
- Task 2: Identify increasing or decreasing trends by material type
- Task 3: Summarize material or diversion innovations in the past decade that significantly impact the material disposal
- Task 4: Summarize consumer expenditure data that delineate impacts on waste generation

Because a full-scale waste audit was not feasible in 2020, the UIC team was directed to provide estimates for 2020 based on Chicago historical data, along with regional and national datasets. The following sections report on our methodology, raw data used, estimation results, and key findings from both quantitative and qualitive analyses.

While it can be appealing to compare the estimation results in 2020 in this report to past or future years, it is important to note that the tonnage is not and should not be regarded as the single metric to measure waste performance or impacts, for multiple reasons (e.g., material light-weighting trend and varying life cycle impacts across material classes and uses). Notably, COVID-19 pandemic conditions in 2020 may also have changed the waste stream, as well as waste management services, from fairly stable and predictable patterns in the past decade. Findings from our data analysis generally confirm the changes reported by waste professionals in anecdotal cases (e.g., more waste is generated from residential locations than an average year and more details in Section 4.2). However, the full magnitude of the impact of COVID-19 on material and waste management has yet to be explored.

It is also important to clarify that the total waste volume estimates in this study are mainly for the purpose of and tasks specified in the 2020 Chicago Waste Strategy Study. For cross-region comparisons, results should be interpreted with caution and additional calculations may be needed. Definitions and classifications of municipal solid waste (MSW) can vary across jurisdictions and over time (Ai and Leigh, 2017). Although this project has attempted to analyze and report data in a consistent way as in historical reports, adjustments had to be made, in particular, regarding the construction and demolition (C&D) waste. Because the nature of C&D waste (heavy and bulky), waste characterization and generation volumes can be significantly affected by the C&D content.

Prioritizing the waste streams that have been documented by verifiable data, the numerical analysis in this study only included C&D waste from buildings; C&D waste generated from other activities (e.g., road construction or maintenance) are excluded. Therefore, it is inappropriate to compare the total waste volume estimates in this study to the national average or other regions' data in which MSW is defined in a different way (e.g., the United States Environmental Protection Agency, the US EPA, excludes C&D waste from the national MSW estimates).

Alternatively, for policy and planning purposes, single sector- or activity-based volume estimates involve less uncertainties and thus tend to be more robust than the total aggregated waste volume. For example, the quantity of organic waste from the residential sector provides policy insights to strategic planning. As discussed previously, pandemic years can be outliers and may not be suitable as a benchmark for decennial planning.

### 2. Overall Project Design

Under data constraints, the scope and design of this project are developed to address the four tasks specified by the Chicago Waste Strategy Study led by the Delta Institute. The methodology of numerical analysis was developed with the intention of replicability, i.e., focus is given to input datasets that are commonly available overtime. This will allow the City of Chicago and other communities to evaluate and report material and waste data using a consistent methodology year over year.

For Task 1, waste volumes need to be estimated because waste generation statistics are not commonly available at local or regional levels in the U.S. and waste characterization studies are not regularly conducted due to intensive requirements for labor and resources (Ai and Leigh, 2017). The Chicago 2010 Waste Diversion Study (CDM, 2010a) provides a discussion about the complexity of waste stream data in the case of the City of Chicago. Chicago waste is managed both by the City and private haulers, not all of which have been reporting waste quantities or flows to the City. While underreporting suggests a lower estimate of total waste volume, there are other factors that possibly contribute to double counting. For example, waste processed by Chicago area haulers does not necessarily originate within the City limits. Hauler reports may also include recycled materials that are backhauled to other locations. Eventually, not all materials collected for recycling are recycled. Therefore, the total tonnage as reported by all waste collection service providers does not represent the overall waste generation.

This study analyzes the data reported by the Chicago Blue Cart Program (managed by the City) and private haulers, and further, develops estimates using time series analysis to fill in data gaps and to make necessary adjustments. The total waste volume is the sum of refuse (destined for disposal) and commodity (collected for recycling) from all MSW generators in the City. Data in the 2010 Chicago Diversion Study (CDM, 2010a) and 2010 Chicago Waste Characterization Study (CDM, 2010b) were adopted as the baseline for this 2020 study update. As such, this project has adopted the definitions, material, and sector classification systems in the Chicago 2010 reports (provided in Appendix) to the extent possible. Various methods for volume estimates are tested for each sector in this study, and modeling results are validated using local data whenever possible. Given varying availability and quality of data by sector, there are various levels of confidence in data estimates by sector.

Task 2 requires the information about the composition of the Chicago waste stream. While the US EPA has adopted a commodity-based approach for waste composition estimates of a national average, economic data at the local level are inadequate to support this approach. Thus, periodical waste auditing is often the resort. The last waste characterization study in Chicago was prepared by CDM in 2010. A total of 535 waste samples were hand-sorted, or visually inspected by volume, and characterized into ten material classes at 14 solid waste facilities (CDM, 2010a). The sampling plan was intended to represent waste generated from various sectors (i.e., residential, institutional, commercial, industrial, and construction and demolition waste) and various ward characteristics (i.e., average household income and curbside recycling availability). Besides the 2010 Chicago waste studies, the City has collected limited data that characterize the waste stream by material class. However, the categorization methods have been inconsistent over time and thus would not allow for a trend analysis. Numerical estimates of material-specific volumes are limited to ICI sectors, when waste volumes are linked to employment size by sector. For a qualitative analysis for Task 2, this study refers to federal and state reports, academic research, industry surveys and reports, and well-regarded industry magazines as well as major news outlets.

For Task 3, two different types of innovations and changes are reviewed in this report: (1) product innovation (e.g., light weighting of materials); and (2) programs and policies (e.g., plastics bag fees, Blue Cart program expansions, and landfill bans). In other words, innovations/changes can be technological or institutional. Given the large scope of the topic, our summary report only focuses on innovations that have "documented" impacts on the diversion performance in the past decade. The goal is to identify the most influential factors that affect specific types of materials (e.g., C&D, organics, and plastics), instead of an exhaustive list for all types of programs nationwide. It is important to note that not all the "innovations" or "changes" are progressive for various reasons (e.g., budget constraints, administration

transition/changes, and pandemic conditions). The review aims to focus on notable innovations/changes that have occurred, may have affected, or can be possibly applicable in the Chicago region. Thus, nationwide and Illinois state practices are also reviewed and discussed.

Task 4 is conducted in a parallel process to Task 2 and aims to boost the literature review in Task 2 by a quantitative analysis of consumer expenditures and patterns over time. In a coordinated approach, Tasks 2-4 aim to make some important clarifications about changes that cannot be quantified but appear to be confounding factors when interpreting the results solely in the unit of material weight (tons).

Given the connectiveness of various task elements, our results and findings from the four tasks are re-grouped in the two sections as follows: Section 3 focuses on sector-based waste volume estimates in numerical terms; Section 4 focuses on material-specific analysis, both qualitative and quantitatively.

## 3. Chicago Waste Volume Estimates

As explained earlier, this project aims to follow a consistent system of sector and material definitions as the Chicago 2010 studies (CDM, 2010a and 2010b), which includes three general categories, definitions in Appendix:

- Residential waste, which is further categorized into single-family (SF) and multi-family (MF) residential;
- Institutional/commercial/industrial (ICI) waste;
- Construction and demolition (C&D) waste;

Besides SF and MF residential, ICI, and C&D waste volumes, this study also develops estimates for yard waste and overall organic waste, which possibly have been on a rising trend given several identified factors (e.g., rapid growth in restaurant and food industry employment and increases in consumer expenditure on food away from home, more details in Section 4).

To avoid double counting, the total waste volumes are calculated based on the generators (i.e., sectors) instead of materials (i.e., yard waste volume is calculated as part of the SF residential waste volume and thus is not added as a separate category). The following sub-sections report on varying levels of reported data availability and quality, volume estimation methodology and results, starting with a grand total. All the tonnage values are in US short tons in this report.

### 3.1 Total waste volume

In the 2010 Chicago waste studies (CDM, 2010a and 2010b), total waste generation includes residential waste (from both SF and MF homes), ICI waste, and

C&D waste. All the results in the 2010 studies are estimated for the year 2007, when Chicago is estimated to have generated a total of 7.67 million tons of waste, including 1,103,025 tons (14.4%) of City collected SF residential waste, 576,529 (7.5%) of privately collected MF residential waste, 1,332,507 tons (17.4%) from privately collected ICI, and 4,656,037 tons (67%) from C&D (CMD, 2010b).

For this 2020 Chicago waste generation study, total waste generation includes the same categories as of 2010, but the scope is different for the C&D waste. Only C&D waste from buildings are estimated in the 2020 study; other types of C&D waste (e.g., roads and bridges) are excluded due to data constraints and anticipated risks of compromising the confidence level of total waste generation estimates given the heavy material weight of C&D waste. Section 3.5 in this report provides more details about the scope used in this study and rationale.

Figure 1 below shows the annual waste estimates between 2010 and 2020. Overall, there is an increase in waste generation in the last decade. Yearly fluctuations of waste generation volume seem to respond to economic conditions. The City of Chicago generated 4.13 million tons of waste in 2020 (estimated in this study), compared to 4.02 million tons in 2010 (backcasted in this study using the consistent method for 2020 estimates). Caution should be given when interpreting waste volume in 2020, given COVID-19 pandemic conditions.



### Figure 1 Chicago Annual Waste Generation (2010-2020)

SF: Single family homes (typically with four or fewer units) where waste is collected by the City Department of Streets and Sanitation (DSS). MF: Multi-family homes where waste is collected by private haulers. ICI: Institutional, Commercial, and Industrial. C&D: Construction and Demolition. Data are compiled from various reports from the City of Chicago to the extent possible; incomplete data in city reports are estimated by the UIC team.

Combing residential and ICI sectors, the total yard waste generation from Chicago is estimated at about 71,010 tons a year. Further, a previous study by Ai and Zheng (2019) estimated food waste generation in Chicago at 451,500 tons per year, including 203,130 tons from SF residential, 64,470 from MF residential, and 183,900 from ICI sectors. Combining the estimated volume of yard waste and food waste, it is estimated that about 522,510 tons of organic waste are generated every year, including 245,260 tons from SF residential, 81,250 tons from MF residential, and 196,000 tons from ICI sectors. In other words, implementing source separation of 75% of organic waste from SF homes would boost landfill diversion rate by 18.6%.

### 3.2 Residential Waste

Residential waste is collected by both the Chicago Department of Streets and Sanitation (DSS) and private haulers. The DSS services SF homes or apartments with four units or less; private haulers manage MF residential waste together with ICI waste. Therefore, residential waste streams are documented by the City separately and analyzed separately in this project. SF residential waste volume is recorded by the City; MF residential waste volume is estimated in this project.

Figure 2 presents the total of residential waste, i.e., managed by both the City and private haulers, between 2010 and 2020. In 2020, SF residents generated 989,924 tons of waste; MF residents generated 629,735 tons of waste (95% confidence interval, CI, ranging from 626,910 to 632,560 tons). As reported by the City, SF residents generated 9.89% in 2020 more waste than 2019 (at 900,862 tons). The increase may be partially a result of lockdown policy and remote working conditions during COVID-19.



Figure 2 Chicago Residential Waste Generation (2010-2020)

Note: SF volumes are reported by Chicago DSS. MF volumes are estimated by the UIC team, using an extrapolation method based on changes of MF units.

In normalized measures (Figure 3), residential waste generation (by population and household) has shown a decreasing trend in the last decade, except for 2020 (possibly due to the COVID-19). On average, each Chicago resident generates a little over 3 pounds (lbs) of waste per day at home, or under 3,000 lbs of waste per year for each Chicago household. For clarification, these normalized rates refer to residential waste (generated from SF and MF homes) only, which is only part of MSW. Compared to other peer cities and regions, residential waste generation rates in Chicago are higher than those in NYC and California (NYC Department of Sanitation, 2018; CalRecycle 2021). This suggests potential opportunities for source reduction from Chicago residents at home.



*Figure 3 Residential Waste Generation Rates per Household and per Person (2010-2020)* 

Note: SF waste data are reported by the City. MF waste data are estimated by the UIC team. Data of population and households in Chicago are from the US Census American Community Survey (ACS) 5-year estimates (2010-2019). The 2020 demographics are estimated by the UIC team.

### 3.2.1 DSS Collected Single Family Residential Waste

The Chicago DSS collects waste from homes that are typically with four or fewer units. Rolled out in 2007, the Chicago Blue Cart program collects refuse; the Black Carts collect commodity for recycling. The coverage of Blue/Black Cart services expanded moderately afterwards. In 2011, the City initiated managed competition of waste collection services that involved private sectors. In 2013, the City had a major expansion. Since October 2013, the Blue/Black Cart program have been covering the entire city. The City initially included yard waste in the Blue Cart program but reduced

the efforts in the following years. After 2015, yard waste has been collected only by work orders (i.e., upon SF resident request).

The total volumes of SF residential waste generation include refuse collection, commodity collected for recycling, and yard waste (collected by work orders). Monthly collection volume of the Blue/Black Cart services has been recorded by the City. This is the most and only complete set of waste records across waste generation sectors in Chicago. Section 3.2.1.1 summarizes the City recorded data and explores the possible impacts of COVID-19 on residential waste generation. Section 3.2.1.2 analyzes the Blue/Black Cart program performance since the program implementation, which also provides another opportunity to analyze waste volume in a normalized measure (i.e., per household). Section 3.2.1.3 has a target analysis of yard waste, which shows the largest variations in reported data over time.

### 3.2.1.1 DSS SF Refuse and Commodity Volume

While the City records monthly volume of refuse and commodity from DSS collected SF homes, this project also develops a time-series analysis that is anticipated to reveal possible impacts of COVID-19. The assumption is that the difference between Chicago reported data in 2020 and predicted volume of time series modeling can be partially resulted from the pandemic condition, if the predicted values from the time series in pre-COVID years match the historical data.

In Figures 4-5, both reported (solid line) and modeled (dashed line) volumes are plotted at a quarter interval after 2013, when the Blue/Black Cart program began to cover the entire city. The refuse volume from the time-series modeling fairly matched the recorded collection rates between 2013 and 2020 (with a R-square of 0.94). In 2020, the time-series model estimated the refuse collection volume of 829,844 tons (the total of four quarters), compared to the actual collection volume of 902,851 tons. The 8.80% difference between the estimated value and actual value of refuse volume likely reflects the impact of COVID-19.

In terms of commodity for recycling, the time-series results generally match the actual data, except for 2018 when service disruptions were reported (due to fire at a recycling facility). Similar to the case of refuse, the estimated tonnage for commodity (78,470 tons) was lower than reported volume (86,477 tons) in 2020, i.e., a 10.20% difference that is possibly associated with COVID-19.

### 3.2.1.2 DSS Service Levels vs. Waste Material Collection

For a better understanding of the DSS SF residential waste trends, the number of DSS served homes and SF residential material collection since the beginning of the City Blue/Black Cart operation in 2007 are analyzed. As shown in Figure 6, the level of

material collection seems to be generally consistent with the number of homes for which DSS has provided waste collection services. The volume of materials collected fluctuates considerably by season.



### Figure 4 DSS SF Residential Refuse Volume (2013-2020)

Refuse volume (solid line) recorded by the City; the predicted volume (dashed line) is resulted from the time series modeling in this project.

*Figure 5 DSS SF Residential: Volume of Commodity Collected for Recycling* (2013-2020)



Refuse volume (solid line) recorded by the City; the predicted volume (dashed line) is resulted from the time series modeling in this project.

## *Figure 6 Number of DSS Served Homes vs. Monthly Total SF Residential Material Collection (2007-2020)*



Note: Total material collection includes refuse, commodity, and yard waste from SF homes where the City has provided waste collection services. Data are provided by the City. Chart is produced by the UIC team.

The DSS SF residential trends were also measured in normalized measures (i.e., per capita and per households) (Figure 7). After the Blue Cart Program coverage significantly expanded in 2013 (shown in Figure 6), per household refuse collection volume has remained relatively stable (until 2020). Per household commodity volume collected for recycling decreased, which suggests the increases in commodity volume collected did not keep up with the increase in the City's recycling program expansion. The decreasing trend of recycling performance turned around in 2018, when the City launched community campaigns to boost residents' participation in recycling and to reduce contamination.

For refuse, the linear predictions show an average of 819,976 tons in 2020 (95% CI from 761,244 to 878,709 tons), which generally confirms the time-series modeling result in Figure 4 (829,844 tons). Regarding commodity collected for recycling, the linear model shows an average of 58,595 tons in 2020 (95% CI from 48,520 to 68,671 tons). This is lower than the time-series modeling result in Figure 5 (78,470 tons), possibly because the linear predictions cannot capture increased efforts of recycling services in recent years. In general, the time-series model seems to produce a more accurate prediction of waste volume than the per-household approach.

Further, Blue Cart Program performance is examined by waste service regions. As shown in Figure 8, there is a general trend of declining performance while some service regions show relatively consistent performance over time. Blue Cart program recycling rates varied across the six service regions in the City between 2014 and 2019. Many factors may affect the varying and lagging program performance, for example, possible differences in operation efficiency and effectiveness across DSS and multiple private vendors, neighborhood characteristics (demographics, recycling participation, and waste composition), staggering landfill tipping fees in the region, macroeconomic conditions, overseas waste import restrictions, as well as light-weighting material trends. Therefore, additional data and further analysis are needed to explore cost-effective and region-specific strategies to improve recycling performance.





Note: Refuse and commodity volume from single family homes are recorded by the City. Per household rates and chart are produced by the UIC team. Twelve-month moving averages are adopted to address the seasonal effects. Per household rates were calculated as the data input of the second method for the DSS SF residential waste analysis (compared to Figures 4-5).

### 3.2.1.3 Yard Waste Volume Estimates

While there are no separate bins designated for yard waste collection from single residential homes since 2015, the City has been responding to residential requests for pick up services. There have been large variations of reported volume year over year, and not all yard waste generated is collected.

For an estimate of the yard waste generation volume, various references and documents of yard waste generation in Chicago are collected and compared. Reported shares of yard waste out of the total materials collected seem to be relatively consistent across references (Figure 9). In Chicago, it seems that yard waste accounts for 4-6% from April to September and can be close to 10% in late fall. Based on the literature review (Figure 9), this project adopts the estimated values in Table 1 for yard waste generation from DSS SF residential homes.



*Figure 8 Blue Cart Program Performance by Chicago Waste Service Region (2014 – 2019)* 

Data provided by the City; Chart by the UIC team. Map from ChicagoRecycles.org.





Note: This figure shows the proportion of yard waste in the total materials collected on a monthly basis. Yard waste rates in Chicago as reported from various data sources are compared. Chart is produced by the UIC team.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.18%	1.18%	1.18%	4.69%	6.61%	5.06%	3.68%	4.32%	4.96%	7.42%	9.87%	0.60%

### Table 1 Estimated Shares Yard Waste among Total Material Collected in Chicago

Note: The values are estimated by the UIC team based on references in Figure 9 and are used as input parameters for yard waste estimates in Chicago (Figure 10).

Annually, an estimated volume of 39,956-44,306 tons of yard waste are generated from SF residences (with 4 units or under) in Chicago, but very little has been collected or managed separately from refuse. Monthly yard waste generation can be as low as 503-801 tons in winter months, compared to 3,912-6,662 tons in late spring/early summer, and 4,359-8,203 tons in late fall (Figure 10).

Figure 10 Estimated Yard Waste Generation from Single Family Residences in Chicago vs. Volume Collected by Work Orders



Note: Monthly yard waste generation volumes for single family homes are estimated by multiplying total material collection by the ratios presented in Table 1. Yard waste collection volume (per work order) is recorded by the City. Chart produced by the UIC team.

### 3.2.2 Multifamily Residential/Privately Collected Waste

Because private haulers do not differentiate MF residential waste from the ICI waste stream at the time of collection, this project develops annual estimates based on the number of MF housing units in Chicago.

The US Census American Community Survey provides the number of housing units annually in Chicago from 2010 to 2019. The project extrapolates the data to 2020 using time series modeling. As shown in Figure 11, MF housing units increased from 460,648 units in 2010 to 503,160 units (estimated) in 2020, or by 9.23%. Accordingly, the total waste generation from MF units is estimated to have increased between 2010 and 2020, when it reaches 629,735 tons. In contrast, SF housing (with 4 units or under) decreased from 734,220 units in 2010 to 701,219 (estimated) in 2020, or by 4.49%, in Chicago. After vacant rates are adjusted, occupied SF housing units have been relatively stable and close to the number of homes covered by the City Blue Cart Program (620,313 units).



### Figure 11 Trend of Housing Units in Chicago

Note: 2010-2019 data from the U.S. Census American Community Survey (Table DP-04); 2020 data estimated by the UIC team. Data are unadjusted for vacancy. Chart by the UIC team.

### 3.3 Institutional/Commercial/Industrial Waste

The MSW waste from ICI sectors is managed by private haulers. The completeness and details of material classes in the semi-annual reports vary. Due to irreconcilable inconsistencies in hauler reports and the confounding factors reported in the 2010 Chicago Waste Diversion Study, this study adopted a method that estimates waste volumes based on the employment size.

According to the ZIP Codes Business Pattern database, total employment in Chicago increased between 2007 and 2018, when the latest data are available. The ZIP Codes Business Pattern supports a city-level analysis, however, excludes government jobs (NAICS Sector 92: Public Administration & Government) and suppress some of the industry-specific employment data. To be consistent with the industry classification (five general groups, details in Appendix) in the 2010 Chicago Waste Characterization Study, this study develops methods to fill in the missing employment data by industry, to include jobs in the public sector, and further, to extrapolate data from 2018 to 2020. For consistency with the 2010 studies, employment in Agriculture, Mining, Utility, and Construction is also excluded in this study. After all these adjustments, it is estimated that the Chicago employment size increased from 1.24 million in 2010 to 1.47 million in 2020 (estimated, 95% CI for 1.41-1.55 million), or by 18.66% (Figure 12).

In particular, the Restaurant and Food industry and Professional/Service industry experienced the fastest growth between 2010 and 2020. Their employment grew by 28.29% and 20.54%, respectively. The manufacturing industry experienced significant job losses during the 2008 recession and remained stable afterwards (Figure 13).

Assuming constant rates of waste generation from each ICI sector between 2010 and 2020, ICI waste generation is estimated to have increased from 1,254,429 tons in 2010 to 1,456,708 in 2020 tons (95% CI 1,387,773 to 1,525,644 tons), or by 17.51%.

The ICI employment-based waste estimates also facilitate the material-specific analysis among different material groups. Results are shown in Figure 14. Between 2010 and 2020, it is estimated that Glass increased the most, by 22.44% (from 37,389 tons to 45,779 tons), followed by Organics (a 19.56% increase, from 318,834 to 381,199 tons).



Figure 12 Chicago Employment by Industry Groups (2007-2020)

Note: Data compiled from the ZIP Codes Business Pattern (2007-2018). 2019 and 2020 data are estimated by the UIC team by adopting a linear regression. \* Impacts of COVID-19 on jobs are not adjusted.



Figure 13 Chicago Employment Changes by Industry Groups (2007-2020)

Note: Index values are developed by the UIC team using data from the ZIP Codes Business Pattern (2007-2018). 2019 and 2020 data are estimated by the UIC team by adopting linear trends. \* Impacts of COVID-19 on jobs are not adjusted.



