# Waste Minimization Annual Report: FY23

City of Dubuque

September 7, 2023

THE CITY OF DUBUQUE

*Masterpiece on the Mississippi*

## Figures



## Acronyms and Abbreviations

| | |
|---|---|
| City | City of Dubuque |
| Benchmarking Report | Waste Minimization Annual Report: Benchmarking FY22 |
| DMASWA | Dubuque Metropolitan Area Solid Waste Agency |