# *Figure 14 Estimated ICI Waste Generation Based on Industry Employment Changes (2010 vs. 2020)*

Note: 2010 data from CDM (2010); 2020 data estimated by the UIC team. Chart by the UIC team.

### 3.4 Construction and Demolition Waste

The C&D waste volume, regardless of generation location, is recorded as a separate category in private haulers' reports. Because not all haulers serving Chicago have provided reports, it is impossible to identify the total volume of C&D waste generation.

On the bright side, the C&D waste reports between 2010 and 2015 include specific material classification information (over 10 material types). Such information allows for an examination of C&D waste composition over time. As shown in Figure 15, the composition of C&D waste in the City has been changing over time. Between 2010 and 2015, the shares of C&D refuse and steel out of the total C&D waste decreased; the shares of asphalt, concrete, and wood increased.

C&D waste records after 2015, however, presented significant inconsistencies, which would not enable time series analysis in a reliable way or a replication of the 2010 Chicago studies. Therefore, this project develops two estimation methods. The first one refers to the parameters of material intensity and jobs at the national level in the US EPA (2018) study, which reports C&D waste from three activities: Buildings, Road and Bridges, and Other. This study matches the employment (by NAICS codes) related to these three categories and calculates the C&D tonnage per employment. While the building C&D tonnage per employment is relatively consistent, Road and Bridge and Other construction parameters yield very wide variations. For a reliable estimate of C&D volume estimate, this study only focuses on the C&D waste from buildings by multiplying the C&D tonnage per employment by the number of building construction jobs in Chicago.

The other method builds upon the study by Weber, Kaplan, and Sokol (2009) that estimates the C&D waste volume based on the number of residential building permits (new construction, renovation, and demolition), and then estimates the non-residential building C&D waste based on the share of construction jobs for residential versus non-residential sectors. Building permit data are provided by the City of Chicago Data portal. As construction activities decreased (2007-2009), so did C&D waste generation. As noted by the Delta Institute (2019), construction activities recovered around 2012-2014. After the recovery period, C&D waste generation has remained at 1.31-1.42 million tons each year. As shown in Figure 16, results from two estimation methods are generally consistent. The biggest difference occurred in 2020, when the total number of permits decreased by 19.4% compared to 2019.



Figure 15 C&D Waste Composition (2010-2015)

Note: Data are provided by the Delta Institute and the City. Data aggregation and chart by the UIC team.





Note: This chart compares the estimation results in Figure 17 (based on building permits) to another method (based on the EPA 2018 study below and adjusted by employment). Modeling and chart by the UIC team.

## 4. Material-Specific Trend Analysis

Under data constraints, the numerical analysis in Section 3 reveals a limited amount of material-specific information. This section supplements the above volume analysis in two ways. Section 4.1 summarizes findings from the trending patterns of consumer expenditure; Section 4.2 reports on the literature review of policy and technology innovations and changes since 2010, as well as statistics reported at the national and regional levels.

By no means an exhaustive list, this review aims to reveal those evolutions in waste management system operation, technology, business models, relevant laws and policies between 2010 and 2020 that cannot be analyzed numerically of waste volumes due to data constraints. Special attention has been paid to possible factors or material trends that may not be fully captured by the single metric of total waste tonnage; for example, changes in consumer commodity purchase and waste disposal locations (grocery vs. restaurants), consumer purchase behaviors (online vs. retail), packaging materials (light weight and material substitution), and material recovery facilities that accept comingled or single-stream waste materials.

### 4.1 Changes in Consumer Expenditure

It is assumed that the changes in the MSW generation volume generally correlated with household expenditure on goods and services (US EPA, 2020). The US Bureau of Labor Statistics Consumer Expenditure Survey provides annual consumer expenditure data up to 2018. The Chicago metropolitan statistical areas (MSA) is the most granular geographic scale in the Survey. The project further adjusted the annual consumer expenditures to the 2010 US dollar using Consumer Price Index (CPI).

Analysis of the consumer expenditures (Table 2) reveals considerable increases in Chicagoan's expenditure on Alcoholic beverages, Food away from home, and Household furnishings may have contributed to increases in waste generation of glass (or other types of beverage containers), food scrap, and C&D waste/Household Hazardous Waste/White Goods, respectively. Meanwhile, decreases in consumer expenditure on Apparel and ensuing textile waste generation may have been cancelled off by the fast fashion trends.

### 4.2 Review of documented changes in material and waste management

A cross-sector literature review is conducted for each material class: C&D, organics, paper/cardboard, plastics/beverage containers, textiles, metal, glass, household hazardous waste (HHW), and white goods, as well as MSW in general. Tables 3-11 below summarizes both quantitative and qualitive information in terms of

(1) documented changes to waste generation rate or volume; (2) documented changes to landfill diversion rate or volume; (3) technology and product innovations impacting waste generation or recycling; and (4) policies implemented impacting Chicago since 2010. Pandemic related trends are differentiated from non-pandemic related trends, in separate columns.

	2040	2049	Pct
	2010	2010	Changes
Alcoholic beverages	425	580	36.49%
Healthcare	3,793	4,862	28.20%
Housing - Household furnishings and equipment	1,538	1,857	20.75%
Personal care products and services	715	853	19.42%
Food away from home	2,825	3,340	18.24%
Housing - Household operations	1,204	1,291	7.29%
Reading	117	118	0.67%
Housing - Housekeeping supplies	671	673	0.37%
Food at home	4,355	4,352	-0.05%
Housing - Shelter	13,141	13,101	-0.30%
Education	1,682	1,629	-3.12%
Miscellaneous	781	714	-8.61%
Transportation	8,502	7,761	-8.72%
Housing - Utilities, fuels, and public services	3,975	3,524	-11.35%
Apparel and services	2,021	1,722	-14.75%
Entertainment	3,098	2,506	-19.10%
Tobacco products and smoking supplies	298	197	-33.92%
Total	49,136	49,081	-0.11%

 Table 2 Chicago MSA Consumer Expenditure (2010 vs. 2018)

Note: Original data from Consumer Expenditure Survey (Chicago MSA); expenditure data are CPI adjusted by the UIC team to the 2010 US Dollar.

This review focuses on evolving changes in MSW management in the Chicago area, and refers to existing references in urban regions (e.g., Illinois EPA Region 2) and national statistics. Due to time constraints, this project only focuses on the events that have documented impacts on the MSW system. Many other events that may have indirect or long-term impacts could not be included in the summary; for example, the anticipated institutional support from newly legislated Illinois Statewide Materials Management Advisory Committee in 2021 and the approval of the pharmaceutical rule in 2020.

### Table 3 Municipal Solid Waste Trends

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated that the average per capita MSW generation rate (excluding C&amp;D) was 4.4 lbs/day in 2010 and remained relatively stable until 2018, when it increased to 4.9 lbs/day. The increase, however, reflects a change in the US EPA's food waste measurement methodology (US EPA, 2020).</li> <li>Illinois Region 2 reported a 4.9% increase (from 8.31 lbs/c/day to 8.72 lbs/c/day in MSW generation rate between 2008 and 2014 (compared to decreasing trends in other Illinois regions) (CDM Smith, 2015).</li> <li>The City of Chicago generated 4.13 million tons of waste in 2020 compared to 4.02 million tons in 2010 (see earlier sections in this report for estimation methods and raw data references).</li> </ul>	<ul> <li>The City of Chicago reported an increase in SF residential waste generation in 2020, compared to non-pandemic trending predictions.</li> <li>In an EREF and NWRA survey (2020) of waste industry employees and affiliates, over two thirds of respondents reported changes of specific waste stream, including decreases from the commercial sector, with the largest increases coming from the residential sector.</li> <li>Less waste was generated from schools and offices; more waste was generated from residences. One hauler reported an increase from 28 tons to 31 tons of collection every day, including more packaging materials from takeout food and online shopping (Porter and Holder, 2020).</li> </ul>
Documented changes to landfill diversion rate or volume	<ul> <li>Nationally, the MSW recycling and composting rate plateaued at 34.0%-35.0% between 2010 and 2017, then dropped to 32.1% in 2018, which reflects a change in measurement methodology of organic waste (US EPA, 2020).</li> <li>Statewide, Illinois EPA (IEPA) reported an increase in recovery/diversion rates of MSW from 19.1% in 2008 to 37.3% in 2014 (CDM Smith, 2015).</li> <li>The City of Chicago reported various recycling rates of Blue Cart program across the six service regions in the City between 2014 and 2019. While some service regions showed relatively consistent performance over time, there was a general trend of declining rates (measured by material weight).</li> </ul>	<ul> <li>The City of Chicago reported an increase in SF residential waste collected for recycling in 2020, compared to non-pandemic trending predictions.</li> <li>Labor shortages and slowdowns were noted related to coronavirus (Porter and Holder, 2020).</li> </ul>
Technology and product innovations impacting waste generation or recycling	<ul> <li>Automated material separation system was installed in the Chicago recycling facility (Carr, 2016).</li> <li>Intelligent (optical) sorting equipment to facilitate contamination identification and efficient sorting was adopted at an MRF in Chicago in 2019 (Staub, 2020a).</li> </ul>	<ul> <li>Intelligent (optical) sorting equipment to facilitate contamination identification and efficient sorting was adopted at an MRF in Chicago in 2019 (Staub, 2020a).</li> </ul>
Policies implemented impacting Chicago since 2010	<ul> <li>The Chicago Blue Cart recycling program expanded to cover all SF homes/apartments/condominiums/townhomes with 4 or fewer units (about 600,000 households) in 2013.</li> <li>The City of Chicago changed from a ward to grid-based collection system in 2013.</li> <li>Chicago Blue Cart recycling went bagless (recyclables contained in bags are no longer accepted) starting 2016.</li> <li>Chicago Recycling Ordinance passes in 2017.</li> <li>Chicago community campaigns launch to boost resident participation in recycling and to reduce contamination in 2018.</li> </ul>	

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Illinois EPA Region 2 reported a 38.1% increase, from 665.4 lbs/c/yr to 918.8 lbs/c/yr, in C&amp;D waste generation rate between 2008 and 2014 (CDM Smith, 2015).</li> <li>The number of building permits, which may directly impact the C&amp;D waste generation volume, generally decreased between 2007 and 2012 (except in 2011) and then recovered after 2013 (City of Chicago Data portal, 2020).</li> <li>Composition of material types being landfilled has changed; percentage of wood landfilled increased (Delta Institute, 2019).</li> <li>Considerable increases in Chicago MSA household expenditure on household furnishings from 2010 to 2018 (US BLS, 2020) may have contributed to increases in C&amp;D waste volume.</li> <li>The City of Chicago reported that shares of C&amp;D refuse and steel out of the total C&amp;D waste decreased; the shares of asphalt, concrete, and wood increased between 2010 and 2015.</li> </ul>	<ul> <li>No. of building permits in Chicago decreased in 2020 (City of Chicago Data Portal, 2020).</li> <li>C&amp;D volumes have dipped due to work stoppages and delays in some cases (Crunden, 2020).</li> <li>Residential construction is steady; commercial is down (Karidis, 2020; Elder Demolition, 2020).</li> </ul>
Documented changes to landfill diversion rate or volume	<ul> <li>Statewide, Illinois EPA reported an increase in C&amp;D waste recovery/diversion rates from 5.9% in 2008 to 56.9% in 2014 (CDM Smith, 2015).</li> </ul>	<ul> <li>Increases in home improvement projects but lack of recycling knowledge (Crunden, 2020).</li> </ul>
Technology and product innovations impacting waste generation or recycling	<ul> <li>Technologies have facilitated costs savings in reclaiming C&amp;D waste products (Shooshtarian et al., 2020).</li> <li>Robotics and AI are deployed to assist with sorting and automate recycling in most commodities (Karidis, 2020).</li> </ul>	<ul> <li>Increasing adoption of AI could be useful when construction crews must be socially distanced.</li> </ul>
Policies implemented impacting Chicago since 2010	<ul> <li>Illinois SB 1807 passes, exempting C&amp;D debris from franchise waste agreements (eff. 1/1/2018).</li> <li>IEPA proposes rules for the use of clean construction or demolition debris (CCDD) and uncontaminated soil (US) as fill material, Pub. Act 96-1416 (eff. 7/30/2010).</li> </ul>	

### Table 4 Construction & Demolition Waste Trends

### Table 5 Organic Waste Trends

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated increases in the generation volume of both food waste and yard trimmings between 2010 and 2017.</li> <li>Nationally, the US EPA (2020) estimated 63.1 million tons of food waste were generated in 2018. The significant increase from 2017 (40.7 million tons) reflects a change of food waste measurement methodology/scope (US EPA, 2020).</li> <li>Illinois EPA Region 2 reported a 6.7% increase, from 568.4 lb/c/yr to 606.4 lb/c/yr in Organic waste generation rate between 2008 and 2014 (CDM Smith, 2015).</li> <li>Considerable increases in Chicago MSA household expenditure on food away from home from 2010 to 2018 (US BLS, 2020) may have contributed to increases in food scrap volume.</li> </ul>	<ul> <li>Waste generation has shifted from commercial and institutional to residential settings (Gunders et al., 2020; Roe et al., 2020).</li> <li>Chicago-area composters serving all sectors report mixed trends in food scrap generation, from -66% to +50% during the pandemic. A Chicago-area hauler notes an increase in yard clipping generation (Nelson, 2020).</li> <li>The pandemic conditions caused massive disruptions to food system logistics and subsequently increases in food wastage (as well as shortage) (Ellison and Kalaitzandonakes, 2020).</li> <li>The pandemic influenced many factors that are known to be related to food waste generation, including household size, employment status, and purchasing patterns (Roe et al., 2020).</li> </ul>
Documented changes to landfill diversion rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated increases in recycling/composting rates of food waste (from 2.7% to 6.3%) and yard trimming (57.5%-69.4%) between 2010 and 2017.</li> <li>Nationally, the recycling/composting rate dropped from 33.8% in 2017 to 24.3% in 2018 due to a change of measurement methodology and scope. If all landfill diversion methods were considered, the diversion rate for organic waste was estimated at 38.2% in 2018 (US EPA, 2020).</li> <li>Statewide, IEPA reported organic waste diversion/recovery rate increased from 14.0% in 2008 to 14.3% in 2014 (CDM Smith, 2015).</li> <li>Illinois saw a significant increase in food scraps collected for composting between 2015 and 2017 (Johnston, 2019).</li> </ul>	Composting facilities in Minnesota and collection sites in New York City have closed or reduced capacity as a result of tightening municipal budgets and COVID protection protocols (Carleton, 2021; County Recycling, 2020).
Technology and product innovations impacting waste generation or recycling	<ul> <li>New food waste valorization technologies are being developed, including biofuel generation and energy production (Nayak &amp; Bhushan, 2019).</li> <li>Generation of bioplastics such as PLA increased (Castro-Aguirre et al., 2016).</li> </ul>	
Policies implemented impacting Chicago since 2010	<ul> <li>Permit requirements for commercial food scrap composting in Illinois were reduced in 2009; food scraps became acceptable at previously permitted sites for yard trimmings only.</li> <li>Permit requirements were lifted for urban farms and compost piles under 25 cubic yards in 2013.</li> <li>Temporary and permanent drop-off sites are set up to allow household organics waste collection for composting (HB0437, 7/10/2015).</li> </ul>	• Federal pandemic policies such as the Farmers to Families program and FDA's relaxed regulations for food labeling are likely to decrease waste and shift generation from commercial and industrial to the residential sector (Roe et al., 2020).

### Table 6 Paper/cardboard Waste Trends

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated a 5.5% decrease in paper and paperboard generation volume, from 71.3 million tons to 67.4 million tons, between 2010 and 2018.</li> <li>Illinois EPA Region 2 reported a 10.5% decrease in paper waste generation rate, from 886.2 lbs/c/yr to 793.2 lbs/c/yr, between 2008 and 2014 (CDM Smith, 2015).</li> </ul>	<ul> <li>Greater decreases in high-quality paper scrap from commercial and office locations than increases from home offices in Minnesota) (Paben, 2020).</li> <li>Higher-grade printing and writing paper generation decreased (Staub, 2020b).</li> </ul>
Documented changes to landfill diversion rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated increases in paper recycling rates from 62.5% in 2010 to 68.2% in 2018; otherwise, it was either landfilled or combusted.</li> <li>Statewide, IEPA reported paper waste diversion/recovery rate increased from 33.3% in 2008 to 43.5% in 2014 (CDM Smith, 2015)</li> <li>OCC recovery rates dropped in 2017 (partially due to Chinese import restrictions), recovered after finding alternative destination regions, and then dropped again when waste import restrictions became generally more stringent globally (American Forest &amp; Paper Association, 2020).</li> </ul>	<ul> <li>Increases in OCC generation from residents do not automatically boost the OCC recycling rate during the pandemic when household participation rates for OCC recovery are much lower than that from commercial sectors (Staub, 2020b).</li> <li>The recycled newsprint market is diminishing (Staub, 2020b).</li> </ul>
Technology and product innovations impacting waste generation or recycling	<ul> <li>Recycled newsprint market is diminishing (Staub, 2020b).</li> <li>Increases in Old Corrugated Containers (OCC) generation is driven by the e-commerce market (Staub, 2020b).</li> </ul>	• The pandemic accelerated the decreasing trend of the recycled newsprint market (Staub, 2020b).
Policies implemented impacting Chicago since 2010	•	

### Table 7 Plastic Waste Trends

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated a 13.6% increase in plastics waste generation, from 31.4 million tons in 2010 to 35.7 million tons in 2018.</li> <li>Illinois EPA Region 2 reported a 3.1% decrease in plastic waste generation rate, from 339.0 lbs/c/yr to 328.5 lbs/c/yr between 2008 and 2014 (CDM Smith, 2015).</li> </ul>	<ul> <li>Increases in generation from personal protective equipment (PPE) and healthcare, including plastic lining and components (Tripathi et al., 2020; Vanapalli et al., 2021).</li> <li>Increases in single use plastics associated with higher demand for restaurant takeout food (utensils and packaging) and PPE (Knowles, Zimmermann, and Piston, 2020).</li> <li>Increased generation of food packaging and grocery bags (Vanapalli et al., 2021).</li> <li>"The International Solid Waste Association estimates consumption of single-use plastic may have grown 250% to 300% in America since the coronavirus pandemic began." (Knowles, Zimmermann, and Piston, 2020).</li> <li>These trends may be partially offset by decreased generation from large events, travel, and institutional settings during lockdowns (Tripathi et al., 2020).</li> </ul>
Documented changes to landfill diversion rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated an increase in the plastics recycling rate, from 8.0% in 2010 to 8.7% in 2018.</li> <li>Statewide, IEPA reported the plastics recycling rate increased from 6.2% in 2008 to 8.1% in 2014 (CDM Smith, 2015).</li> <li>Uncertain markets for post-consumer plastics have led to some collected recyclables being landfilled in Illinois and minor service interruptions in the Chicago region (Rosengren et al., 2019).</li> </ul>	<ul> <li>Several US states have documented decreases in plastic recycling collections during lockdowns (Vanapalli et al., 2021).</li> </ul>
Technology and product innovations impacting waste generation or recycling	<ul> <li>Light-weighting of plastic bottles has offset an increase in plastic bottle use (Association of Plastic Recyclers, 2019).</li> <li>Improvements to at least one MRF lead to increased recycling capacity regionally (Carr, 2016).</li> </ul>	
Policies implemented impacting Chicago since 2010	<ul> <li>Plastics grocery bags are banned from Blue Cart program in 2017 (Tom Vujovic at Waste Management, interviewed by NPR [Eng, 2019])</li> <li>Plastic bag fee expected to cause a 27.7% decrease in plastic bag generation from grocery stores (Homonoff et al., 2018).</li> </ul>	

### Table 8 Textile Waste Trends

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated a 28.8% increase in textile waste generation volume, from 13.2 million tons in 2010 to 17.0 million tons in 2018.</li> <li>Illinois EPA region 2 reported a 30.6% decrease in textile waste generation rate, from 178.5 lbs/c/yr in 2008 to 123.8 lbs/c/yr in 2014 (CDM Smith, 2015).</li> </ul>	<ul> <li>Usage of masks increased.</li> </ul>
Documented changes to landfill diversion rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated an increase in recycled textile volume (2.1 million tons to 2.5 million tons) but a decrease in textile recycling rate (15.5% to 14.7%) between 2010 and 2018.</li> <li>Statewide, IEPA reported textile recovery/diversion rate increased from 2.0% in 2008 to 19.0% in 2014 (CDM Smith, 2015).</li> </ul>	
Technology and product innovations impacting waste generation or recycling	<ul> <li>Shift towards sustainability, along with eco-friendly initiatives by manufacturers, is expected to boost the recycled textile market growth (The Insight Partner, 2021).</li> <li>Increasing demand for antimicrobial textiles in recent years (Ardusso, 2021)</li> <li>Increasing use of sustainable and commercial chemicals to recover cotton from waste textile (Yousef, 2019).</li> <li>Hyperspectral near infrared imaging is anticipated to automate textile characterization and recycling (Mäkelä, 2020).</li> <li>Increase of fast fashion, synthetic fabrics that are harder to recycle and also pollute as they break down (Niinimäki et al., 2020).</li> </ul>	<ul> <li>Increased use of textile fibers impregnated with Ag and Cu nanoparticles for manufacturing face masks and commercial products (Ardusso, 2021)</li> </ul>
Policies implemented impacting Chicago since 2010	Clothes and linens are not accepted by the Chicago Blue Cart program.	<ul> <li>Mask mandates are enacted (May 2020).</li> <li>CDC recommends double masking (2/10/2021).</li> </ul>

### Table 9 Metal Waste Trends

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated a 14.0% increase in total metal waste generation volume, from 22.5 million tons in 2010 to 25.6 million tons in 2018.</li> <li>Illinois EPA Region 2 reported a 10.9% decrease, from 138.2 lbs/c/yr in 2018 to 123.1 lbs/c/yr in 2014 in Metal waste generation rate (CDM Smith, 2015).</li> </ul>	<ul> <li>Higher levels of aluminum identified in the stream (Paben, 2020).</li> </ul>
Documented changes to landfill diversion rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated an increase in recycled metal volume (7.9 million tons to 8.7 million tons) but a decrease in metal recycling rate (35.3% to 34.1%) between 2010 and 2018.</li> <li>Statewide, IEPA reported metal recovery/diversion rates increased from 16.6% to 57.4% between 2008 and 2014 (CDM Smith, 2015).</li> </ul>	<ul> <li>Demand from manufacturing and construction industries for scrap metals is expected to decline (IBISWorld, 2020).</li> </ul>
Technology and product innovations impacting waste generation or recycling	• Rapid technology advances have transformed waste electrical and electronic equipment (WEEE) processing from simple disassembly, classification, and sorting to high value-added utilization technologies (Zhang and Xu, 2016).	
Policies implemented impacting Chicago since 2010		
# Table 10 Glass Waste Trends

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated a 6.3% increase, from 11.5 million tons to 12.3 million tons, in glass generation volume between 2010 and 2018.</li> <li>Illinois EPA Region 2 reported a .2% decrease, from 86.2 lbs/c/yr to 86.0 lbs/c/yr, in glass waste generation rate between 2008 and 2014 (CDM Smith, 2015).</li> <li>Chicago MSA household expenditure on Alcoholic Beverages saw the fastest growth among all expenditure categories from 2010 to 2018 (US BLS, 2020), which may have contributed to increases in glass waste volume.</li> </ul>	<ul> <li>Potentially reduced generation from shuttered bars and restaurants (Kummer, 2020).</li> </ul>
Documented changes to landfill diversion rate or volume	<ul> <li>Nationally, the US EPA (2020) estimated a decrease in recycled glass volume (3.13 million tons to 3.06 million tons) and a decrease in glass recycling rate (27.2% to 25.0%) between 2010 and 2018.</li> <li>This decreasing trend is likely driven by cities and counties eliminating glass from curbside recycling programs to enhance cost-effectiveness (Keller, 2018; Ng, 2015; Pyzyk, 2021), which has not occurred to a significant extent in the Chicago region (Pyzyk, 2021).</li> <li>Statewide, IEPA reported glass diversion rate increased from 21.7% in 2008 to 25.3% in 2014 (CDM Smith, 2015).</li> </ul>	<ul> <li>O-I glass estimates a reduction of recycled glass market of 20-62% as the combined result of pandemic-related reductions in generation and recycling due in several Northeast markets (Kummer, 2020).</li> </ul>
Technology and product innovations impacting waste generation or recycling	<ul> <li>Glass bottles are 40% lighter than they were 30 years ago (Rue, 2018).</li> <li>Recent trends in craft beer have led to several new programs producing, collecting, and refilling glass bottles. These refillable bottles can be heavier than single-use glass bottles (Gribbins, 2018).</li> <li>At least one Chicago-area MRF, RMC in Chicago Ridge, has added capacity for cleaning and sorting glass in single-stream recycling (Keller, 2018).</li> </ul>	
Policies implemented impacting Chicago since 2010	<ul> <li>In single-stream recycling systems, such as Chicago's, broken glass may also contaminate more profitable commodity streams such as cardboard and paper (Flower, 2015).</li> </ul>	• Chicago and recycling partners did not make large changes to recycling programs as a result of the pandemic, such as program and enforcement suspensions seen in many bottle deposit states (Pyzyk, 2021; Tripathi et al., 2020).

# Table 11 Household Hazardous Waste (HHW) and White Goods Trends

	Non-pandemic related trends 2010-2020	Pandemic related trends 2020
Documented changes to waste generation rate or volume	<ul> <li>Illinois EPA Region 2 reported a 6.6% decrease, from 28.8 lbs/c/yr in 2008 to 26.9 lbs/c/yr in 2014 in HHW generation rate (CDM Smith, 2015).</li> </ul>	<ul> <li>E-waste volume increased from 348,812 lbs to 350,188 lbs in 2020 (City of Chicago, 2021).</li> <li>Increases in residential drop-off volumes possibly related to home improvement or cleaning (Nemo, 2020).</li> <li>City collection was closed for about three months due to COVID-19 (City of Chicago, 2021).</li> <li>Hazardous chemical totals decreased from 138,074 lbs in 2019 to 125,546 lbs; pharmaceutical totals decreased from 12,542 lbs to 7983 lbs in 2020 (City of Chicago, 2021).</li> </ul>
Documented changes to recycling rate or volume	<ul> <li>Statewide, IEPA reported HHW recovery/diversion rates decreased from 65.2% in 2008 to 62.3% in 2014 (CDM Smith, 2015).</li> <li>The e-waste market is anticipated to reach \$40 billion by 2025 (Adroit Market Research, 2020).</li> </ul>	
Technology and product innovations impacting waste generation or recycling	<ul> <li>Light weighting trends of products discourage manufacturers from recycling, given the Illinois legislation is based on the weight of electronics sold (<u>Ruppenthal</u>, 2017).</li> <li>Kuusakoski Glass and PDC launched a program that processed and treated CRT glass as alternative daily cover (ADC) at the PDC landfill (Peoria, IL) in 2014. In 2015, they adopted a storage-cell method as an additional method. In 2020, the disposition program was phased out (Leif, 2019)</li> <li>Artificial intelligence-based MCA and EPR is a reasonable approach to address the increasing problems with e-wastes (Chen, 2021).</li> <li>New and emerging technologies will continue to accelerate obsolescence and create new waste streams (Shittu et al., 2021)</li> </ul>	<ul> <li>Demand for electronics was induced by the pandemic conditions (Yu, Yu, and Tan, 2020).</li> <li>Demand for used electronics increased (Paben, 2021).</li> </ul>
Policies implemented impacting Chicago since 2010	<ul> <li>Illinois Electronics Products Recycling and Reuse Act (EPRRA) (eff. 1/1/2012).</li> <li>Illinois Consumer Electronics Recycling Act (CERA) signed on August 25, 2017 and replaced EPRRA on 1/1/2019.</li> <li>Illinois Pollution Control Board adopted U.S EPA's RCRA Subpart P amendments in September 2020, which change the standards for entities that generate or manage hazardous waste pharmaceuticals.</li> <li>Landfill ban of white goods without the removal of components, 7/1/1994.</li> </ul>	

# **5. Key Findings and Recommendations**

Table 12 summarizes the key findings and recommendations based on both qualitative and quantitative analysis of national, regional, and City reported data, academic research, industry surveys and reports, and well-regarded industry magazines as well as major news outlets.

Clearly there are some cross-sector trends and issues in the last decade; for example, the critical role of residential awareness of and participation in recycling, the confounding factors of light-weighting trends of materials, varying levels of recycling performance across Chicago neighborhoods and varying quality of data reporting from service providers, and the side-effects of single-stream recycling on contamination, as well as multi-facet impacts of pandemic conditions on material and waste management. Additional studies are needed to better understand the trends, to identify the priorities of waste diversion performance, and to better inform proactive planning and policy making. All these call for more rigorous efforts for waste data collection, data reporting enforcement, and data sharing.

Key Findings	Recommendations
In 2020, the City of Chicago generated an estimated amount of 4.13 million tons of waste from residences, institutional/ commercial/industrial (ICI) sectors; and building construction and demolition (C&D) activities. Overall, there is an increase in waste generation in the last decade. Yearly fluctuations of waste generation volume seem to respond to economic conditions.	<ul> <li>Caution should be given when interpreting data under pandemic conditions or using 2020 data as a benchmark for decennial planning.</li> <li>Tonnage is not and should not be used as the single metric to measure material and waste management program performance.</li> </ul>
The availability and quality of waste stream data vary by generation activity (sector) and by service provider.	<ul> <li>Consistency and enforcement of data reporting is needed.</li> </ul>
Higher volume of refuse and commodities were collected by the Chicago from single-family (SF) residential homes in 2020, compared to 2019 and predicated value in 2020 from time-series modeling.	• While the locations of waste generation have shifted towards residences during pandemic conditions, education programs for City residents can be particularly important.
Multi-family (MF) residential units in Chicago steadily increased between 2010 and 2020, so did residential waste.	• Given many documented challenges of MF residential recycling nationwide (e.g., NYC Bureau of Waste Prevention, Reuse and Recycling, 2001), additional resources and educational programs may be needed to advance residential recycling goals in Chicago.
On average, each Chicago resident generates a little over 3 pounds (lbs) of waste per day at home, or a little under 3,000 lbs of waste per year for each Chicago household. Compared to other peer cities and regions (e.g., NYC and California), residential waste generation rates in Chicago are higher (NYC Department of Sanitation, 2018; CalRecycle, 2021).	<ul> <li>There are potentials for source reduction from Chicago residences.</li> </ul>
After the Chicago Blue/Black Cart Program expanded from limited coverage to city-wide implementation, commodity volume collected per household for recycling decreased, which suggests the increases in recycling participation did not keep up with the City's recycling program expansion. The decreasing trend of recycling performance turned around in 2018, when the City launched community campaigns to boost residents' participation in recycling and to reduce contamination.	• Community education programs matter.

# Table 12 Key Findings and Recommendations

Key Findings	Recommendations
Blue Cart program performance varies across the six service regions in the City.	• Additional data and further analysis (e.g., demographics, public vs. private operations, market development, macroeconomic conditions) are needed to explore cost-effective and region-specific strategies to improve recycling performance.
About 522,510 tons of organic waste are estimated to be generated in Chicago every year, including 245,260 tons from SF residential, 81,250 tons from MF residential, and 196,000 tons from ICI sectors. Implementing source separation of 75% of organic waste from SF homes would boost landfill diversion rate by 18.6%.	<ul> <li>Implementing organic waste diversion programs has great potential to increase the diversion rates in Chicago.</li> </ul>
Total employment in Chicago increased 2010-2018; employment in the Restaurant and Food industry had the fastest growth, by 28.29%. Consumer expenditure on Food away from Home increased 18.24%. Reported increases in food waste generation in the Illinois outpaced diversion efforts (CDM Smith, 2015).	<ul> <li>Increasing food waste volume and possible changes of generation location requires further analysis and proactive planning for food scrap as a target stream in Chicago.</li> </ul>
Among different material classes generated from ICI sectors, Glass increased the largest, by 22.44% (from 37,389 tons to 45,779 tons).	• Increases in glass waste (despite the light-weight trend) in Chicago, the heavy weight of glass, and possible contamination of broken glass for profitable commodity items in the single-stream recycling suggests that glass waste should be another target for waste diversion program in Chicago.
The composition of C&D waste in the City changed over time. Between 2010 and 2015, the shares of C&D refuse and steel out of the total C&D waste decreased; the shares of asphalt, concrete, and wood increased. Information after 2015 is not available or consistent for a comparison.	• Enforcement is needed for waste data reporting. Consistency and clarity in the reporting forms are important.
Building C&D waste generation in Chicago is estimated to be at 1.31-1.42 million tons annually. Additional information is needed for a reliable estimate for C&D waste from other activities (e.g., road and bridge construction and maintenance).	<ul> <li>Besides building C&amp;D waste, more specifics are needed for other types of C&amp;D waste in the Chicago city ordinance.</li> </ul>

# Table 12: Key Findings and Recommendations (continued, 2 of 3)

Table 12: Key Findings and Recommendations	(Continued, 3 of 3)
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Key Findings	Recommendations
Fast fashion and synthetic fabrics have presented challenges for textile waste management. Uses and discards of masks have significantly increased during pandemic conditions. Statewide, Illinois (CDM Smith, 2015) saw increases in textile recovery/diversion rate increased from 2.0% in 2008 to 19.0% in 2014. Clothes and lines are not accepted by the Chicago Blue Cart program.	<ul> <li>New programs for textile reuse and diversion may be needed to address the lagging performance of textile waste management.</li> </ul>
The amount of MSW generated per dollar spent is decreasing (US EPA, 2020). Light- weighting trends of electronic products discourage manufacturers from recycling, given that the Illinois legislation is based on the weight of electronics sold (Ruppenthal, 2017). Light-weighting of bottles has offset an increase in bottle uses (Association of Plastics Recyclers, 2019; Rue, 2018).	<ul> <li>Light-weighting material trends present ar important confounding factor for the traditional approach of measuring material and waste management by weight (tonnage) only. Additional studies are needed to assess the impacts of light- weighting trends.</li> </ul>
Nationwide, some materials showed opposite trends of recycled volume and recycling rates. For example, the recycled volume of metal and textile increased but the recycling rates dropped in the last decade (US EPA, 2020).	• Multiple metrics (instead of one single metric of waste tonnage or recycling rate) should be analyzed. Environmental life cycle impacts and socioeconomic impacts should be also considered on a case-by-case basis.
Pandemic conditions changed not only the waste volume but also composition and location. Documented increases in waste from home renovation projects and packaging materials from takeout food and online shopping, but lack of recycling knowledge from residents (Cruden, 2020; Porter and Holder, 2020).	<ul> <li>Additional efforts and resources are needed to support residential recycling during pandemic conditions.</li> </ul>

Note: All waste volumes are in US short tons.

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# Appendix: Definitions of Waste Stream in Chicago 2010 Study

The 2020 Chicago waste generation and characterization studies uses the 2010 Chicago waste study as the baseline and has adopted its definitions, material, and sector classification systems. The Chicago Waste Characterization Study (CDM, 2010b, ES-1 to ES-3) provides the following description. Further, it documents that the Chicago Department of Streets and Sanitation (DSS) collects waste from residences (typically single family homes/ apartments/condominiums/ townhomes with 4 or fewer units), and the private waste haulers collect waste from Institutional/Commercial/Industrial (ICI) sectors, multi-family residential, and C&D waste. It also clarifies that haulers do not distinguish between residential and commercial buildings for waste collection.

- Residential waste collected by private haulers from multi-family residences (typically apartment buildings and condominiums) and waste collected by the Department of Streets and Sanitation (DSS) from residences (typically single family homes/ apartments/condominiums/ townhomes with 4 or fewer units). This waste is primarily collected in packer trucks (e.g., side-loading or rear loading vehicles).
- Institutional/Commercial/Industrial (ICI)-Includes waste generated by industrial and commercial businesses and institutions;
  - Commercial and Institutional waste generated by businesses and government/education institutions. This waste is collected in a variety of vehicles including loose and compactor drop boxes, and front-end loading trucks. Small commercial facilities are collected in packer trucks.
  - Industrial waste generated by industrial activity, such as that of primary and fabricated manufacturing facilities, and mills. Unlike regular municipal waste that is primarily food, packaging and disposed products, industrial waste is the material disposed from the production of the specific commercial and consumer goods being manufactured at that location.
  - The ICI waste sector was further divided into the following five industry groups, which make up approximately 76% of the ICI waste stream:

o Restaurants, bars, food stores, food manufacturing;
o Financial, insurance, real estate, legal, professional, consulting;
o Manufacturing (except food);
o Government, schools, higher education, post office; and
o Wholesale.

 C&D – waste generated from new construction, renovation activities, or demolition. This waste is collected in vehicles such as dump trucks, loose roll-off boxes, and end dump vehicles. This includes clean construction or demolition debris (CCDD) includes the following uncontaminated materials (415 ILCS 5/3.160(b)): broken concrete without protruding metal bars; bricks; rock; stone; reclaimed asphalt pavement; and dirt or sand generated from construction or demolition activities and diverted C&D materials.



# City of Chicago Solid Waste Strategy: Peer City Profiles

November 2020

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# Introduction

This document presents Peer City Profiles, each of which describes various solid waste management programs, practices, and policies utilized in metropolitan areas across the United States, herein referred to as peer cities. These profiles are intended to provide a better understanding of how peer cities have created and implemented innovative solid waste management strategies and help inform decisions about Chicago's materials management system.

The profiles have been grouped into categories to provide an ordered understanding of how peer cities address the unique conditions of different waste management systems. Each profile details the essential characteristics of the approaches utilized by peer cities, including the basic principles on which approaches are implemented; how they are administered and who to contact for more information; financial information; and finally, eligibility requirements. Some profiles include additional information such as success metrics and applicable legal mechanisms for program authorization and enforcement.

While this document does not provide an exhaustive analysis of the universe of successful waste management approaches utilized across the United States, it does indeed highlight some of the most innovative programs, practices, and policies that peer cities have demonstrated with promising and replicable outcomes. These profiles and lessons learned will support development of materials management strategies for the City of Chicago.



# **Construction & Demolition Debris Diversion**

# Deconstruction Incentive | Hennepin County, Minnesota

#### Program Basics:

Homeowners and developers in Hennepin County can receive \$2 per square foot (up to \$5,000) for projects that use deconstruction techniques, in order to offset the costs of additional time and labor associated with deconstruction.

#### Administration and Contact Information:

The program is administered by the Hennepin County Department of Environment and Energy. Lead Contact: Olivia Cashman Email: olivia.cashman@hennepin.us

#### Eligibility:

- Applicants must be a homeowner or developer in Bloomington, Brooklyn Center, Brooklyn Park, Crystal, Deephaven, Edina, Excelsior, Greenfield, Greenwood, Hopkins, Minneapolis, Minnetonka, Maple Grove, Mound, Orono, St. Louis Park, and Woodland (additional cities will be considered for participation as the program expands).
- Projects must be for residential properties, including houses and apartment buildings up to four units.
- Projects must meet the reuse and disposal criteria.
- The structure being demolished or renovated must have been built prior to 1970.
- The size of structure or area of renovation must be 250 square feet or larger.
- Deconstruction must take place after the agreement to issue grant funds is established. Grant funding cannot be used for deconstruction work that has already been completed.

#### Reuse + Disposal Requirements:

To qualify for funding, projects must meet the following criteria:

- A pre-demolition inspection must be conducted by Hennepin County staff.
- A minimum of five material types in category A and one material type from category B must be removed for reuse to qualify for funding (see the materials included in each category in the application below).
- At least 550 pounds of material from category B must be deconstructed for reuse.
- All non-reusable building material generated from the project is sent to a Hennepin County approved construction and demolition waste recycling processing facility.

Category A includes brick or stone blocks, cabinets, casing around doors and windows, light fixtures, mantels, molding, plumbing fixtures, solid wood doors, stair treads and railings, stone details, radiators, wood-framed windows, and shutter or siding.



Category B includes wood flooring, dimensional lumber, and ceiling and floor joists.

Cost:

\$100,000 budget for 2020 (max \$5,000 per grant)

#### **References and Additional Resources:**

- Hennepin County Deconstruction Grants
- Minnesota Public Radio Coverage

# Deconstruction Policy | Portland, Oregon

#### **Program Basics:**

The <u>Deconstruction Policy in Portland, Oregon</u> requires that residential structures be removed through deconstruction instead of demolished. Only Certified Deconstruction Contractors can perform work under the deconstruction ordinance. Homeowners are allowed to request exemption if the structure is in poor condition - to the point that building materials would not have resale value - or unsafe condition - to the point that it would endanger deconstruction contractors to enter the building.0F

The City maintains a list of Certified Deconstruction Contractors and issues certifications based on completion of a third-party deconstruction training, skills assessment, written exam, and demonstrated experience.

Consideration of a deconstruction ordinance in Portland began with convening a Deconstruction Advisory Group in early 2015, establishing a voluntary incentive program (\$3,000 per deconstruction project) in late 2015. The ordinance was passed by Portland City Council in 2016.

From 2016 to 2019, Portland's deconstruction ordinance resulted in more than two million pounds of building materials diverted from landfills and salvaged for reuse.

#### Administration and Contact Information:

The Deconstruction Policy is administered by the Bureau of Planning and Sustainability.

Lead Contact: Shawn Wood Email: <u>shawn.wood@portlandoregon.gov</u> Phone: (503) 823-5468

#### **Eligibility Requirements:**

All single-dwelling structures (houses and duplexes) in all areas of Portland that were constructed before or in 1940 and structures of any age which have been designated as historic.



In the first iteration of the ordinance, 33 percent of the 240 annual demolition permits fell under the required deconstruction requirements. Expanding the ordinance to include structures built between 1916 and 1940 is estimated to cover 66 percent of annual residential demolition permit requests.

#### Cost:

The permitting costs required for standard deconstruction or demolition are the same. However, demolition must be performed by a Certified Deconstruction Contractor, and deconstruction typically requires more project days and labor hours to complete.

In reviewing deconstruction pilot programs across the country, Delta Institute has found that typical demolition costs range between \$4.94 and \$11.64 per square foot and deconstruction costs range between \$7.93 and \$15.52 per square foot. Additionally, materials salvaged through deconstruction can offset project costs by reducing disposal fees and capturing value through material resale.

#### **References and Additional Resources:**

- Portland, OR Deconstruction Ordinance
- Portland, OR Deconstruction Requirements
- EPA Webinar Deconstruction Program: City of Portland, Oregon
- EPA Webinar C&D Materials Markets: Identifying Opportunities Regionally and Locally
- <u>City of Portland Deconstruction Press Release, 2019</u>

## Deconstruction Pilot for Publicly Owned Vacant Structures | St. Louis, Missouri

#### **Program Basics:**

St. Louis, Missouri, like many Midwestern legacy cities, has experienced a sharp decline in population since the mid-20th century, resulting in vacant and abandoned properties across the city. The St. Louis Land Reutilization Authority (LRA), the oldest land bank in the country, owns thousands of vacant properties, and public funds are budgeted to remove vacant structures in unsafe condition.

The 2017-2018 city budget included \$1.5 million dedicated to public demolitions, and the 2018-2019 budget increased that amount to \$3.6 million.1 Additionally, the Metropolitan St. Louis Sewer District (MSD) committed \$13.5 million over a five-year period for the removal of vacant and blighted structures.

Though not all vacant structures are appropriate candidates for deconstruction, using a condition scoring index (informed by variables including years vacant and cumulative maintenance costs) can help identify structures that can be expected to yield valuable materials.

• Using this index for the current dataset of vacant structures in St. Louis, an estimated 24.8 million bricks and 10.4 million board feet of lumber could be salvaged.



• Combined with additional salvaged materials in the best condition structures, a potential salvage value range of \$18.25 million to \$39.38 million is available to enter the local market.

#### Administration and Contact Information:

The program is administered by the St. Louis Development Corporation.

Lead Contact: Laura Ginn Email: <u>ginnl@stlouis-mo.gov</u> Phone: (314) 657-3778

#### Eligibility:

The program is open to all vacant structures that are publicly owned by the St. Louis Land Reutilization Authority (LRA).

#### Cost:

St. Louis will be conducting a pilot to demolish 30 structures and deconstruct 30 comparable structures to compare holistic costs including labor, equipment, disposal, and profit from material resale.

Through a combination of funders including US EPA, Missouri Environmental Improvement & Energy Resources Authority (EIERA), Missouri Department of Natural Resources, Metropolitan St. Louis Sewer District, and the St. Louis Regional Business Council, the pilot program (including stakeholder engagement, market research and analysis, structure selection, bid specification development, contractor training, demolition and deconstruction costs for pilot structures, project consulting, and post-pilot analysis) is estimated to cost between \$500,000 and \$600,000, plus local staff time, over several years (according to the St. Louis Development Corporation).

#### **References and Additional Resources:**

- Green City Coalition Deconstruction & Demolition Best Practices
- <u>St. Louis Deconstruction Market Assessment</u>



# **Education, Metrics, Advocacy**

## GreenSpot | Columbus, Ohio

#### **Program Basics:**

GreenSpot is a membership-based program that provides a framework to think about sustainability and a way to log your successes. It provides educational and technical resources to assist households, neighborhoods, businesses, and community groups reach sustainability goals. As of August 2020, program participation reached 20,000 individuals. The program has built and relied upon support from an advisory board that is composed of a broad set of stakeholders including nonprofits and NGOs, academic institutions, local and state government agencies, and private enterprises.

#### Administration and Contact Information:

The program is administered by the City of Columbus' Office of Sustainability.

Lead Contact: Green Spot Coordinator David R. Celebrezze Phone: (614) 645-6703

#### Eligibility:

All residents, businesses and community groups in Franklin County and surrounding counties.

Cost:

The program is free for all participants.

#### **Estimated Impact of GreenSpot:**

- \$13 million saved
- Reduced CO2 emissions by 41 million pounds
- Reduced water consumption by more than 145 million gallons
- Recycled 32 million pounds of material

#### **References and Additional Resources:**

• <u>GreenSpot Homepage</u>

#### Minnesota GreenStep Cities | State of Minnesota

#### **Program Basics:**

The Minnesota GreenStep Cities program is a voluntary challenge, assistance, and recognition program to help cities achieve their sustainability and quality-of-life goals. To further the program's goals, a set of best management practices (BMPs) were developed by the Minnesota Pollution Control Agency (MPCA) and Foth Consultants which cities could take to exceed minimum state requirements for solid waste management and recycling. The program features



29 BMPs that describe 175 specific actions that cities can take to support those practices. Nine organizations compose the program's steering committee, representing Minnesota state government agencies, nonprofits organizations, and NGOs. Staff from each of the organizations represented on the steering committee contribute valuable time and expertise to support the goals and activities conducted by the program.

#### Administration and Contact Information:

The GreenStep Cities program is administered by the MPCS.

Lead Contact: Commissioner Laura Bishop Email: <u>info.pca@state.mn.us</u> Phone: (651) 296-6300

#### Eligibility:

All cities in Minnesota are eligible.

#### Cost:

It is free for all cities to participate in the program.

#### **Best Management Practice Options:**

The program recommends BMPs across a variety of categories including:

- Solid waste ordinance and licensing
- <u>Recycling</u>
- Solid waste collection

#### **References and Additional Resources:**

- Program Webpage
- Legal background on solid waste management
  - <u>Waste Management Act and related laws</u>
  - Memo on organized collection (League of Minnesota Cities)
- <u>GreenStep Cities report</u>
- <u>MPCA Tools for Local Government</u>



# **Food Waste and Organics Diversion**

# 412 Food Rescue/Food Rescue Hero | Pittsburgh, Pennsylvania

#### **Program Basics:**

The program prevents food from entering the waste stream and redirects suitable food items to individuals experiencing food insecurity. Pittsburgh was the pilot city for Food Rescue Hero. The program is now active in Cleveland, San Francisco, northern Virginia, Los Angeles and Vancouver. Driven by the United Nations Sustainable Development Goal to halve food waste by 2030, Food Rescue Hero is committed to serving 100 cities over the next 10 years. To ensure sustainable growth, they select 8-10 new partners each year - allowing Food Rescue Hero to focus fully on each organization they onboard.

#### Administration and Contact Information:

412 Food Rescue is a nonprofit organization.

Email: info@412foodrescue.org Phone: (412)407-5287

#### Eligibility:

• Food Rescue Hero is actively seeking high-impact food rescue or hunger relief nonprofits to partner with to launch and scale food rescue in their communities.

#### Impact:

- Approximately 4,692,288 meals (5,630,746 pounds of food) were provided through the program between March 2015 and February 2019.
- 87 percent of the rescued food is fresh food.
- 508 food donors have participated.
- 542 nonprofit distribution partners have participated to date.

#### **References and Additional Resources:**

- <u>412 Food Rescue</u>
- Food Rescue Hero Tech
- 2018 Impact Report



# Commercial Composting Program | Evanston, Illinois

#### **Program Basics:**

The program provides two composting options to residents and one for commercial properties. Thirty-five percent of waste in Evanston is estimated to be compostable.

#### **City Services (Residential)**

- 95-gallon cart used
- Collection service April 1 through December 10
- Fees are assessed annually and appear on residents' water, sewer and sanitation bills

#### **Collective Resource Compost (Residential)**

- Food-waste only
- Collective Resource Compost; official composting partner of Evanston beginning in 2017
- Program expires October 2022
- 5-gallon bucket used

Collective Resource Compost (Commercial Composting Program)

- Food-waste only
- 32-gallon bucket used
- Program expires October 2022

#### Administration and Contact Information:

The program is administered by the City's Public Works Agency.

Lead Contact: Director Dave Stonebeck Phone: (847) 448-8198

#### Eligibility:

All properties in Evanston are eligible to participate in the available service options. Collective Resource currently services over 750 residents, businesses, and schools in Evanston (according to Erlene Howard, Collective Resource).

#### Cost:

Collective Resource Compost services

- Weekly pickup, \$302.50 annually (5-gallon bucket for residents)
  - \$27 monthly
  - \$78 quarterly
- Bi-weekly pickup, \$227 annually (5-gallon bucket for residents)
  - \$20.50 monthly
  - \$58.50 quarterly
- Communal composting is available for up to 24 people sharing a single tote
  - $\circ$   $\,$  Each swap of the 32-gallon tote is \$24  $\,$



- Cost will vary for commercial and institutional properties based on the number of carts supplied (32-gallon carts offered to these properties) and the frequency of pickups.
  - <u>View complete price chart here.</u>

City of Evanston Food and Yard Waste Collection Services

- \$82.50 cart fee (one-time)
- \$25 annual fee
- Collective Resource also offers a "Winter Gap" program for Evanston residents who participate in the yard waste ride along food scrap collection program or compost in their backyards. Service is offered mid-December through end of March.
  - Weekly, 1 Bucket, \$106
  - Weekly, 2 Bucket, \$170
  - Weekly, 1 Tote, \$362
  - Biweekly, 1 Bucket, \$82
  - Biweekly, 2 Bucket, \$114
  - Biweekly, 1 Tote, \$186

#### **References and Additional Resources:**

- <u>City of Evanston Zero Waste Goals</u>
- <u>Collective Resource Compost FAQ</u>
  - o Winter Gap Service
  - o <u>Neighbor Totes</u>
- <u>Commercial Composting in Evanston & Skokie</u>

# Food Waste Drop-Off Program | Washington, D.C.

#### **Program Basics:**

The program allows participants to drop off food waste in sealed containers at designated locations to be composted. The food waste is composted at D.C. community composting sites and at the Prince George's County Organics Compost facility. Commercial food scraps are not accepted. Program officials have made the case for in-district composting, as the current transfer stations are not currently set up to separate three waste streams and would require a significant investment to allow for organics transfer; approximately \$2.3 million plus \$37 per ton of waste transferred.

#### Administration and Contact Information:

The program is administered by the DC Department of Public Works.

Lead Contact: Director Christopher Geldart Email: <u>dpw@dc.gov</u> Phone: (202) 673-6833



#### Eligibility:

The program is available to all Washington, D.C. residents.

#### Cost:

The program is free for participants.

#### Locations:

Currently, there are eight designated locations (farmers markets) to drop off food waste. Not all designated locations are open year round, so participants might need to travel further during certain times of the year. Only three locations are open year round as of October 2020.

#### **Composting Partners:**

Two composting partners support this program including:

#### Community Compost Cooperative Network (CCCN)

- CCCN is administered by D.C. Parks and Recreation (DPR). CCCN trains community members to compost food waste and garden waste from DPR sites.
- Currently, CCCN operates 50 compost sites with the capacity for 5,000 people to actively compost each month (50 tons per month equivalent).

#### Prince George's County Organics Compost facility

- Prince George's County piloted food scrap composting during 2013 utilizing the Gore Cover technology which is an in-vessel aerated pile system with oxygen and temperature monitoring devices.
- This system allows for the processing of a greater volume of yard trim and the inclusion of food scraps on a smaller footprint of area with little energy consumption and creates finished compost within 30 days.
- Food scraps are accepted from pre and post-consumer entities, including residential, commercial and institutional sectors.



# Land Use and Environmental Justice

# Landfill Redevelopment | Case Studies

When landfills reach capacity, or closure is otherwise required, that land (if properly managed) can be redeveloped or restored for other uses.

#### Closed landfill sites in Chicago:

- Paxton Landfill, 116th Street & Paxton Avenue, 10th Ward
- 122nd Street Landfill Land and Lakes, 122nd Street and Stony Island Avenue, 10th Ward
- CID Landfill, 134th Street and S Calumet River Street, 10th Ward
- 138th Street Land and Lakes, 138th Street and Cottage Grove Avenue, 9th Ward

#### Unregulated Municipal Landfill Restoration | Karwick Nature Park - Michigan City, Indiana

#### **Project Basics:**

The project involved transforming 23.5 acres, which were formerly an unregulated landfill, into a public access recreation area bordered by an undisturbed wildlife habitat and natural forest along the banks of Trail Creek. A leachate collection system spanning over 1,000 feet has been installed to capture and treat groundwater leaching from the landfill into Trail Creek. The sanitary district reports that nearly 25 gallons per minute of leachate is being collected and treated. More information on the streambank restoration component of the project (2007) is <u>available here.</u>

Additional efforts adjacent to the nature park have restored natural wetlands and have added stormwater treatment enhancements throughout the forested and wetland areas. Together, these efforts provide significant value to the municipality in the form of recreational amenities and improved environmental function.

#### Administration and Contact Information:

The project was administered by the City of Michigan City and the Michigan City Sanitary District with maintenance assistance provided by the Michigan City Parks Department.

Lead Contact: Michael Kuss, General Manager Email: mkuss@mcsan.org

#### Funding Source:

Lake Michigan Coastal Program

#### **References and Additional Resources:**

- <u>Karwick Nature Park webpage</u>
- <u>Contractor project webpage</u>



#### Superfund Site Redevelopment | Brick Township Landfill - Brick, New Jersey

**Project Basics:** When Brick Township, New Jersey, became responsible for bankrolling an expensive landfill closure, the town's leaders started thinking creatively about how the site could help generate revenue to defray the cost to taxpayers. Ultimately, they decided on a solar power facility large enough to supply all of the electricity used by township government buildings and community parks. By assembling a public-private partnership, the Township was able to leverage the resources needed to create the 7-megawatt solar facility. This case study describes the journey of the Brick Township Landfill Superfund site from contamination, through cleanup, to redevelopment. This story demonstrates how property owners can work with the U.S. Environmental Protection Agency and private parties to return once-contaminated sites to productive use. The story also illustrates the benefits of planning for reuse before designing a site's cleanup. The case study provides useful information and lessons learned to companies, local governments, communities, utilities and regulators interested in exploring utility-scale solar projects at landfills or other cleaned-up sites across the United States.

#### Administering and Contact Information:

The project was administered by the U.S. Environmental Protection Agency. Lead Contact: Keith Rella, Sustainable Brick Committee member Phone: 732-262-1050

#### **EPA Required Remedy:**

- Install an impermeable landfill cap.
- Implement a groundwater monitoring program.
- Implement institutional controls to restrict the use of groundwater.
- Restrict uses on the landfill.

#### Financing the Solar Project:

- The solar developer is paying for the solar facility.
- The Township issued municipal bonds to raise the funds for the project. The solar developer is responsible for paying off these bonds.
- The 30 percent federal solar investment tax credit also played a major role in the project's feasibility, which equated to \$9 million for the project.
- The Township and the solar developer entered into a redevelopment agreement in 2011. The solar developer will operate the solar facility for 15 years, selling all the electricity produced to Brick Township at a set rate (currently 8.5 cents per kWh). In 2012, the solar developer made a \$2.5 million lease payment in advance to the Township for the 15-year lease of the site.
- The solar project provides all the electricity needed by the Township government (3.5 MW), as well as about a third of the electricity used by the Municipal Utilities Authority, the area's water and sewer provider.



• When the 15-year lease ends, the Township will assume ownership of the solar field. The solar field will provide free electricity to the Township, providing a cost savings of \$500,000 to \$600,000 per year.

#### **References and Additional Resources:**

• EPA Case Study



# **Recycling and Municipal Solid Waste Diversion**

# Cart Downsizing | San Antonio, Texas

#### **Program Basics:**

The program uses a variable-rate pricing/Pay-As-You-Throw (PAYT) approach, allowing residents to choose what size brown garbage cart they want based on the amount of garbage they throw away. Much like a utility bill, residents pay for what they use. Three



brown carts are available to choose from. Residents reduce the amount of waste discarded as new programs, such as the curbside organics program, allow them to reallocate their waste.

#### Administration and Contact Information:

The program is administered by the City's Solid Waste Department (SWMD). Lead Contact: Director David Newman Phone: (210) 207-6428

SWMD serves approximately 359,000 households, employs 730 individuals, and has a budget of over \$125.5 million for the 2019 Fiscal Year. SWMD operates four district centers located around the city, various closed landfills, and administrative offices.

In addition to providing customers with reliable solid waste collection, SWMD operates drop-off and processing sites for brush, bulky items, and household hazardous waste. SWMD also manages and maintains the city's closed landfills in compliance with the Texas Commission on Environmental Quality.

#### Eligibility:

All SWMD customers are eligible to participate in the program.

Cost:			
PAYT	SMALL	MEDIUM	LARGE
Solid Waste Fee	\$14.76	\$18.76	\$26.76
Environmental Fee - Solid Waste	\$1.74	\$1.74	\$1.74
Environmental Fee - Parks	\$1.50	\$1.50	\$1.50
Total City Services (Taxable)	\$18.00	\$22.00	\$30.00
Other fees:			
Blue Cart Contamination Fee	\$25.00		
Extra Garbage Collection Fee	\$10.00		



Residents can always downsize their cart at no cost. Residents can also request one cart upsize at no cost. Additional cart upsizes are \$25 per occurrence. Residents can also request additional collection pickup for \$10 by calling 311.

#### **References and Additional Resources:**

- City of San Antonio Garbage Collection Overview
- Rates & Fees
- San Antonio Recycling and Resource Recovery Plan (2013 Update)

# Commercial Waste Zones | New York City, New York

#### **Program Basics:**

Ordinance change preceded by a <u>Private Carter Study</u> in 2016, which was first proposed in <u>"One</u> <u>New York: The Plan for a Strong and Just City."</u>

The CWZ program will divide the city into 20 zones, each served by up to three carters selected through a competitive process. Five citywide contracts will also be awarded for the collection of containerized waste and compactors. This approach will reduce truck traffic associated with commercial waste collection by 50percent, eliminating millions of heavy-duty truck miles from NYC streets every year, while strengthening service standards and allowing for customer choice. In addition, commercial waste zones will create a new regulatory framework that allows the City to achieve several additional program goals:

- Zero Waste: Reduce commercial waste disposal and incentivize recycling
- Environmental Health: Reduce truck traffic throughout the city to reduce air pollution and improve quality of life
- Pricing: Provide fair, transparent pricing with low prices for businesses
- Customer Service: Strengthen customer service standards and establish accountability
- Health and Safety: Improve training and safety standards to make the industry safer for workers and the public
- Labor and Worker Rights: Improve industry labor standards and uphold worker rights
- Infrastructure and Waste Management: Prioritize investments in clean, modern fleets and facilities that make up a reliable, resilient, and sustainable waste management system
- Robust, Competitive Industry: Create a system that works for carters of all sizes and prevents overreliance on any single company

Moving toward implementation of the law, DSNY will conduct multiple rulemaking processes leading up to the release of an RFP in 2020. A multiyear customer transition process will begin in 2021.

#### Administration and Contact Information:

The program is administered by the NYC Department of Sanitation.

Lead Contact: Commissioner Kathryn Garcia



#### Eligibility:

All New York office buildings, retailers, restaurants, manufacturers, and other commercial establishments are subject to the program. The New York Sanitation Department (DSNY) collects residential waste.

#### Implementation Plan:

The City's plan to implement the CWZ program covered a five-year period (2018 - 2022), during which a variety of activities would be conducted to support a successful rollout of the program. The plan included:

- A period of environmental review from fall 2018 to summer 2019;
- A period of competitive solicitation from 2020 to 2021, during which interested carters could respond to the issued RFP; and,
- A customer transition from 2021 to 2023 with multiple phases within that final period.
- Stakeholder engagement has and will occur during every phase of the implementation plan.

#### **References and Additional Resources:**

- <u>New York City Department of Sanitation Commercial Waste Zones</u>
- Private Carter Study

# Container Deposit | State of Michigan

#### **Program Basics:**

The Michigan Beverage Container Deposit Law requires that every beverage container sold or offered for sale by a dealer within this state shall clearly indicate by embossing or by a stamp, a label, or other method securely affixed to the beverage container, the refund value of the container and the name of this state.

A dealer who regularly sells beverages for consumption off the dealer's premises shall provide on the premises, or within 100 yards of the premises on which the dealer sells or offers for sale a beverage in a returnable container, a convenient means whereby the containers of any kind, size, and brand sold or offered for sale by the dealer may be returned by, and the deposit refunded in cash to, a person whether or not the person is the original customer of that dealer, and whether or not the container was sold by that dealer. Regional centers for reclamation may also be established in addition to the standard retail locations. Retailers may, but are not required to, refund more than \$25 per day per person.

Michigan is one of 10 states with a beverage container deposit law. You can find information about other states' bottle bills at: <u>Container-recycling.org</u>.

#### Administration and Contact Information:



The program is administered by the Michigan Department of Treasury.

Lead Contact: Howard Heideman / Al Martin Email: <u>heidemanh@michigan.gov</u> Phone: (517) 335-7437

#### Eligibility:

The law applies to all:

- Soft drinks, soda water, carbonated natural or mineral water, or other nonalcoholic carbonated drinks; beer, ale, or other malt drinks of whatever alcoholic content; or a mixed wine drink or a mixed spirit drink. Kombucha was added in 2019.
- Any airtight metal, glass, paper, or plastic container, or a combination, under 1 gallon

#### Deposit Amount:

- \$0.10 per container
- \$338.1 million in refunds were issued in 2019, representing an 88.7 percent refund rate.

#### **Unredeemed Deposits:**

Twenty-five percent of unredeemed deposits in Michigan go to retailers, the other 75 percent is retained by the state in a Cleanup and Redevelopment Trust Fund (Trust Fund), and distributed as follows:

- 80 percent to the Cleanup and Redevelopment Fund, used to clean up specific sites of contamination in Michigan.
- 10 percent to the Community Pollution Prevention Fund, for educational programs on pollution prevention methods, technologies, and processes, with an emphasis on the direct reduction of toxic material releases or disposal, at the source.
- 10 percent remains in the Trust Fund. The Trust Fund continues to collect the 10 percent per year until a maximum of \$200 million is met.

#### **References and Additional Resources:**

- <u>Michigan Beverage Container Deposit Law</u>
- <u>Michigan Bottle Deposit Law FAQ</u>
- Bottle Bill Resource Guide

# Volume-Based Pricing | Portland, Maine

#### Program Basics:

The program relies on the pay-as-you-throw (PAYT) collection model. Waste generators are required to purchase color coded or imprinted plastic bags or stickers for their waste at retail outlets. The predetermined price of each bag or sticker includes some or all of the cost of waste services. Collection crews only collect municipal solid waste (MSW) with purchased stickers or placed in official blue bags. From FY2012 and FY2014 the program processed an average of 7,900 tons of MSW each fiscal year.



#### Administration and Contact Information:

The program is administered by the City's Department of Public Works.

Lead Contact: Director Christopher Branch Phone: (207) 874-8801

#### Eligibility:

All residential single family and a large number of multi-family buildings and municipal buildings are eligible to participate. An estimated 14,200 single family customers and 1,700 multi-family and municipal buildings are served under the program.

#### Cost and Revenue:

The program generated an average of \$1,576,827 in revenue from FY2012 to FY2014. Expenditures during that same period are shown in the table below.

Expense	3-year Average Amount (USD)
Personnel	\$1,048,835
Vehicle Fuel, Maintenance, and Repair	\$254,161
Disposal (Tip) Fees	\$772,481
Ecomaine Assessment	\$695,680
Riverside Facility Operations	\$1,169,349
Other	\$212,006
Total	\$4,152,511

#### **References and Additional Resources:**

• Evaluation of Recycling and Solid Waste Collection Services

# Recycling Incentive Payments | San Jose, California

#### Program Basics:

The program has restructured RFPs and resulting contract agreements with recycling contractors so that contractors are paid (per household serviced) an incentive for diversion rates above 40 percent. These incentive payments are made according to a tiered system, where the greater the diversion rate the greater the payment. These payments offset the costs to contractors incurred by marketing "hard-to-market" materials like textiles.



Contractors keep 100 percent of revenue derived from the sale of recyclables. Contract requirements also ensure contractors receive more compensation for recycling materials than sending them to landfills. Lastly, contractors with commercial recycling contracts are charged a flat franchise fee, mitigating the city's financial risk as diversion rates fluctuate.

#### Administration and Contact Information:

The program is administered by the City's Environmental Services Department.

Lead Contact: Director Kerrie Romanow Phone: 408-277-3671

#### Eligibility:

All residents and commercial entities in San Jose are eligible to participate.

#### Cost:

The city is required to pay recycling contractors between \$5.40 to \$9.20 per household based on a tiered payment system for diversion rates above 40 percent. Contractors achieving a diversion rate of at least 46 percent will receive the highest rate of \$9.20 per household.

#### Annual Tonnage based on FY17/18 data:

- 369 tons per day on average collected from 214,000 single-family dwellings
- 83 tons per day on average collected from 3,373 multi-family dwellings
- The two materials recovery facilities that process recyclables can operate at peak tonnage of 2,530 each day.

#### Location:

- Recycling services for single-family dwellings are separated into three districts serviced by two contractors.
- Multi-family dwellings citywide are serviced by one contractor.

#### **References and Additional Resources:**

- U.S. EPA Zero Waste Case Study
- San Jose Recycle Plus Material Flow and Facility Diagram
- <u>Status Update to San Jose's Zero Waste Strategic Plan 2022</u>



# **Reuse and Repair**

#### Building Materials Reuse Warehouse | Houston, Texas

#### **Program Basics:**

The warehouse provides infrastructure to store materials until they can be reused by the community. <u>A list of accepted items is linked here.</u> The Solid Waste Management Department provides guidance for unaccepted materials.

#### Administration and Contact Information:

The program is administered by the City's Solid Waste Management Department. Lead Contact: Director Harry J. Hayes

Email: <a href="mailto:swdworks@houstontx.gov">swdworks@houstontx.gov</a>

#### Eligibility:

Individuals, supply companies, and builders in Houston are eligible to donate materials. Non-profit organizations in Houston are eligible to receive materials to reuse for free.

#### Cost and Funding:

Not-for-profit organizations can collect materials for reuse at no cost. The program is funded by a grant from Houston Galveston Area Council, a region-wide voluntary association of local governments in the 13-county Gulf Coast Planning region of Texas. Excerpt from *Guide to Developing Building Material Reuse Centers* - "The majority of the case studies presented in this report received some form of grant funding for one to two years for start up and then became self sustaining. Some of the non-profit operated centers conducted fundraising to help support the centers. The municipally operated centers are supported by city budgets after grant funding expires."

#### **References and Additional Resources:**

Guide to Developing Building Material Reuse Centers

#### Materials Marketplace | Austin, Texas

#### **Program Basics:**

The Austin Materials Marketplace is an online platform allowing businesses and organizations to connect and find reuse and recycling solutions for waste and by-product materials.

Since 2014, the Austin Materials Marketplace has facilitated over 700 unique transactions characterized by:

- Value of over \$645,000
- Weight of over 945,000 pounds



- Volume of over 55,000 cubic feet
- Over 950 MTCO2E avoided

Since 2014, the top categories of material types transacted through the marketplace by weight have been (in descending order):

- Inedible organics
- Business furniture, fixtures, and equipment
- Metals and metal sludge
- Paints and coatings
- C&D concrete and aggregates
- Wood pallets
- Non functional electronics
- Functional electronics
- C&D wood

#### Administration and Contact Information:

The program is administered by the U.S. Business Council for Sustainable Development.

Lead Contact: Daniel Kietzer Email: <u>kietzer@usbcsd.org</u> Phone: (512) 981-5417

#### **Eligibility**:

Participation is open to any company or organization that wants to explore new opportunities to transform waste materials into new products, or secure recycled material streams to reduce use of virgin feedstocks.

#### Cost:

Costs to use the online platform (a.k.a. software-as-a-service costs [SaaS]) were variable based on the number of users on the platform. For example, the State of Michigan has 300 users costing \$5 per user per month which equates to a total of \$1,500 per month.

Additional costs include labor hours for the U.S. BCSD advisory support services for initial recruitment and platform creation. The program in Austin included six-year support contract with U.S. BCSD, intended to become self-sustaining at that point.

#### **References and Additional Resources:**

- <u>Austin Materials Marketplace website</u>
- US Business Council for Sustainable Development

# Urban Ore Materials Reuse | Berkeley, California

**Program Basics:** 


The City of Berkeley has granted exclusive salvage rights to materials from the City's transfer station tip floor to Urban Ore. Urban Ore has allocated space on the Transfer Station property for a staff shed and the salvage vehicle which transports the salvaged materials to their retail Eco Park in South Berkeley. Through the exclusive contract, approximately 800 tons of materials are salvaged and reused each year on average.

#### Administration and Contact Information:

The contract is administered by the City's Department of Public Works.

Lead Contact: Director Liam Garland Email: <u>pwrecycle@CityofBerkeley.info</u> Phone: (510) 981-7270

#### Urban Ore's Economic Impact:

- 40 living wage staff jobs with income-sharing performance incentives, profit sharing, and benefits
- In 2014, Urban Ore supplied nearly \$2.6 million dollars' worth of construction materials and other goods to local artisans, contractors, property managers and residents

#### **References and Additional Resources:**

- City Council Report (June 2020)
- <u>Video Highlight</u>



### **Specialty Material Diversion**

### Appliance and Electronics Fee Stickers | Madison, Wisconsin

#### **Program Basics:**

The City of Madison charges a fee to recycle many appliances. This fee applies to appliances left at the curb for collection or brought to the two City drop-off sites. The City of Madison Streets Division contracts with Universal Recycling Technologies to recycle electronics and appliances locally in Wisconsin.

#### Administration and Contact Information:

The program is administered by the City's Streets and Sanitation department.

Email: streets@cityofmadison.com Phone: 608-246-4532

#### **Eligibility**:

The program is available to all residents of Madison. The sticker order site is linked here.

#### Cost:

A \$35 fee will be charged for the following items.

- Air Compressors
- Boats
- Ovens
- Air Conditioners
- Ranges
- Copiers
- Refrigerators
- Dehumidifiers
- Stoves
- A \$15 fee will be charged for the following items. • Fluorescent light
  - fixtures
  - Microwave ovens
- Small "dorm" • refrigerators weighing less than 50 pounds

- Furnaces
- Water Softeners
- Large Medical Devices
- Ice Machines
- Water Coolers
- Hot Tubs
- Tanning Beds
- Gas Grills
- Lawn Mowers
- Snow Throwers
- Garden Tiller

Computers (\$10) and televisions (\$15) are available for drop off, but are not included in the curbside program

#### **References and Additional Resources:**

- Madison Streets & Recycling
- Madison Television, Computer, and Electronics Recycling Program



Appliances Wood Stoves Dishwashers

Large Commercial

- Trash Compactors
- Dryers
- Washers
- Freezers
- Water Heaters

#### Textile Recycling | Lansing, Michigan

#### **Program Basics:**

The program uses uniquely colored Simple Recycling bags (orange for Lansing, MI) which are requested by residents. Simple Recycling handles all aspects of the program launch and education, collection, processing and management of the program. The program reduces textile contamination and downtime at single stream recycling facilities. Simple Recycling trucks follow the City's existing trash or recycling collection schedule, meaning no extra collection day for residents. All of the materials are graded and sorted locally and/or regionally based on guality and



condition. The top quality materials will be resold to local thrift outlets, mid grade is exported to international markets and "unusable" items are processed for raw materials.

#### Administration and Contact Information:

The program is administered by Capital Area Recycling and Trash (CART). Email: <u>recycle@lansingmi.gov</u> Phone: (517) 483-4400

Eligibility: The program is available to all Lansing residents.

#### Cost:

The program is free for participants. All Simple Recycling programs are offered free of cost to cities, residents and participants. Additionally, the municipality will be compensated on a "per pound" basis for the material collected by Simple Recycling.

In East Lansing, the City receives \$0.01 for each pound of material collected by Simple Recycling. The average collection volume is 4,000 to 5,000 pounds per month, bringing in \$40 to \$50 per month to the City to be used for recycling education materials.

#### **References and Additional Resources:**

- Simple Recycling website
  - Impact information from Simple Recycling
  - Information on other participating cities
- City of Lansing CART website



#### Appendix A: Deconstruction Policy | Portland, Oregon

#### Ordinance No. 187876

Adopt requirements for deconstruction of the city's oldest and most historic houses and duplexes (Ordinance; add Code Chapter 17.106). The City of Portland Ordains:

Section 1. The Council finds:

- 1. On February 12, 2015, City Council directed the Bureau of Planning and Sustainability to develop strategies for increasing deconstruction activity.
- 2. On April 15, 2015, the Bureau of Planning and Sustainability convened a Deconstruction Advisory Group comprised of deconstruction experts, builders, developers, neighborhood groups and historic preservationists; this group met 16 times to provide advice on strategies and incentives for advancing deconstruction activities.
- 3. On June 3, 2015, City Council adopted Resolution 37127, which directed the Bureau of Planning and Sustainability to establish a deconstruction grant program with funding from the Solid Waste Management Fund Reserves and to report back in January 2016 with recommendations for next steps.
- 4. On September 8, 2015, the Bureau of Planning and Sustainability launched the deconstruction grant program and has funded 11 projects to date, resulting in innovative approaches, new participants, and increased awareness of the benefits of deconstruction.
- 5. On February 17, 2016, City Council adopted Resolution 37190 which directed the Bureau of Planning and Sustainability to develop code language for Council consideration to require deconstruction for the city's oldest and most historic houses and duplexes.
- 6. Bureau of Planning and Sustainability applied (Ordinance 187474) and received notice of award from the Oregon Department of Environmental Quality (DEQ) for \$50,000 in funding to supplement the existing deconstruction grant program.
- 7. A review draft of the deconstruction code language was available for a four-week public comment period.
- 8. With the assistance of a local workforce development consultant, the Bureau of Planning and Sustainability convened a group of stakeholders to develop a training and certification plan for deconstruction workforce and contractor.

NOW, THEREFORE, the Council directs:

- a. City Code Title 17 is amended to add a new Chapter 17 .106, Deconstruction of Buildings Law attached as Exhibit A.
- b. The City Code amendment adding Chapter 17 .106 shall be effective on and after October 31, 2016 to allow adequate time for the development of administrative rules, procedures,



database programming, and training/certification of deconstruction workforce and contractors.

- c. The Bureau of Planning and Sustainability shall report back to City Council within the first six and twelve months of the deconstruction program's effective date, addressing program status and making recommendations on whether or not to modify, maintain, or expand the program with a goal of including houses and duplexes built before 1941 by the year 2019.
- d. Develop administrative rules, procedures and forms associated with adopted code language.

#### Appendix B: Food Waste Drop Off | **Washington, D.C.**

#### Municipal Law: § 8-761. Compost drop-off program.

(a) The Department of Public Works ("Department") shall establish a program that allows residents to drop off food waste weekly for compost.

(b) The Department shall establish one drop-off site in each ward to operate year-round.

- (c) The Department shall provide the public with instructional materials that describe:
  - (1) How to collect food waste for compost; and
  - (2) What food waste is appropriate for compost.

(d) If the Department requires residents to purchase any materials or equipment to participate in the program, the Department shall sell the materials or equipment at cost; provided, that the Department shall provide any required materials or equipment for free to any resident who participates in a federal assistance program.

#### Appendix C: Commercial Waste Zones | **New York City, New York**

Local Law 199 of 2019 requires the establishment of Commercial Waste Zones throughout NYC

#### A LOCAL LAW

To amend the New York city charter and the administrative code of the city of New York, in relation to the establishment of commercial waste zones, and to repeal sections 16-523 and 16-524 of such code, relating to a pilot of special trade waste removal districts

Section 753 of the New York city charter is amended by adding a new subdivision e to read as follows:

e. Except as otherwise authorized by section 16-1020 of the administrative code, the commissioner shall have the powers and duties set forth in this subdivision.

1. The commissioner, in the performance of his or her powers and duties pursuant to paragraph 2 of this subdivision and title 16-B of the administrative code, shall be authorized to receive complaints, conduct investigations, hold public and private hearings, administer



oaths, take testimony, serve subpoenas, receive evidence, issue orders, and mediate disputes.

2. The commissioner shall have the power and duty to regulate the conduct of businesses authorized to collect commercial waste in commercial waste zones pursuant to title 16-B of the administrative code and any other applicable law, including but not limited to, the power and duty to establish and enforce:

(a) environmental, safety and health standards;

(b) standards for service;

(c) requirements regarding contracts for commercial waste removal;

(d) requirements regarding billing forms and procedures;

(e) requirements regarding the maintenance and inspection of records;

(f) requirements regarding the maintenance of appropriate insurance; and

(g) requirements established in furtherance of the goals of reducing waste and

promoting sustainability, safety and efficiency in the commercial waste zone system. 3. The commissioner shall have the power and duty to establish programs for the education

of the public and commercial establishments regarding the commercial waste zone system established pursuant to title 16-B of the administrative code.

Subdivision a of section 16-116 of the administrative code of the city of New York, as amended by local law number 42 for the year 1996, is amended to read as follows:

No later than the applicable final implementation date set forth in the rules of the department pursuant to subdivision e of section 16-1002, each owner, lessee or person in control of a commercial establishment [that is located in a special trade waste removal district designated by the New York city trade waste commission pursuant to section 16-523 of this code, except for an owner, lessee or person in control of a commercial establishment who has registered with the New York city trade waste commission as required by subdivision b of section 16-505 of this code and except as otherwise provided by subdivision g of section 16-523 of this code,] shall [provide] contract with an awardee selected by the department for the zone in which such establishment is located for the removal of commercial waste only by a [licensee with whom such commission has entered into an agreement pursuant to subdivision b of such section] designated carter pursuant to the agreement entered into between such awardee and the department pursuant to title 16-B, as such terms are defined in section 16-1000, in accordance with the provisions of such title and any rules promulgated pursuant thereto, except as otherwise provided by such title, provided however, that an owner, lessee or person in control of a commercial establishment may contract for the removal of containerized commercial waste, as such term is defined in section 16-1000, with either an awardee selected for such zone or with an awardee selected for the removal of containerized commercial waste citywide pursuant to title 16-B, in accordance with the provisions of such title and any rules promulgated pursuant thereto.





# CITY OF CHICAGO WASTE STRATEGY MATERIALS MANAGEMENT STRATEGIES

JULY 2021



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### **STRATEGY OVERVIEW**

The City of Chicago has an exciting opportunity to implement strategies to tackle the issues of waste and materials management that impact its economy, environment, and citizens every day. The strategies listed in this document offer opportunities to reduce waste; increase diversion through reuse, recycling, and composting; reduce costs; and increase economic and environmental justice opportunities.

Strategies were developed through:

- Review of current waste and recycling data, programs, policies, and infrastructure;
- Analysis of best practices and programs in peer cities; and
- Engagement with stakeholders in the City, the private sector, and Chicago communities.

Redesigning how the City manages waste and recycling and addresses long-standing environmental justice issues requires a long-term commitment on behalf of many of the City's stakeholders. This holistic strategy represents the first step in that process. This first phase is intended to provide guidance that accounts for the many perspectives in the city regarding waste, addresses the budgetary realities, and incorporates other systemic challenges to prioritize actionable strategies to achieve ambitious goals.

In transitioning to implementation, this document includes several approaches to address the multifaceted issue of materials management. These approaches can be prioritized or deprioritized by the City, and many can be addressed simultaneously. This menu of strategies is intended to allow the City to deliberately allocate limited resources and maximize impact.

**NOTE:** The complete City of Chicago Waste Strategy is comprised of the Materials Management Strategies, Existing Conditions Report, Peer City Analysis, and the UIC Waste Characterization and Generation Update report.



### **GUIDING PRINCIPLES**

These guiding principles serve as a compass upon which the City of Chicago can rely as it works to advance the strategies presented in this report. These guiding principles provide not only direction and accountability in action, but also ensure that these priorities are kept in focus over time. Specifically, these guiding principles are to be practically incorporated as essential elements in every strategy described in this report. Some strategies will more closely reflect these guiding principles than others. Therefore, it is important to note that these principles address a diversity of priorities and elements of the waste system. For example, the first principle addresses the need to change societal perceptions and a material shift in policy and practice.

#### Reframe Chicago's materials as resources, instead of waste.

Include sustainable materials management practices in Chicago's overall climate mitigation and adaptation strategies.

Change existing perceptions using tailored educational programs to reframe waste materials as valuable resources that are not being utilized and reconfigure Chicago's materials management system away from disposal.

Shift materials interventions upstream to capture value and materials before they enter any waste stream (e.g. procurement changes, reuse, repair)

#### Center equity and environmental justice in program design

Consider neighborhood-specific impacts (both positive and negative) based on current and historical land use, and projected climate change impacts.

Analyze strategies for potential unintended consequences.

Avoid creating additional burdens (financial or otherwise) for low- to moderate-income (LMI) Chicagoans.

#### As the City, identify opportunities for establishing internal and external partnerships.

Clarify and document the role of the Mayor's Office, legislative body, and City departments and agencies to determine how coordination can improve.

Partner with early adopters (institutions, corporations, and organizations) already pushing innovation in waste reduction in Chicago.

Identify how the City can create the conditions to sustain impactful partnerships and a more participatory materials management system.

# Prioritize initiatives with revenue potential, no/low cost, or a positive return on investment when applied at scale.

Identify opportunities for economic benefit, revenue generation, and additional cost savings through materials management.



Consider budgetary realities to develop realistic strategies.

Prioritize most critical investment needs to meet identified City goals.

# Identify opportunities to include goal setting, metrics, and data sharing to demonstrate progress and increase transparency.

Develop opportunities to share data and resources with the community.

Prioritize routine, equitable stakeholder engagement.

Establish goals and metrics for success and determine how those metrics will be realistically evaluated.

# Equip consumers with the education and tools needed to drive innovation in evolving waste systems.

Consider necessary investments to support initial and continuous public education.

Prioritize routine, equitable stakeholder engagement.

Highlight opportunities for Chicago to act as a national leader in sustainability.



### **STRATEGY ORGANIZATION & ASSESSMENT FRAMEWORK**

The strategy organization described in this section will help frame the strategies presented in the following section. Materials management is a highly complex system, and there are many ways to segment and address the issues present within it.

### STRATEGY CATEGORIZATION

Materials management strategies are organized into seven categories, each of which addresses a different component of the system. These categories include:

#### **Municipal Management and Data Tracking**

Opportunities for improved municipal management of waste and materials to lead by example, strengthen capacity for citywide programs and initiatives, and improve data collection and management to enforce policies, improve how trends are identified, increase transparency in the process, and build trust among Chicago's residents more efficiently.

#### Source Reduction, Reuse and Repair

Highlighting impactful, upstream strategies related to source reduction, extending the useful life of materials, and reuse. Preventing materials from entering the waste (or recycling) stream reduces pressure on existing systems and infrastructure maximizes climate benefits, shifts the cultural norms towards circularity and away from traditional disposal models, unlocking potential for economic benefit and improved sustainability.

#### **Residential Waste Reduction**

This section offers strategies to reduce the waste volume and increase diversion rates in recycling, yard waste, and compost programs for Chicagoans in both low-density (single family homes and multifamily buildings with four or fewer units) and high-density (multifamily buildings with five or more units) residences.

#### ICI (Industrial, Commercial, and Institutional) Waste Reduction

Opportunities for reduction and diversion of waste generated by Chicago's ICI (industrial, commercial, and institutional) sector, which includes businesses, like restaurants and office buildings; institutions including government, cultural, and educational; and manufacturing and other industrial processes.

#### **Organics and Wasted Food**

Highlights opportunities to reduce organics and food currently sent to landfills in the residential and ICI sectors and bolster markets for finished compost.

#### **Specialty Materials**

Addressing materials in Chicago's waste stream that cannot or should not be managed through traditional curbside recycling or composting initiatives including household hazardous waste (HHW), bulk items, electronic waste, pharmaceuticals, textiles, and plastic film.



#### **Construction & Demolition Debris**

This section provides strategies for diverting materials generated from construction, renovation, demolition, or deconstruction projects through recycling and reuse.

### **STRATEGY TYPE FRAMEWORK**

Each topic section includes a menu of strategies for the City of Chicago to consider according to available funding, partners, and administration prioritization. It is important to note that one should consider how the strategies presented in this document might interact with each other. More specifically, care should be taken to anticipate any potential conflicts or unintended consequences related to the goals and implementation requirements of each strategy when implemented jointly.

This framework provides a tiered model for assessing key factors that impact each strategy's overall feasibility and readiness for implementation. Specifically, the framework focuses on the overall complexity and ease of implementation of each strategy, the expected timeline for implementation, and the expected cost and financial impact of each strategy. Ultimately, strategies will be categorized as a *Pilot, Practical*, or *Optimal* strategy based on the projected impact of the relevant factors as identified by the project team.

**Optimal** strategies are those that are relatively complex and more demanding in terms of the coordination and resources required to implement. These will have the greatest relative diversion potential among the menu of strategies and may be suitable to implement in concert with other strategies in the same materials category. And, though they represent the most ambitious of the proposed strategies, they have been developed to reflect the realities of the current system.

<u>**Practical**</u> strategies are those that can be readily implemented at full scale; they represent less ambitious, attainable progress toward long-standing materials management goals with modest diversion potential. These strategies are characterized by a relatively high degree of feasibility with fewer complexities related to coordination and mobilization of resources required for implementation.

**<u>Pilot</u>** strategies are those that are ready for site-specific implementation and are characterized by a high degree of feasibility and relatively low demand for additional coordination and resources. These strategies represent opportunities to both evaluate program performance within a defined geography and to support additional efforts undertaken through other selected materials management strategies.



### **PILOT ASSESSMENT FRAMEWORK**

Planning Timeline & Complexity		
LOW END	Limited intergovernmental coordination required; primarily operational initiatives	
	<ul> <li>Moderate intergovernmental coordination required (e.g. permitting)</li> </ul>	
HIGH END	<ul> <li>High degree of coordination required among internal stakeholders</li> <li>Significant commitment by private and public sector stakeholders required to support implementation, education and outreach</li> </ul>	

Cost	
\$ LOW .	Limited intergovernmental coordination required; primarily operational initiatives
\$\$ MID RANGE	Moderate intergovernmental coordination required (e.g. permitting)
\$\$\$ HIGH END	High degree of coordination required among internal stakeholders Significant commitment by private and public sector stakeholders required to support implementation, education and outreach



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### **MATERIALS MANAGEMENT STRATEGIES**

### **MUNICIPAL MANAGEMENT & DATA TRACKING**

Municipal management of waste and materials can include providing leadership and guidance through City of Chicago offices and facilities, as well as strengthening capacity for citywide programs and initiatives through interdepartmental collaboration and communication. Additionally, improving data collection and management within the network of partners in Chicago's waste system can provide opportunities to enforce policies, improve how trends are identified, increase transparency in the process, and build trust among Chicago's residents more efficiently.

#### Identifying Opportunities to Lead by Example

#### Practical: Update procedures for municipal offices and facilities to minimize waste generation.

The City of Chicago is an expansive organization with more 30,000 employees comprising more than 30 departments.<sup>1</sup> Municipal buildings can demonstrate leadership in improving management of office and consumable waste through effectively developing and implementing materials management goals and policies.

Policies around source reduction (e.g. providing reusable serviceware for coffee and meals), increasing recycling (e.g. placing additional paper recycling bins near printers), preventing food waste (e.g. reducing excess food ordered in catered meetings), improving access for specialty material disposal (e.g. hosting annual e-waste collection events for employees), or procurement (e.g. purchasing supplies and materials with high levels of recycled content) are a great place to start for municipal facilities. Though these initiatives may not have an overwhelming impact on the City's overall waste generation and diversion tonnage, they are important steps to provide models for other entities and shift the cultural norms around waste.

#### Practical: Update vendor guidelines to minimize waste generation

Establishing vendor guidelines for municipal facilities and events can support internal policies to minimize waste generation. Coordinating with the Department of Procurement Services to establish appropriate waste minimization requirements for City vendors and contractors can help to amplify policies and procedures implemented for municipal offices.

The Chicago Department of Aviation (CDA) has developed extensive sustainability guidelines for airport terminal vendors through the Sustainable Airport Manual. The Manual includes guidance on single-use plastic reduction, surplus food donation, waste stream audits, and other materials management strategies.<sup>2</sup> These requirements can provide a framework for broader municipal implementation.

In December 2020, the State of California passed new legislation requiring any food service concessionaires operating on state-owned property or for a state agency to exclusively use packaging that is reusable, recyclable, or compostable.

Source: CalRecycle



#### <u>Optimal: Continuously highlight Chicago successes and initiatives in sustainable materials</u> <u>management</u>

Regular external communication highlighting new and existing materials management initiatives in Chicago can help to increase community awareness and participation in programs, build momentum for future momentum, increase accountability for goals and metrics, and highlight Chicago as a leader in the sustainability field nationwide.

#### **Improving Data Tracking & Sharing**

#### Practical: Update or add additional calculations for waste metrics

The City of Chicago often cites diversion rate, particularly the diversion rate for the Blue Cart program, when evaluating waste streams and the success of waste management programs. Reassessing municipal waste metrics can provide a more holistic and accurate picture of Chicago's materials management system, while also highlighting opportunities for improvement.

Calculating diversion rates that encompass different waste streams like ICI, high density residential, and C&D can provide more insight to overall materials management in the city. Considering what waste streams are captured in diversion numbers can also generate more valid comparisons when looking at peer cities.

Using capture rates - the percentage of recyclable materials actually being recycled - indicates how well a program is recovering materials. This information can inform how successful a program is while also indicating areas where a more targeted approach can improve outcomes.<sup>3</sup>

Though Chicago's Blue Cart lowdensity residential diversion rate has hovered near eight to 10 percent for several years, this is only a small portion of the waste generated and diverted in Chicago overall. In the most recent comprehensive generation and diversion studies conducted in 2010, CDM Smith calculated diversion rates for DSScollected residential (8%), private collected (19%), and C&D (65%) resulting in an **overall diversion rate** of 45 percent. While there is still room for significant improvement, it is important to base comparisons against peer cities on comparable diversion metrics.

Source: Chicago Waste Diversion Study, 2010

Additionally, updating waste metrics can allow for more accurate goal setting and progress tracking for Chicago's materials management system.

#### <u>Practical: Streamline permitting, reporting, and enforcement standards and responsibilities</u> <u>between City departments.</u>

As described in the Chicago Waste Strategy Existing Conditions report, responsibility for permitting, reporting, and enforcement for components of the waste system are spread across several City departments.

The Department of Streets and Sanitation (DSS) is responsible for enforcement of private hauler reporting requirements, though the Department of Business Affairs and Consumer Protection



(BACP) have authority to withhold business license renewal.<sup>4</sup> The Chicago Department of Public Health (CDPH) is responsible for permitting waste processing, disposal facilities and collecting data around C&D debris generation and diversion; but, recyclers often send reports to DSS.<sup>5</sup> The City's commercial dumpster database for containers in Chicago Department of Transportation (CDOT) permitted alleys is managed by the Department of Assets, Information, and Services (AIS) and DSS is responsible for enforcement.<sup>6</sup> Though a complex materials management system requires significant coordination and expertise, these examples highlight potential communication and accountability issues for ensuring effective data collection and enforcement of City policy.

Once roles are clarified, data collection and reporting requirements can also be strengthened. For Chicago's low-density residential Blue Cart program, the Department of Streets and Sanitation developed updated requirements for private haulers serving one or more zones starting in 2021. New bid requirements include daily reporting of route completion, weekly reporting of collection refusals and cart tagging due to severe contamination (and photo documentation of contamination), monthly reporting of collection tonnage, and annual reporting of composition and capture rate data by service area.<sup>7</sup> Building requirements and capacity for data collection across materials management programs is essential for addressing issues, developing responsive solutions, and improving overall diversion.

#### Optimal: Transition the City's waste reporting system to a dynamic, digital platform

Data collection and reporting is required for several actors in Chicago's materials management system but reporting enforcement and data analysis is often labor-intensive and results in an incomplete or outdated understanding of waste generation and diversion.

Shifting to a responsive, digital platform can allow data to be shared and analyzed real-time. Private waste haulers are required to report collection tonnage and diversion data and strengthening and reinforcing requirements for haulers while streamlining platforms can help to maintain an accurate and up-to-date picture of Chicago's materials management landscape. Real-time data collection and analysis can also provide opportunities for more frequent and transparent public engagement around waste data and potential solutions. Re-TRAC Connect is an example of a software system designed for municipalities and other public entities to collect, analyze, and share waste and recycling data. Waste system actors like haulers, transfer stations, and recycling facilities report information directly into the Re-TRAC Connect system, which provides real-time updates for analytical reports including tonnage, diversion, GHG equivalencies, and others. These reports are then ready to share with the Chicago community to increase transparency in the materials management system.

Source: Re-TRAC Connect

#### **Building Municipal Capacity**

Transforming and improving Chicago's materials management system is a complex problem that requires coordination between many actors, both internal and external to the municipal government. In addition to streamlining responsibilities for data collection, permitting, and



enforcement, there are several opportunities to build the City's capacity to lead materials management strategies and engage external partners.

#### <u>Practical: Invest additional staff and resources to materials management initiatives across</u> <u>departments</u>

Although streamlining roles and responsibilities can ease workloads for Chicago employees, any department leading a new materials management initiative will be required to invest in staff and other resources to be successful. Limited time and staff capacity were cited by several internal City stakeholders as barriers to implementing or scaling programs and enforcing policies. Improving the efficiency of materials collection and reducing the tonnage of materials sent to landfills will reduce costs, but major improvements will likely also require targeted investment and dedicated staff.

#### <u>Optimal: Re-establish the Department of Environment to centrally manage sustainability</u> <u>initiatives, including materials management.</u>

Following the dissolution of Chicago's Department of Environment in 2012, several initiatives related to waste reduction and sustainable materials management were distributed to other departments. Reestablishing the Department of Environment with an additional emphasis on environmental justice can improve coordination and the prioritization of materials management strategies that provide equitable benefits for all Chicago residents.

In the interim, establishing an interdepartmental group of internal City stakeholders can support communication and coordination in moving materials management initiatives forward.

Low-density residential garbage and recycling collected by DSS/Blue Cart costs Chicago residents \$9.50 per household per month. This fee generated over \$64 million in 2020, but only covers about a quarter of the cost of recycling and waste collection/disposal for residences served by DSS.

Chicago's waste fee is lower than peer cities. For example, monthly fees for low-density residential service are \$36.32 in Los Angeles, \$25.08 in Minneapolis, and \$14 in St. Louis.

Sources: Chicago OBM, RecycLA, Minneapolis Public Works, City of St. Louis



### SOURCE REDUCTION, REUSE, AND REPAIR

The most impactful strategies for improving materials management in the City of Chicago are related to source reduction, extending the useful life of materials, and reuse. Preventing materials from entering the waste (or recycling) stream reduces pressure on existing systems and infrastructure and captures additional climate benefits through reduced landfilling, transport, and processing, and a reduced need for the extraction of virgin materials. Additionally, shifting cultural norms towards circularity and away from traditional disposal models unlocks potential for economic benefits, jobs, and sustainability.

Note: this section focuses on opportunities for source reduction, reuse, and repair generally - material specific strategies for organics and building materials can be found in later sections.

#### **Supporting Material Reuse**

#### <u>Practical: Develop a comprehensive directory for reuse options in Chicago across several</u> <u>material types.</u>

Establishing a directory of businesses and organizations in the reuse and secondhand market can encourage material reuse and highlight opportunities outside of disposal and purchasing new items. There is already a strong network of reuse, thrift, consignment, repair, and share entities in Chicago that can grow with increased awareness and participation.

A City-supported, reliable directory with information about accepted and available material types and services can increase the convenience of reuse efforts and highlight existing gaps for future reuse endeavors. The Hennepin County, MN Choose to Reuse website provides a directory of hundreds of organizations and businesses in the Twin Cities area that offer opportunities for buying, selling, and donating used items, repairing items, and renting and sharing items including furniture, apparel, electronics, pet supplies, medical and fitness equipment, musical instruments, office supplies, and more. Choose to Reuse also provides resources for residents interested in learning more about waste reduction and reuse.

Source: Hennepin County Choose to Reuse

# <u>Pilot Opportunity: Support existing and new material exchange initiatives in Chicago and the region through creating tax and financial incentives.</u>

Connecting waste, surplus, and byproduct materials from businesses and institutions to other Chicago-area entities that can use those materials as inputs can significantly reduce waste. However, the incentives for doing so are often absent or involve significant startup and operating costs. There is no silver bullet to developing tax incentives to solve systemic problems, and they must be designed and tested carefully.

The City can play a significant role in encouraging private enterprises to change their approach to waste management through the creation of subsidies, tax incentives, and taxes on certain goods and services. Examples of incentives for environmentally friendly products and services are numerous; so too are examples of programs that failed to achieve their intended



environmental effect. Chicago has piloted entrepreneurial waste initiatives in the past with some success, but few initiatives have been developed beyond the pilot phase.

To meet this challenge, the City could facilitate a roundtable discussion among key stakeholders to engage on specific issues and develop working groups to tackle specific issues. The roundtable should encourage open dialogue on nuanced issues that affects stakeholders and their constituencies. The goals of this group should include discussion of implementation strategies for a certain waste stream, constituency, or initiative to guide the development of legislation or other policy initiatives. An example of a similar effort delivering actionable recommendations was the NextGrid initiative, led by the State of Illinois, convened electric utility stakeholders to discuss and develop solutions to complex issues in the energy sector.<sup>8</sup>

### \$\$ MID RANGE RANGE

Rheaply, a Chicago-based technology company, has developed an Asset Exchange Manager (AxM) platform that allows organizations and institutions to track, share, rent, donate, and sell physical assets. Resource tracking reduces unnecessary purchases and waste and increases reuse opportunities within an organization or throughout a network.

Rheaply has been deployed in Chicago to support equitable distribution of personal protective equipment (PPE) during the COVID-19 pandemic. Rheaply is also used by several Chicago-area businesses and institutions including the University of Illinois at Chicago's Great Stuff Exchange (GSX) where surplus office supplies and materials are available to students, faculty, and staff free of charge.

Source: Rheaply, UIC Sustainability

#### **Opportunities for Source Reduction**

#### Optimal: Enact the Plastic Free Waters Ordinance

To reduce the estimated 11.6 million pounds of plastic entering Lake Michigan each year,<sup>9</sup> Chicago's City Council proposed the Plastic Free Wasters Ordinance in January 2020. This legislation, if passed, would limit the use of disposable serviceware in restaurants and bars, including prohibiting polystyrene in food service. The ordinance would also encourage the increased use of reusable items and requirements around education and signage for waste, recycling, and composting.<sup>10</sup>



# CHICAGO MATERIALS MANAGEMENT STRATEGIES

Some Chicago businesses are already providing leadership in reducing plastic packaging and waste. Several grocery stores provide bulk shopping options and allow patrons to bring their own containers to fill. Eco & The Flamingo in Lincoln Square is a "zero waste general store" that offers bulk options for customers to fill their own containers of food, household cleaning products, personal care items, and more.

Source: Eco & The Flamingo

The ordinance remains under review, on hold due to the COVID-19 pandemic, which has impacted the restaurant industry and has increased consumer reliance on carry out and delivery services. Once restaurants and bars in Chicago can safely operate at full capacity and recover economic losses, ordinance provide this can an opportunity to reduce waste and contamination from the food service sector.11

#### <u>Pilot Opportunity: Establish a partnership program with unwanted mail services for Chicago</u> <u>residents to reduce junk mail.</u>

The United States Postal Service (USPS) handled over 75 billion pieces of advertising mail in 2019.<sup>12</sup> Individuals can reduce their unwanted advertising mail through services like PaperKarma,<sup>13</sup> CatalogChoice,<sup>14</sup> and DMAchoice,<sup>15</sup> which allow users to opt out of physical junk mail. Providing a central location for Chicago residents to opt-out of unwanted mail can help to increase awareness of these services and reduce the volume of paper in Chicago's mail. GreeNYC has established a partnership with CatalogChoice to support New York City residents looking to reduce their unwanted mail. This partnership has resulted in over 100,000 residents opting out of physical junk mail.

Source: GreeNYC

# S LOW C LOW END

#### **Repair & Share**

#### Practical: Develop partnerships to expand existing community repair event initiatives in Chicago

Working bikes is a nonprofit organization in Chicago that repairs and refurbishes bikes for sale and donation in Chicago and across the globe. Since 1999, Working Bikes has provided a new life for 100,000 bicycles.

Source: Working Bikes 2020 Annual Report Though repair was historically a common practice for broken or damaged items, it has become commonplace to dispose and replace household items like appliances, electronics, clothing, and more. Volunteer-led repair initiatives, many inspired by The Repair Cafe model in Amsterdam, provide opportunities for skill building, community engagement, cost savings, and waste reduction. Though several items may require referral to professional repair services, community events expose residents to repair possibilities and help shift cultural norms away from disposal.<sup>16</sup>



Municipal support for existing community efforts like Community Glue at the Edgewater Workbench,<sup>17</sup> pop-up Repair Cafes,<sup>18</sup> and pop-up Fixit Clinics,<sup>19</sup> can help to increase awareness and volunteer participation for such events. Repair Cafe and Fixit Clinic also provide materials and resources for any individuals or organizations seeking to host a repair event.

City support for initiatives such as Right to Repair at the state level can encourage manufacturers to allow their products to be maintained by independent businesses and interested individuals.<sup>20</sup>

#### Optimal: Establish a regular Repair Cafe event series through the Chicago Public Library

The Chicago Public Library has hosted one-day Repair Cafe events in recent years at branch locations including Austin<sup>21</sup> and Sulzer Regional.<sup>22</sup> Establishing a regular, rotating Repair Cafe at Chicago Public Library branch locations across the city can engage Chicago residents in all neighborhoods and provide opportunities for repair services and awareness across the city. Increased access to Repair Cafes can help keep items like bulk appliances, e-waste, and textiles out of the curbside recycling and waste streams. Repair Cafes can also provide opportunities for skill building and workforce development for volunteers and participants.

#### Practical: Support material "share" or rental models in Chicago

Options for renting or sharing materials can also provide environmental benefit by reducing the need for the manufacturing of new items. High profile examples of the "sharing economy" include ride sharing like Uber and Lyft and home sharing through Airbnb and VRBO, but there are also opportunities to increase sharing and renting of materials like tools (e.g. Chicago Tool Library<sup>23</sup>), toys (e.g. Minneapolis Toy Library<sup>24</sup>), and other equipment for municipal operations and Chicago residents.

The Chicago Tool Library, established in 2019, provides access to tools and equipment for activities including woodworking, home repairs, camping, gardening, cooking, cleaning, automotive repair, jewelry making, and more. The organization seeks to provide equitable tool and equipment access to all Chicago residents, and annual membership pricing is based on a sliding scale.

Source: Chicago Tool Library



### **RESIDENTIAL WASTE REDUCTION**

Waste generated in Chicago residences accounted for nearly 40 percent of the City's overall waste stream in 2020.<sup>25</sup> This section offers strategies to reduce the waste volume and improve diversion in recycling, yard waste, and compost programs for Chicagoans in both low-density (single-family homes and multifamily buildings with four or fewer units) and high-density (multifamily buildings with five or more units) residences.

#### Improving Low-Density Residential Waste Diversion & Reducing Contamination

#### Practical: Maintain clear and consistent messaging around recycling contamination

Contamination, the inclusion of nonrecyclable materials in recycling streams, is a significant issue for recycling processing and resale. Current recycling technology and equipment cannot appropriately process materials like plastic bags and can halt operations and result in damage to processing facilities when included in curbside recycling streams. Additionally, soiled materials (e.g., greasy pizza boxes, food containers that have not been emptied) can lessen the quality of the entire recycling stream, making it difficult to sell the materials for remanufacturing.<sup>26</sup>

Individuals often add items to recycling bins that they want to be recycled, even if they are not recyclable, leading to contamination in a process called **aspirational or wishful recycling**. This slows the recycling process, makes recycling more costly, and affects global recycling markets. Typical items added that cannot be recycled are disposable cups, pizza boxes, greasy or dirty food containers, plastic bags, other non-recyclable plastics, yard waste, fabric, food scraps, items like hoses and cords that get tangled in recycling machinery.

Source: Livia Albeck-Ripka, The New York Times

For recycling to remain economically viable, particularly with increasingly rigorous international acceptance standards, contamination must be kept as low as possible. The Recycling Partnership developed recommendations for Chicago's Blue Cart program in their "It's All You, Chicago" report (2018) which included a particular focus on addressing contamination. A primary recommendation from the report was to invest in consistent, long-term communications through several channels to promote clear guidance, based on persistent issues at Chicago's recycling facilities.<sup>27</sup>

The Recycling Partnership also sampled Blue Carts across Chicago and found that the most frequent items contaminating recycling bins were food and paper contaminants when measured by weight; and plastic film, paper contaminants, and rigid plastic contaminants when measured by frequency of occurrence.<sup>28</sup> These findings highlight the need to focus education and diversion efforts on organics and plastic film to have the biggest impact on contamination.

Based on this report, DSS and the Recycling Partnership launched new recycling signage and guides (Figure 1) that provide clear, picture-based direction on how to successfully recycle in the Blue Cart program.



# CRECYCLE THANK YOU FOR RECYCLING THESE LOOSE IN YOUR CART:

Cartons



Aluminum and Steel

Cans

empty and rinse

NO!



Food and Beverage Cartons

empty and replace cap



**Bottles and Jars** mpty and rinse



Mixed Paper, Mail, Newspaper, Magazines, and Flattened, Clean Cardboard

Paper





Kitchen, Laundry, Bath: **Bottles and Containers** empty and replace cap



Recyclables No Garbage

No Plastic Bags

or Liquid

No Tanks

No Tanglers (no hoses, wires chains, or electronics)

TREETS & Lori E. Lightfoot Mayor of Chicago

Questions or Service Requests?

Visit RecycleByCity.com/Chicago or Call 311

Funded in Part By THE RECYCLING **ARTNERSHIP** (oca Cola

Printed on Recycled Paper

Figure 1: City of Chicago Household Recycling Guide, Source: Recycle By City

#### Optimal: Introduce additional recycling streams to improve curbside recycling guality.

(empty all

containers)

Ten states in the U.S. have implemented container deposit programs to increase recovery of beverage containers for recycling. Michigan's Bottle Deposit Law, enacted in 1976, established a 10cent deposit on beverage containers. The deposit is refunded upon returning the empty container to a participating retailer for recycling. Over \$338 million dollars in refunds were processed in 2019, representing an 88.7 percent refund rate.

> Source: State of Michigan Treasury

While single-stream recycling (the system currently used in the Blue Cart program) is convenient for residents and haulers and can increase the tonnage of material collected for recycling, processing costs and contamination rates are often higher than in multi-stream separated recycling.<sup>29</sup>

Some municipalities across the country have started limiting the type of items accepted in single-stream recycling or increasing recycling streams to improve the quality of recycled material for reprocessing. For example, Flagstaff, Arizona collects only metal cans and pans, paper, cardboard, and plastic bottles, jugs, and jars. All other plastics and glass are not accepted in curbside collection.<sup>30</sup> In Emmet County, Michigan, residents are offered dual-stream recycling options with two separate bins, one for paper, cardboard, and plastic bags; and one for plastic, metal, and glass containers.<sup>31</sup>



Engaging in regular dialogue with Chicago-area materials recovery facilities (MRFs) can identify common issues and determine if an increase in recycling streams or decrease in accepted materials can improve the quality and marketability of Blue Cart materials.

#### Optimal: Identify appropriate Blue Cart to black cart distribution and bin size options.

One strategy to increase the capture of recyclable materials from low-density residences in Chicago is to ensure that containers are available to manage the volume of recycling (and potentially organics) for a targeted diversion rate.

Most haulers and processors use weight as a metric for waste. However, typical recyclable and landfillable materials have different densities and this needs to be considered when designing an optimal recycling program. The U.S. Environmental Protection Agency (EPA) has reported that mixed recycling has roughly half the density (pounds per cubic yard) as household refuse on average.<sup>32</sup> Consequently, when comparing recycling and refuse collection in tons, the mixed recycling occupies around twice the volume (or bin space). This ratio can be further exacerbated by cardboard boxes that are not broken down and flattened which means limited space for additional recyclables in the Blue Cart.

As recycling rates improve, waste generation is reduced and organics diversion is introduced on a broader scale, it may be appropriate to increase pickup frequency or the available volume for recycling and provide options for black garbage cart downsizing.

San Antonio, Texas has introduced a brown cart downsizing program, allowing residents to select a large (96-gallon), medium (64-gallon), or small (48-gallon) garbage cart with lower collection fees for smaller volume options. In FY2019, over 6,500 residents downsized to the medium cart size and over 10,000 downsized to the small cart.

Source: City of San Antonio Solid Waste Management Department FY2019 Annual Report

# Optimal: Continue improving low-density residential waste and recycling route optimization to reduce GHG emissions associated with hauling.

Implementation of the DSS grid garbage collection for low density residences in 2013 had a major efficiency impact, reducing the number of daily garbage trucks from 360 to 320 and saving \$18 million annually in collection costs.<sup>33</sup> Regular review and optimization of collection routes for DSS and private waste haulers can reduce materials collection costs while supporting emissions reduction and climate goals.

#### **High Density Residential Waste Diversion**

#### <u>Practical: Improve high density residential recycling ordinance compliance based on 2020</u> <u>Chicago Office of the Inspector General report findings</u>

In December 2020, the City of Chicago Office of the Inspector General published findings and recommendations from an audit of DSS enforcement of high-density (five or more units) residential buildings.<sup>34</sup> The Chicago Recycling Ordinance requires high-density residential



building managers or owners to contract with a private hauler to provide recycling services for building occupants.<sup>35</sup>

The audit found that recycling violations were not adequately enforced due to DSS capacity and information constraints, as well as technical barriers within the DSS electronic citation system. The OIG recommended updating the electronic citation system and conducting inspections both in response to complaints and proactively based on random selection or risk assessment.<sup>36</sup>

DSS has coordinated with the Law Department to address the electronic ticketing issue and is planning a March 2021 rollout and training session. Successfully implementing the ordinance will require a significant increase in dedicated staff and resources, as well as interdepartmental coordination within the City.<sup>37</sup>

#### Optimal: Increase outreach and education for high density residential buildings

Beyond ordinance enforcement, increasing education and engagement with high density residential building managers and owners can identify common issues and solutions, as well as reach a broad audience of Chicago residents.

#### **Public Education & Engagement**

In addition to messaging that focuses on proper recycling and reducing contamination, broader public engagement and education is a critical component of the entire materials management system. Increasing awareness and support for programs can support increased diversion, safe disposal when needed, and a shift in cultural norms around materials management.

#### <u>Practical: Leverage existing public education and communication channels to increase</u> <u>awareness and use of Chicago's materials management resources.</u>

The City already has access to powerful communication tools to share information about sustainability initiatives. The Recycle by City<sup>38</sup> website (<u>www.recyclebycity.com/chicago</u>) hosts updated and interactive resources for Blue Cart recycling guidance and other waste and recycling services specific to Chicago. Additionally, the City's Sustain Chicago website<sup>39</sup> (<u>sustainchicago.cityofchicago.org</u>) was created in 2018 through a series of public engagement meetings and surveys to host resources and opportunities to get involved with environmental efforts.

The City's general website (<u>http://www.chicago.gov/city/</u>) is also often cited as a source of materials management information, but stakeholders reported frustration with outdated and missing information.<sup>40</sup> Maintaining or streamlining web-based information from the City can help to avoid confusion for Chicago residents.

Outside of web-based resources, regular engagement (e.g., meeting participation and presentations) with existing community stakeholder groups working towards waste reduction, environmental sustainability, and equity can help to build support for City initiatives and reach more Chicagoans.



#### <u>Optimal: Establish creative programs to further engage Chicago's community around</u> <u>sustainable materials management</u>

Identifying opportunities for non-traditional engagement around waste diversion can also help to build excitement for materials management programs and engage additional stakeholder groups.

Potential ideas for engagement include connecting with artists to commission works made from items found in Chicago's waste stream and partnering with Chicago chefs and restaurants to provide guidance on minimizing food waste.

Recology, a West Coast waste collection and processing company, established an Artist in Residence program in four cities that supports artists who create work from materials recovered from the waste stream by Recology's operations. Artwork from over 200 artists who have participated in the program are exhibited as part of Recology's permanent collection.

#### Source: Recology Artist in Residence

#### <u>Pilot Opportunity: Engage with existing sustainability volunteer programs to support materials</u> <u>management pilots and strategy implementation.</u>

Volunteer cohorts like the Chicago Conservation Corps (through the Chicago Academy of Sciences and Peggy Notebaert Nature Museum)<sup>41</sup> and the Greenest Region Corps (through the Metropolitan Mayors Caucus)<sup>42</sup> can provide support for new materials management programs and pilots while developing a new generation of Chicago sustainability leaders. Programs like the Greenest Region Corps are supported by AmeriCorps and Serve Illinois and rely on a strong network of local host communities and organizations.

#### The Minnesota GreenCorps program, coordinated by the Minnesota Pollution Control Agency, provides training opportunities for new professionals interested in environmental work. Programs include waste reducing and recycling through placements with cities, counties, tribal nations, public schools, universities, watershed districts, and nonprofit organizations.

Source: Minnesota GreenCorps

# S END C RANGE

#### Preventing Illegal Fly Dumping

"Fly" dumping refers to the discarding or dumping of any waste materials on private or public property without a CDPH permit. Materials discarded in this way typically have a greater likelihood of toxicity or nuisance and often include materials like tires, furniture and other bulk items, hazardous waste, and construction debris.<sup>43</sup> Cleaning up illegally dumped items is a strain on City resources and dumping sites can pose public health and safety concerns.



#### <u>Pilot Opportunity: Standardize data collection to identify location-based trends for specific fly</u> <u>dumped materials to prioritize education and infrastructure investment.</u>

Through the 311-request system, residents can report fly dumping at specific sites throughout the City. The request system provides a series of prompts about the material location and any awareness of the perpetrator, as well as an open text field for material description.<sup>44</sup> Providing multiple choice options based on commonly dumped material types can help to identify trends for material recovery infrastructure gaps. For example, if tires are repeatedly dumped in a certain ward, CDPH and DSS can work with the Alderman and other stakeholders to identify tire-specific education and collection opportunities to reduce problematic dumping and promote safe disposal.



#### Practical: Increase public education efforts around fly dumping prevention

Equipped with location and material data from 311 reports and other sources, the City can develop targeted fly dumping campaigns in issue areas. Highlighting the public health and safety issues, cost to taxpayers for cleanup, and alternative disposal options can strengthen messaging to reduce and prevent fly dumping in Chicago.



### ICI (INDUSTRIAL, COMMERCIAL, INSTITUTIONAL) WASTE REDUCTION

Beyond residential waste generation, a significant proportion of Chicago's waste is generated by the ICI (industrial, commercial, and institutional) sector. This sector includes businesses like restaurants and office buildings; institutions including government, cultural, and educational; and, manufacturing and other industrial processes.

#### **Commercial Waste Generation and Hauling**

#### Optimal: Implement waste hauling zones for commercial waste

Several of Chicago's materials management services are organized through a zone system. The Department of Streets and Sanitation (DSS) implemented grid garbage collection for low density residences in 2013, reducing the number of daily garbage trucks from 360 to 320 and saving \$18 million annually in collection costs.<sup>45</sup> The Blue Cart recycling program for low-density residences is also organized through a grid system in which DSS services two service areas and the remaining four are exclusively franchised through municipal procurement.<sup>46</sup>

Implementing commercial waste hauling zones is not a new idea for Chicago. The Department former Chicago of Environmental (DOE) proposed an exclusive franchising model for privately collected waste and recycling in 2008. At that time, the DOE estimated that a commercial franchise model would result in reduced collection costs for 80 percent of customers, six percent fewer scavenger trucks traveling 19 percent fewer miles, a 23 percent reduction in greenhouse gas emissions, 500 additional jobs, and 18 percent increased diversion.47

New York City passed legislation establishing commercial waste zones (CWZ) in 2019, following a private hauler industry study in 2016 and CWZ implementation plan in 2018.

Though rollout of the commercial waste zones was delayed by the COVID-19 pandemic, the NY Dept. of Sanitation released an RFP in late 2020. The CWZ program will establish 20 zones for commercial waste collection and is expected to reduce applicable truck traffic by 50 percent.

Source: New York Department of Sanitation

The recommended next step to explore commercial waste zone implementation is engaging with private waste hauling organizations and commercial customers to gather feedback on if and how the program should be structured. One potential approach to address the anticipated feedback regarding the overall lack of options for customers is to establish non-exclusive franchises, where each zone is serviced by more than one hauler.<sup>48</sup>

#### <u>Practical: Update the 2013 Chicago Energy Benchmarking Ordinance to add waste tracking</u> requirements for large commercial buildings.

Chicago is home to nearly 3,000 buildings over 50,000 square feet, each of which is required to track energy consumption in EnergyStar Portfolio Manager and report annually to the Department of Business Affairs and Consumer Protection.<sup>49 50</sup> The same system can be used to track waste, providing buildings with an additional tool to manage and improve their diversion and understand their impact. Portfolio Manager allows buildings to track waste as a commingled stream (Trash,



Mixed Recyclables, or Compostable) or as many as 27 additional, specific material streams (e.g., Cardboard/Corrugated Containers). This may include continuous tracking of streams (e.g., weekly pickups of Compostable waste) or spot reads (e.g., periodic Electronics recycling). Energy Benchmarking has been shown to reduce energy use by two percent on average for buildings.<sup>51</sup> Tracking and reporting waste data will encourage buildings to develop more efficient and sophisticated waste management programs when comparing their waste management to peer buildings.

#### **Institutional Partnership Opportunities**

#### <u>Practical: Engage with academic institutions to conduct research, pilot initiatives, and refine</u> <u>public education and engagement strategies</u>

The Chicago area is home to several world-class academic institutions that are leading sustainability and climate research and initiatives including waste reduction and diversion. Chicago's academic institutions offer opportunities to not only divert large quantities of waste from campuses and facilities, but also conduct research and develop resources to support materials management opportunities for the broader community.

Initiatives by Chicago's academic institutions which can support the City's goals are already active. The University of Illinois at Chicago received \$300,000 from EPA in 2020 to provide technical assistance for potential anaerobic digestion development.<sup>52</sup> The Illinois Sustainable Technology Center leads research on utilizing waste plastics and wood waste, waste minimization, and more.<sup>53</sup> Loyola University is home to the Searle Biodiesel Program, which leads production, research, and outreach for zero-waste biodiesel production.<sup>54</sup> The University of Chicago recently launched the Environmental Frontiers program focused on identifying sustainability projects to test on campus and developing recommendations based on findings.<sup>55</sup> This is not an exhaustive list but is meant to highlight the available resources for the City's sustainable materials management implementation.

Additionally, supporting curricula around sustainable materials management provides a natural engagement point for Chicago's students and alumni to participate in City programs.

The Shedd Aquarium has incorporated single-use plastic pollution prevention as part of its mission to promote conservation. The aquarium has developed significant education and advocacy resources to support businesses and community members in reducing plastic waste.

Source: Shedd Aquarium

## Practical: Engage with cultural institutions to increase material diversion and public engagement

Chicago's cultural institutions and facilities can also provide opportunities for significant waste diversion, as well as engagement and education with broad groups of residents and visitors. Organizations like the Chicago Sustainability Task Force and Green Sports Alliance bring together major facility managers to share best practices and successes in environmental initiatives including waste diversion. Coordinating City initiatives with these institutions and organizations can help to reinforce educational messaging and reach City diversion goals.



#### Waste System Infrastructure & Industrial Operations

Although industrial waste-permitting and producer-responsibility legislation is typically managed at the state level, there are opportunities for the City of Chicago to engage with existing and historical waste infrastructure and the manufacturing sector to support materials management goals.

#### Optimal: Support ambitious statewide extended producer responsibility (EPR) legislation

Extended producer responsibility (EPR) legislation requires manufacturers to take financial responsibility for the end-of-life recovery or safe disposal of their products. There are currently active EPR laws in Illinois for electronics, mercury thermostats, and auto switches.<sup>56</sup> Products with high toxicity and environmental or human health concerns are typically good candidates for EPR legislation.

Recently, several states have proposed EPR legislation for manufacturers of product packaging, to manage and discourage single-use and difficult to recycle plastics. In 2021, a group of lawmakers representing California, Colorado, Hawaii, Maryland, New Hampshire, New York, Oregon, Vermont, and Washington proposed a series of proposals to address growing issues with plastic packaging.<sup>57</sup> Stronger EPR legislation in Illinois has the potential to shift the financial burden of collecting and processing these materials from taxpayers and municipalities to manufacturers, allowing the City flexibility to fund other materials management initiatives.<sup>58</sup>

#### Pilot Opportunity: Establish a grant program for development of secondary markets

Establishing a grant program for development of new secondary markets for materials in Chicago's waste stream can spur innovation while also reducing materials sent to landfills. Development of new technology and markets to reclaim wasted materials locally can also have significant economic growth and disposal cost saving impacts.

# **\$\$\$** HIGH & HIGH END

#### <u>Practical: Deprioritize waste incineration and Waste to Energy (W2E) operations until further</u> research and technology development.

Waste to Energy (W2E) has a harmful history in the Chicago region and has disproportionately impacted black, Indigenous and people of color (BIPOC) communities in the past. This makes incorporation of W2E infeasible as a near-term next step for Chicago, but conducting more research and education is an important next step.

W2E technologies have been evolving rapidly to reduce their and environmental impact over the past several years and innovation continues to make this technology more viable as a part of a holistic materials management approach. However, with current permitting, siting, and infrastructure, this technology is not recommended at this time for the City of Chicago, a recommendation that is supported by organizations like the Illinois Environmental Council.<sup>59</sup>



Prior to exploring this option, the City should prioritize the other reuse, repair, reclamation, and recycling options presented in this report. Without significant investment in infrastructure and changes in zoning to ensure a reduction in environmental justice impacts, W2E would not meet overall City objectives and commitments.

#### <u>Practical: Update zoning of waste operations facilities to reduce negative environmental</u> <u>impacts in nearby communities and prevent concentration of environmental burdens.</u>

To address historic and current environmental justice issues around the concentration of waste infrastructure, the City should review and update zoning of waste operations facilities to improve environmental impacts in nearby communities including adding more buffering (including planting vegetative and tree buffers) and invest in ordinance enforcement capacity around noise, odor, and air quality infractions. This approach could include prioritizing siting new waste infrastructure in existing Planned Manufacturing Districts and incorporating recommendations from the PMD modernization process currently being done by the City's Department of Planning and Development.<sup>60</sup>

#### Optimal: Remediate and redevelop Chicago's closed landfill sites for community benefit

Though there are no open landfill sites in the City of Chicago or surrounding Cook County, closed landfill sites are largely concentrated in the Southeast side of the City (Figure 2). Closed landfill sites require long-term site maintenance and are difficult to redevelop, creating a lasting burden for the surrounding community. Several landfills and dump sites have been remediated and redeveloped as conservation and habitat restoration sites;<sup>61</sup> wind and solar energy generation;<sup>62</sup> and, golf courses, including Chicago's Harborside Golf Course at the Illinois International Port District. 63

Engaging community organizations like the Southeast Environmental Task Force to identify community priorities and opportunities for



Figure 2: Former landfill locations within or directly adjacent to Chicago (Source: City of Chicago)

community benefit in redevelopment can help to address one of the lingering issues of concentrated waste management infrastructure.<sup>64</sup>



### **ORGANICS & WASTED FOOD**

Organic material, including yard and forestry waste, food scraps, and food-soiled or shredded paper products, comprises a significant portion of Chicago's waste stream across all generator types. Organic material not only generates greenhouse gas emissions when landfilled but also presents opportunities for critical benefit when captured including feeding hungry people and animals and improving soil health through compost amendment.

#### **Citywide Food Waste Prevention & Food Rescue**

#### Practical: Leverage the National Resources Defense Council (NRDC) Food Matters Great Lakes Regional Cohort participation to conduct a food rescue assessment of existing infrastructure and gaps

Food insecurity and hunger are persistent problems in Chicago which have been worsened by the COVID-19 pandemic. Feeding America estimates that there are over 520,000 people in Cook County experiencing food insecurity,<sup>65</sup> and Northwestern University's Institute for Policy Research estimated that the Chicago Metropolitan Area reached food insecurity rates as high as 24 percent in April 2020.66 Organizations like the Greater Chicago Food Depository and other local food banks provide essential services for Chicagoans that can be supported and complemented by food rescue initiatives.

The NRDC Food Matters Regional Initiative develops cohorts of municipal governments and other representatives to leverage opportunities, provide technical and network support, and create goals and programs to reduce food waste on a regional scale. Chicago was selected to join the Great Lakes cohort, along with the City of Cincinnati, OH, the City of Madison, WI, Make Food Not Waste in Detroit, MI, and the Solid Waste Authority of Central Ohio. NRDC has also launched cohorts in the mid-Atlantic and Southeast regions.

Source: NRDC Food Matters

Conducting a food rescue assessment with input from food donors, food banks, and recipients of food assistance can help to determine current gaps and opportunities for food rescue to expand impact.<sup>67</sup>

412 Food Rescue in Pittsburgh, PA uses Food Rescue Hero technology to activate volunteers to tackle the "last mile" of food access. Between March 2015 and February 2019, 412 Food Rescue worked with 508 food donors and 542 nonprofit distribution partners to rescue over 5.6 million pounds of food in the Pittsburgh area.

Source: 402 Food Rescue

#### Optimal: Launch a citywide food rescue program for the City of Chicago

Food rescue supports traditional food bank infrastructure by adding capacity to capture food from the retail sector including very perishable food that needs to be eaten quickly, smaller size donations, and donations with unpredictable frequency.<sup>68</sup>

A potential pathway to citywide food rescue expansion is by establishing a partnership with



Food Rescue Hero. Food Rescue Hero offers a technology platform to support food rescue logistics, currently in use in 10 cities including Pittsburgh, Cleveland, Los Angeles, and Vancouver, BC.<sup>69</sup>

#### **Organics & Food Scrap Collection for Chicago Residents**

Composting, although less impactful than preventing or rescuing wasted food, is a preferred alternative to landfills for organic waste. Composting facilities and anaerobic digesters can process significant amounts of organic material but require infrastructure and investment to develop. Illinois EPA, in conversations with Waste Management, identified the lack of guaranteed feedstock as a barrier to more composting infrastructure in Illinois. City programs that increase high-quality, non-contaminated organics collection can support additional infrastructure and capacity in the state.<sup>70</sup>

## Practical: Establish permanent drop off sites for residents at the Sanitary District or Ward level.

Supervised drop off locations throughout the City for Chicago residents to bring yard waste and food scraps can provide significant diversion potential with limited infrastructure costs and lowered contamination risk compared to a full launch of a curbside residential collection program.

A drop off model could provide opportunities for Chicagoans throughout the City to learn about and divert organic waste, increase the volume of feedstock for anaerobic digesters and compost facilities, and complement the existing network of businesses providing subscription-based curbside organics collection. The Department of Public Works in Washington, D.C. has implemented eight food scrap drop off locations collocated with farmers market sites. Three of the eight sites are open yearround, and all drop offs are free for residents. Food scraps collected are composted locally in Washington, D.C. at community composting sites and the Prince George's County Organics Compost facility.

Source: Washington DC Dept. of Public Works

#### Pilot Opportunity: Introduce drop off locations through "pumpkin smash" events.

The City of Chicago, in partnership with the Chicago Parks District, already successfully manages several seasonal organics drop off locations through the Christmas tree recycling program.<sup>71</sup> SCARCE, a nonprofit organization in DuPage County, provides guidance (including Illinois EPA regulations<sup>72</sup>) and materials for pumpkin collection events after Halloween. In 2020, over 40 pumpkin smash events were hosted in Illinois, four of which were hosted in Chicago, resulting in over 150 tons of pumpkin diverted from landfills for composting.<sup>73</sup> Implementing single-day events pumpkin collection events at the ward or Sanitary District in Chicago can provide opportunities for significant diversion and education.



#### <u>Practical: Improve Chicago's existing yard waste collection program and incorporate food scrap</u> <u>"ride along"</u>

Chicago residents must currently submit a 311-request to receive yard waste collection services. DSS collected over 1,000 tons of yard waste in 2019,<sup>74</sup> but several Chicago stakeholders expressed frustration with the program's capacity or were not aware the program was available. Increased investment and education to expand the yard waste program and resident awareness offer an opportunity to divert valuable organic material and prevent methane generation in landfills. Strengthening the yard waste collection program with resources and staff to allow for regular seasonal pickups (as opposed to the 311-request model) can provide an opportunity to include food scraps as a "ride along" without added rodent or nuisance concerns.

**Optimal: Provide opt-in curbside organics collection for all Chicago residents served by DSS** With significant education and infrastructure investment, curbside collection for all interested Chicagoans could significantly reduce the volume of material sent to landfills and help to curb contamination in recycling streams.

Options for implementation include a managed competition system, as is currently in place for Blue Cart recycling, through which existing or new organics haulers can offer bids to become a service provider for low-density residences in one or more In 2017, the City of Evanston entered an exclusive hauling agreement with Collective Resource Compost to provide food scrap collection to residents and businesses. Due to the resulting route density, Collective Resource Compost can offer Evanston customers a reduced rate for collection.

Source: City of Evanston, Collective Resource Compost

areas of the City. This approach can support existing collection businesses by concentrating route density, though would require significant outreach and engagement to ensure an inclusive network. DSS could provide organics collection to residences served by the zone garbage collection system. However, this approach would require major investment in DSS staff, equipment, education, and infrastructure. For any City-wide organics collection program, processing capacity will need to be evaluated and grown as feedstock volume increases.

Providing residents with the opportunity to "opt-in" to a curbside organics collection program can allow for iterative public education and reduced contamination. Based on initial adoption rates, contamination rates, and local processing capacity, shifting to a required or "opt-out" system may be possible in the future.

#### <u>Practical: Provide information about current organics hauling services to high density</u> <u>residential buildings</u>

Providing information about the current organics collection services available to high-density residential building managers can help to encourage food scrap and organics diversion from these buildings. Organics collection, like garbage and recycling services, would be contracted by individual buildings in the current ICI waste management system in Chicago.



#### **ICI Food Waste Prevention & Food Scrap Diversion**

# <u>Practical: Identify partnership and support opportunities for industrial, commercial, and institutional entities implementing food waste diversion programs</u>

Industrial, commercial, and institutional (ICI) generators provide significant potential for food scrap prevention and diversion, and several ICI entities in Chicago are already taking steps to prevent food waste from entering landfills.

Chicago agencies including Chicago Public Schools (CPS) and Chicago Park District (CPD) have launched food scrap prevention and diversion programs through school cafeterias and summer camp food service, respectively. Beyond CPS and CPD, the We Compost program through the Illinois Food Scrap Coalition (IFSC) provides resources and recognition for Illinois restaurants, religious and cultural institutions, grocery stores, farmers markets, educational institutions, and municipalities that divert food waste through on- or off-site composting.<sup>75</sup> Identifying opportunities to connect ICI waste generators with We Compost or other resources and encouraging expanded participation can increase food scrap diversion and provide public education and awareness for organic waste prevention initiatives citywide.

The average cost of a 32-gallon tote, with a compostable liner and collected using a pickup service, ranges from \$30 to \$50 per week. The City could encourage voluntary adoption of these services by sponsoring a competition for reduction, partnering with large businesses to underwrite costs for institutions, or using grant funds to fund focused pilot programs to demonstrate the cost savings on the landfill segment of a typical waste budget.

New York City's Commercial Organic Waste Law went into effect in 2015, and since then has been gradually adding additional establishments to the group covered by this requirement based on square footage, guest capacity, and number of locations in the City (e.g. chain restaurants). The first covered group included food service establishments in hotels with 150 or more rooms, stadiums with capacity of 15,000 or more people, and food manufacturers and wholesalers with floor areas of more than 25,000 and 20,000 square feet, respectively.

More recent groups covered by the ordinance include chain food service and retail food establishments with combined floor area of 8,000 and 10,000 square feet, respectively, food service establishments in hotels with between 100 and 149 rooms, and on-site events at catering establishments with over 100 attendees.

Source: New York City Department of Sanitation

#### Optimal: Require the largest food waste generators to divert food waste through donation or composting

Beyond voluntary and recognition programs, the City of Chicago could use legislation to require some or all food waste generating businesses and institutions to divert organics. Any organic waste legislation should be phased in to allow for significant public and stakeholder education and to build local compost processing capacity to handle increasing feedstock.

Several major food waste generating businesses like grocery stores (including Mariano's,<sup>76</sup> Trader Joe's,<sup>77</sup> and


Whole Foods<sup>78</sup>) are already incorporating food donation and composting into their operations, providing a model for other businesses. Targeting initial legislation to the largest food scrap generators can provide significant diversion impact while avoiding disproportionate burdens on small restaurants and businesses.

#### <u>Pilot Opportunity: Incorporate food donation and food scrap composting into City events to</u> <u>reduce organic waste and provide high-profile educational opportunities.</u>

Chicago is home to countless special events and street festivals at every scale neighborhood. and in every The Department of Cultural Affairs and Special Events produces and promotes major festivals including Taste of Chicago, Chicago Blues Festival, Chicago Jazz Festival, and more.<sup>79</sup> Requiring or incentivizing food vendors to divert organic waste, as well as providing organic collection and education for attendees can prevent significant tonnage from entering landfills, provide educational opportunities, and highlight Chicago as a sustainability leader for tourists and sponsors.

The Chicago Marathon, one of the world's largest marathons, has incorporated several sustainability initiatives, including food waste reduction and composting. Food and water unused by the 45,000 marathon participants are donated to the Greater Chicago Food Depository. The marathon has shifted procurement requirements to include compostable serviceware, including water cups, which are composted and donated to the Chicago Park District for use as soil amendment.

Source: Chicago Marathon

# \$\$ MID RANGE RANGE

### **Compost Market Development**

#### Practical: Incorporate additional finished compost into existing City landscaping maintenance.

Finished compost, when used as a soil amendment, offers several environmental and economic benefits, including chemical fertilizer reduction, higher crop yields, soil remediation, carbon sequestration, and increased water retention in soil.<sup>80</sup> Incorporating finished compost into

The Illinois Food Scrap Coalition (IFSC) is an organization dedicated to diversion and posting of organics in the state. IFSC has developed robust materials for municipalities, counties, and other stakeholders, including guidance for public procurement and use of finished compost.

Source: Illinois Food Scrap Coalition

existing City activities, including tree planting and landscaping, can increase the demand for compost locally and support broader organics recycling markets.

There are several opportunities to increase the procurement and use of finished compost across city



departments and agencies. The DSS Bureau of Forestry is responsible for planting trees in the public right-of way across Chicago;<sup>81</sup> the Department of Transportation oversees the Streetscape and Sustainable Design Program, which includes green infrastructure planting and installation to manage stormwater;<sup>82</sup> and the Chicago Park Department (CPD) owns and maintains over 8,800 acres of public green space in the City.<sup>83</sup>

## Practical: Support increased adoption of backyard composting and composting at community garden sites

Decentralized composting at community garden sites and homes is a potent solution for diverting food scraps with a low carbon footprint due to a reduced need for the transportation of materials. Though not all types of organic waste (e.g. bones, dairy) are appropriate for non-industrial composting, items like landscape waste, fruit and vegetable scraps, and eggshells can be successfully composted in backyards and community gardens.<sup>84</sup>

In 2015, the City of Chicago amended the Municipal Code to allow for small-scale collection of off-site food scraps and landscape waste for in-vessel composting (in a container, as opposed to an open compost pile) at community garden sites.<sup>85</sup> Community composting sites are required to obtain a permit (at a much lower cost than industrial composting sites) and register annually with the Chicago Urban Agriculture Mapping Project (CUAMP).<sup>86</sup>

As of 2020, 109 of the 890 community gardens were registered through CUAMP as composting sites throughout the city.<sup>87</sup> Additional City-sponsored promotion and education for residents about this program can support small-scale composting in addition to food scrap collection for industrial composting.

The Pritzker Traubert Foundation awarded a \$10 million "Chicago Prize" grant to the Always Growing, Auburn Gresham project. This initiative includes development of an urban farm in the Auburn Gresham neighborhood collocated with an anaerobic digester that will process food waste into compost (to support on-site farming) and natural gas.

Source: The Pritzker Traubert Foundation



### **SPECIALTY MATERIALS**

The term "specialty materials" is meant to include materials in Chicago's waste stream that cannot or should not be managed through traditional curbside recycling or composting initiatives. This includes household hazardous waste (HHW), electronics (e-waste), bulk items like furniture, appliances, and mattresses that often end up in Chicago alleys, electronic waste, pharmaceuticals, textiles, and plastic film. These materials are important to address as they can either require special handling for safety reasons or cause operational issues for waste haulers and processors when included in typical waste and recycling streams.

### **Permanent Collection Facilities**

### <u>Practical: Expand material types available for collection and diversion through the HCCRF and</u> <u>rebrand the facility as a Chicago Recycling Center</u>

The Household Chemical and Computer Recycling Facility (HCCRF) is a 24,000 sq. ft., permanent facility that provides a proper disposal and recycling option for HHW (e.g., cleaning products, lawn chemicals, pharmaceuticals, auto fluids) and some e-waste (e.g., computers and related equipment, TVs, cell phones). However, there are several categories of HHW and e-waste that the HCCRF does not accept including calculators, smoke detectors, latex paint, household appliances, air conditioners, digital cameras, print cartridges, and more.

Identifying additional vendors to expand safe disposal and recycling options for more materials at the HCCRF can help to build awareness and use of the facility as a potent and versatile recycling center. Offering additional collection services can encourage residents to take advantage of this service and potentially increase proper disposal of dangerous items through increasing convenience.

Kane County, Illinois has established three permanent recycling centers accepting e-waste, books, textiles, holiday string lights, and scrap metal for residents. These recycling centers are supplemented by several single day events throughout the year with targeted focus including document shredding, hazardous waste, paint, bikes, pumpkin composting, and more.

Source: Kane County Recycles

Potential services and material streams to consider adding to the HCCRF to develop a holistic "recycling center" include: paper shredding for sensitive personal documents; textiles; holiday string lights; plastic film; polystyrene foam; latex paint; and refrigerants.

### Optimal: Increase access options for HHW disposal for Chicago residents

The improper storage and disposal of HHW can have serious human health and environmental implications. If disposed of with conventional curbside MSW, hazardous material can contaminate groundwater through landfill leachate. HHW can also pollute surface water when poured down drains or into sewers.<sup>88</sup> Stockpiling flammable HHW materials can pose a fire risk to residents<sup>89</sup> and increase risk of accidental exposure or ingestion in homes, especially for children. Of 2.1 million cases handled by the American Association of Poison Control Centers in 2019, household cleaning substances are the second most common exposure substances.



Approximately half of those incidents involved children under 12, and 92 percent of exposures occurred at home.<sup>90</sup>

There are currently three permanent HHW collection facilities in the Chicago Metropolitan Region (Chicago, Naperville, and Gurnee). The HCCRF serves thousands of Chicago residents each year, and the Chicago Department of Public Health reported collection of over 125,000 pounds of HHW, nearly 8,000 pounds of pharmaceuticals, and over 350,000 pounds of electronics in 2020.91 However, the HCCRF has limited operating hours and may not be easily accessible for much of Chicago's population. In 2015, a survey of over 800 Cook County residents found that the majority are not willing to travel more than 10 miles to properly dispose of HHW, creating an access gap in the southern portion of Chicago.<sup>92</sup>



Figure 3: HHW Disposal Access Map

Improving access to safe HHW disposal could be managed through the development of an additional permanent facility, curbside collection services, or rotating collection sites across the City. Construction and operation of a new permanent facility would require significant investment in staff and capital expenses. The HCCRF facility site conversion cost \$3.8 million of state and municipal funds in 2005.<sup>93</sup> Appointment-based curbside HHW collection is offered by several private waste haulers (including Lakeshore Recycling Systems<sup>94</sup> and Waste Management<sup>95</sup>) through a municipal contract for several Chicago-area suburbs. The Chicago Department of Public Health, in partnership with DSS, offered rotating collection sites for e-waste at District Sanitation Offices in 2020. Accepting HHW in those collections would require additional safety precautions and disposal costs but may improve safe disposal of HHW for currently underserved areas.

### <u>Pilot Opportunity: Develop directory of participating retail take-back options for e-waste and</u> <u>HHW in Chicago</u>

Some electronics stores and other retailers offer take-back programs to ensure proper end-of-life disposal of their products. Chicago's Recycle by City online resource offers suggestions for potential electronics trade-in options<sup>96</sup> but does not provide a comprehensive list of available e-waste and HHW take-back. Developing a directory and map of options across the city for safe recycling of electronics (e.g., participating Best Buy locations<sup>97</sup>), compact fluorescent light bulbs (e.g., participating Home Depot locations<sup>98</sup>), motor oil (e.g., participating Jiffy Lube locations<sup>99</sup>) and other materials can offer Chicago residents awareness of more convenient safe disposal options in addition to the HCCRF.



# S LOW & MID RANGE

### **High Priority Safe Disposal**

<u>Practical: Develop a partnership with private door-to-door recycling services of appliances with</u> <u>refrigerants and provide a referral through 311 city services</u>

Project Drawdown cites a 58 gigaton effect of properly managing refrigerant containing equipment end of life disposal, roughly equal to 18 months of total current human caused emissions.

Source: Project Drawdown

Refrigerants have been commonly used since the 1920s to assist modern cooling systems in controlling temperature and humidity for human comfort, cold storage, and industrial operations.<sup>100</sup> Chemical and physical properties of refrigerants allow them to be customized for different cooling requirements. These same properties also make them potent greenhouse gases that must be properly disposed of to prevent their harmful impact on the climate.

Refrigerants in heating, ventilation, and air conditioning (HVAC), and fire suppression systems are usually recovered when systems are maintained or replaced. Refrigerant leakage problems may arise with improper recycling of household appliances. These appliances may be picked up when a new one is purchased, but they are sometimes left for pickup by alley scrap recyclers. Both room air conditioners and refrigerators contain easily recyclable aluminum and copper in their heat exchangers. While secondary markets for refrigerants do exist, they may not always be used. If recovery is not completed, the refrigerant may be improperly removed to facilitate metal recycling as components cannot be under pressure when crushed. A one-ton capacity (12,000BTU) room air conditioner contains two to four pounds of refrigerant, making each small unit outgassing equivalent to releasing one ton of carbon dioxide.<sup>101</sup>

## <u>Practical: Expand pharmaceutical drop off through partnerships with additional retail pharmacies.</u>

Pharmaceuticals can present a problem in landfills by leaching into water supplies or through water treatment systems when they enter stormwater drainage systems. Entities like the Metropolitan Water Reclamation District of Greater Chicago (MWRD)<sup>102</sup> and the Chicago Department of Public Health (CDPH) in partnership with the Chicago Police Department<sup>103</sup> collaborate to provide secure drop off locations for over the counter and prescription medications.

New EPA regulations require healthcare facilities including pharmacies to come into compliance with the Resource Recovery & Conservation Act (RCRA).<sup>104</sup> As Chicago residents are much more likely to remember to properly dispose of old expired pharmaceuticals when obtaining new ones, a marketing and public education partnership with additional retail pharmacies and medical institutions can help to expand access for Chicagoans to properly dispose of pharmaceuticals.



### **High Volume Specialty Materials Diversion Opportunities**

### <u>Pilot Opportunity: Establish a revenue-sharing partnership with a textile recycling company for</u> <u>collection of clothes, shoes, and other textiles otherwise ending up in landfills</u>

Textile waste is the fastest growing category of waste generation in the United States.<sup>105</sup> Chicago's ICI sector is estimated to have generated over 50,000 tons of textiles in 2020 alone,<sup>106</sup> in addition to significant generation from the residential sector. Capturing and diverting textiles can reduce landfill tonnage, improve recycling contamination, and provide revenue sharing opportunities for the City.

Several organizations have established municipal partnership models to collect textile waste from residents and businesses. Two organizations active in the Chicago area include Simple Recycling, which offers curbside collection; and, Chicago Textile Recycling, which offers drop off bins.

The pickup model deployed by Simple Recycling uses uniquely colored and labeled bags which are requested by residents. Simple Recycling trucks follow the City's existing trash or recycling collection schedule, meaning no extra collection day for residents. Additionally, the company handles all aspects of the program launch, education, collection, processing, and management. All materials are graded and sorted locally and/or regionally based on quality and condition. The top-quality materials will be resold to local thrift outlets, mid-grade is exported to international markets, and "unusable" items are processed for raw materials.

All Simple Recycling programs are offered free of cost to cities, residents, and participants. Additionally, the partner municipality is compensated per-pound basis for the material collected by Simple Recycling. For example, in East Lansing, Michigan, the City receives \$0.01 for each pound of material collected by Simple Recycling. The average collection volume is 4,000 to 5,000 pounds per month, bringing in \$40 to \$50 per month to the City to be used for recycling education materials.<sup>107</sup> The city of Elgin, Illinois diverted more than 500,000 pounds of material with Simply Recycling between 2017 and 2020.<sup>108</sup> As such, Chicago's current textile waste generation scale provides an opportunity to generate significant revenue to reinvest in materials management programs.

Organizations like Chicago Textile Recycling (CTR) also offer revenue sharing opportunities for municipalities for textile drop-off bins, as opposed to curbside collection. CTR creates custom City-branded bins for textile drop off and manages all bin placement, regular collection, and reporting. Depending on market fluctuations, CTR provides approximately \$0.06 per pound for all goods collected with the potential for increased revenue sharing (up to \$0.45 per pound) for high-value items like shoes.<sup>109</sup> The Solid Waste Agency of Lake County, Illinois (SWALCO) has partnered with CTR, resulting in over \$45,000 of additional revenue as of 2020.<sup>110</sup>



#### Practical: Identify partnership opportunities to divert frequent and problematic bulk items

Bulk items left in Chicago alleys cause issues for DSS during collection. Large items like mattresses, tires, and furniture are picked up during garbage collection to keep alleyways clear, which contributes to disproportionate landfill tonnage. Additionally, some items may prematurely fill a garbage truck, resulting in additional trips and potential delays. Residents can submit a 311 request for on-demand bulk pick up but providing information to residents on other available services may reduce strain on DSS pickups and increase material diversion and recovery.

Mattresses are particularly good candidates for recycling, and companies like A Bedder World<sup>111</sup> currently provide pickups in the Chicago area for a fee.

California, Connecticut, and Rhode Island have all passed statewide mattress recycling requirements. In those states, the Mattress Recycling Council offers no-cost mattress collection for recycling. Since 2015, the programs have recycled more than six million mattresses, resulting in 214 million pounds of material diverted and 7.4 million cubic yards of landfill space saved.

Source: Mattress Recycling Council

#### Practical: Increase public education about proper recycling or disposal of flexible plastic film

In 2017, Chicago's \$0.07 plastic bag tax (replacing an initial plastic bag ban) went into effect. In 2018, the City of Chicago commissioned an impact assessment study which found that the plastic bag tax resulted in a 42 percent reduction in the number of disposable bags used per grocery trip. Additionally, the proportion of customers using reusable bags jumped from 12 percent to 33 percent after the tax was implemented.

Source: University of Chicago Energy & Environment Lab, New York University, Ideas42 The Recycling Partnership estimates 75 pounds of plastic film and flexible packaging are generated annually per household across the country.<sup>112</sup> Though low-density polyethylene (LDPE) can be recovered and remanufactured into composite lumber and other durable plastic items,<sup>113</sup> it should not be commingled with other recyclables and is not acceptable in current curbside recycling programs in Chicago. Several grocery stores and businesses in Chicago host drop-off sites for plastic film, but Closed Loop estimates that only four percent of residential plastic film generation is recycled through these sites. The rest are either landfilled or incorrectly recycled (and eventually landfilled).<sup>114</sup>

As some major online retailers shift to lightweight plastic packaging and shipping material, additional public education and engagement will be critical to prevent contamination and increase diversion.



### **CONSTRUCTION & DEMOLITION DEBRIS**

Construction and demolition (C&D) debris refers to materials generated from construction, renovation, demolition, or deconstruction projects including lumber, bricks, concrete, drywall, and other building materials. C&D debris comprises a significant portion of Chicago's waste stream, particularly when generation estimates include material generated from road construction and repair projects.

RE-USE Consulting in Washington has calculated that the waste material generated in a single residential demolition (based on average square footage and material weights) equals the average MSW generation for a single person over a 75-year lifetime (based on EPA per capita generation rates).<sup>115</sup> This data highlights the scale of the diversion opportunities for C&D debris. The University of Illinois at Chicago (UIC) estimates over one million tons of C&D debris was generated from Chicago buildings in 2020, not including materials from roadway construction.<sup>116</sup>

### **C&D Debris Diversion**

# Practical: Assess C&D Recycling Ordinance compliance and identify opportunities for increased contractor education.

Chicago's Construction and Demolition Site Waste Recycling Ordinance, which has been in effect since 2007, requires contractors to track C&D debris generation at construction and demolition sites and recycle at least 50 percent of the recyclable material. After completion of a construction or demolition project, the contractor must submit a Recycling Compliance form along with a waste hauler or recycler affidavit to the Chicago Department of Public Health (CDPH).<sup>117</sup>

The most recent publicly available data from CDPH reports 258,208 tons of recyclable C&D material generated, 236,907 tons of which were recycled, reaching nearly a 90 percent diversion rate.<sup>118</sup> UIC's Waste Generation and Characterization Update calculations estimate over 1.3 million total tons of C&D debris generation from buildings (not including any roadway construction waste) in 2013.<sup>119</sup> While some of this waste is likely from structures not covered by the ordinance or includes non-recyclable material, there were potentially over one million tons of unreported C&D material generated in 2013.

Assessing C&D debris generation, recycling, and ordinance compliance can highlight gaps and opportunities to improve contractor and homeowner education and diversion and capture of C&D materials.

The Sustainable Building Group convened by the Minnesota Pollution Control Agency (MPCA) has proposed an ordinance framework for municipalities that include requirements to recycle 80 percent of all concrete and asphalt and divert 85 percent of remaining materials, including 10 percent reclaimed for reuse.

Source: MPCA Sustainable Building Group

Optimal: Adjust the C&D Recycling Ordinance to specify targeted material types and include parameters for reuse.

Through the evaluation of the existing C&D recycling ordinance, the City can identify opportunities and capacity required to include parameters for reuse. Under an



ordinance that requires a percentage of recycling by weight, contractors may meet requirements by recycling exclusively very heavy materials like concrete and steel. Identifying a portion of overall tonnage required for reuse may provide growth in C&D recycling markets outside of recycled concrete aggregates and metals. Additionally, specifying an end use that qualifies for diversion requires more definition. For example, the use of demolished drywall as alternative daily cover for landfill qualifies as diversion, though it may be put to better use as a recycled gypsum product. As data becomes more available, more granular tracking and identification of opportunities for improvement can lead to better use cases for certain materials.

### **Developing Opportunities for Building Material Reuse**

Deconstruction, an alternative to demolition, is the process of dismantling structures in a way that enables building materials to be salvaged. Deconstruction, in addition to other salvage and preservation efforts, can create conditions for an increased supply of high-value reclaimed materials for reuse. While not all buildings currently demolished are good candidates for deconstruction, there is a significant opportunity in Chicago to divert valuable lumber, bricks, and other materials currently ending up in landfills.

### Practical: Host one or multiple deconstruction trainings for Chicago contractors

There are currently a few active deconstruction contractors in the Chicago area, including the Evanston Rebuilding Warehouse<sup>120</sup> and Blue Earth Deconstruction,<sup>121</sup> but there is significant room for growth in the industry. Reducing the volume of C&D debris from buildings sent to landfills requires a local workforce capable of deconstructing appropriate structures.

In 2013, the Cook County Sheriff's Office launched the Restoring Neighborhoods Workforce (RENEW) program, which provides training for Cook County inmates in deconstruction practices and provides OSHA certification for participants. The program works in neighborhoods experiencing issues of vacancy and blight to safely remove the blighted properties and provide valuable training to participants to prepare for similar work once they return to their communities. Since 2013, the program has resulted in the deconstruction of over 300 structures in 22 south suburbs in the Chicagoland region.

Source: Chicago Tribune Daily Southtown, Ted Slowik

Build Reuse (formerly BMRA) is a national nonprofit organization encouraging the recovery, reuse, and recycling of building materials. Build Reuse is currently developing deconstruction training curricula and accreditation standards.

Source: Build Reuse

Deconstruction is increasingly seen as an opportunity for "triple-bottom line positive impact,"<sup>122</sup> where the economic and environmental benefits are paired with social benefits, such as workforce development.

Deconstruction programs can provide a valuable opportunity for job training and skill development for existing contractors as well as individuals with barriers to employment. Additionally, deconstruction training can often be paired with other training and certification, such as OSHA safety training, which can help participants gain access to a variety of jobs in the



construction industry. Additional training could include use of reclaimed materials in new construction and renovation projects to strengthen demand for building materials once salvaged through deconstruction.<sup>123</sup>

#### Optimal: Explore the potential for deconstruction policy initiatives in Chicago

decades, In the past two municipalities and counties have several passed ordinances to increase C&D debris recycling and building material reuse requirements. Based on existing housing stock and conditions, market some municipalities are also finding success with legislation based on some level requiring of deconstruction in structure removal. Ordinance mechanisms vary, and each policy type has strengths and challenges. The City of Chicago should carefully consider if, and which type, of legislation is most appropriate for the City. The first

The Deconstruction Policy in Portland, Oregon requires that select residential structures be removed through deconstruction instead of demolished. The first iteration of the ordinance, enacted in 2016, covered houses and duplexes constructed in 1916 or earlier and designated historic structures of any age. Due to the success of the program, the coverage was expanded to include houses and duplexes constructed in 1940 or earlier.

From 2016 to 2019, the deconstruction ordinance resulted in more than two million pounds of building materials diverted from landfills for reuse.

Source: Portland Bureau of Planning and Sustainability

recommended step to developing a deconstruction-based ordinance is to convene a local advisory committee to consider factors including feasibility, possible incentives, enforcement, available and desired materials, typical structure age and historic significance, among others. Based on the findings of this committee, Chicago's City Council can consider proposing deconstruction guidance or requirements for the city.

### Pilot Opportunity: Establish a deconstruction grant program for homeowners.

Deconstruction requires more time and labor than demolition and is often a more costly option for homeowners and contractors. Although material sales or tax benefits of donating materials can help to offset additional costs, providing grants for residential deconstruction can help to increase awareness and build the demand for deconstruction services in Chicago.

Hennepin County, Minnesota has established a small grant program for residential structure removal and renovation projects that incorporate deconstruction techniques and material salvage. Grants are available at \$2 per square foot, up to \$5,000 and must meet criteria for material reuse and disposal.<sup>124</sup> The grant program in Hennepin County launched as a pilot in 2020, awarding 17 projects and making funds available for the program again in 2021.<sup>125</sup>

### **\$\$\$** HIGH & MID RANGE



#### Pilot Opportunity: Launch a deconstruction pilot program for publicly owned structures.

The Chicago Department of Public Health (CDPH) requires a Demolition Notice of Intent (NOI) form submitted before any non-emergency demolition within the city.<sup>126</sup> Since 2010, nearly 6,000 NOIs have been filed for buildings recorded as owned by the City of Chicago or a City department or agency.<sup>127</sup> While some buildings slated for demolition are not appropriate for deconstruction (e.g., structurally unsafe, fire or water damage, low-quality building materials), there may be potential for incorporating deconstruction in these publicly owned structures slated for demolition.

Identifying structures for a deconstruction pilot should include consideration of the structure safety and condition, as well as the year constructed. Commercial and residential buildings built prior to 1950 typically contain higher quality lumber and may include more unique and distinctive elements for architectural salvage.<sup>128</sup> Refab, a nonprofit deconstruction and building material salvage organization in St. Louis, MO, was funded by the St. Louis Development Corporation to deconstruct a vacant brick warehouse built in 1884. The project increased public awareness for planned deconstruction initiatives and salvaged an estimated \$250,000 worth of building materials from landfills.

Source: St. Louis Public Radio, Eli Chen

Developing a deconstruction pilot program can help generate public awareness and support for a larger program and test the availability and scale of physical and labor infrastructure in Chicago (e.g., deconstruction contractors, building material reuse facilities).

# **\$\$** MID RANGE

## Practical: Support existing historic preservation efforts to increase awareness and education around building material waste prevention

Historical preservation groups can be a powerful partner in improving sustainable materials management. Restoration and repurposing is the ideal treatment of vacant historic buildings. However, in many cases this may be not possible or practical. Costs of renovation may exceed the cost of new construction, structures may not be compatible with the local community's needs, or the building could be in such a deteriorated state that it is no longer structurally sound. Cities like Chicago have faced these challenging decisions when dealing with the renovation or demolition of historic and cherished structures. When restoration is not desired or feasible, deconstruction and building material reuse can preserve built history while managing blight and responding to development needs.



Partnering with the City's Historical Preservation Division, as well as organizations like Preservation Chicago,<sup>129</sup> Logan Square Preservation,<sup>130</sup> Chicago Bungalow Association,<sup>131</sup> and others can help to prioritize architecturally and historically significant materials and features to recover from structure removals.

Built in 1896, the Madison/Wabash Chicago Transit Authority (CTA) station was the last remaining original CTA "L" train station in Chicago. The station was historically and architecturally significant, but in need of modernization to bring it up to par with the other stations in the Loop. In 2015, demolition of the station began, which included a partial deconstruction. The station façade was kept by Preservation Chicago for display to the public and an auction was held at the Rebuilding Exchange, where customers could bid on reclaimed items like station decking, signage, decorative tin ceiling tiles, and other historic features.

Source: Preservation Chicago, Rebuilding Exchange

#### Optimal: Establish a City-Managed Reuse Warehouse

Creating and funding a City-managed material reuse warehouse to add to and partner with the existing nonprofit and commercial reuse and salvage establishments could have a significant impact on diversion and grow the reuse community in Chicago.

The City of Houston has established a building material reuse warehouse in 2009, supported by the City's general fund, which accepts materials from residents, businesses, and other organizations free of charge. All materials collected at the warehouse are available to public organizations including nonprofits, schools and universities, and government entities. Materials move in and out of the warehouse very quickly (sometimes in a single day) and the facility can divert 500 to 600 tons of materials from landfills per year.<sup>132</sup>

The Houston warehouse has a beneficial relationship with surrounding building material reuse organizations like Habitat for Humanity ReStore, which is one of the largest material donors. The warehouse can act as a "catchall" for materials to provide an additional opportunity for diversion.<sup>133</sup>

Materials for the Arts in New York City is another example of a municipally supported reuse center that focuses on creative and arts items including musical instruments, audio/visual equipment, theater equipment, arts and crafts supplies, fabric, and more. Donated materials are available free of charge for New York organizations including nonprofits, public schools, and government agencies. Materials for the Arts collected 1.7 million pounds of reusable materials in 2018.<sup>134</sup>



### **IMPLEMENTATION NEXT STEPS**

There are several activities that the City of Chicago can implement immediately to build momentum and begin processes as it launches longer-term planning, partnership development, and capacity building for major initiatives. The City is already working to reduce waste and improve recycling through initiatives including participating in the NRDC Food Matters Great Lakes cohort to reduce wasted food and implementing a new contract for the Blue Cart recycling program to improve low density residential recycling services and reporting requirements.

### SHORT-TERM PRIORITIES FOR 2021 AND 2022

### **Policy Review and Exploration**

The City of Chicago seeks to review existing materials management ordinances to identify opportunities to increase impact and conduct initial research for new potential legislation.

- Researching potential for implementing waste hauling zones for commercial waste
- Supporting ambitious statewide extended producer responsibility (EPR) legislation
- Assessing Construction & Demolition Debris (C&D) Recycling Ordinance compliance and identifying opportunities for increased contractor education
- Adjusting the C&D Recycling Ordinance to specify targeted material types and parameters for reuse

### Increasing Opportunities for Community Interventions

The City of Chicago seeks to provide new programs and educational opportunities for Chicago's residents to engage with the materials management system and improve residential diversion.

- Leveraging the National Resources Defense Council (NRDC) Food Matters Great Lakes Regional Cohort participation to pilot food waste prevention and composting programs
- Maintaining clear and consistent messaging around recycling contamination
- Introducing organics drop off locations through seasonal "pumpkin smash" events
- Developing a directory of participating retail take-back options for e-waste and HHW in Chicago
- Establishing a revenue-sharing partnership with a textile recycling company for collection of clothes, shoes, and other textiles otherwise ending up in landfills

### **Strengthening Internal Operations**

The City of Chicago seeks to improve internal operations related to materials management to increase efficiency across departments and improve waste diversion in the City.

- Identifying appropriate Blue Cart to black cart distribution and bin size options
- Improving high density residential recycling ordinance compliance based on 2020 Chicago Office of the Inspector General report findings
- Improving Chicago's existing yard waste collection program and incorporating potential food scrap "ride along" options



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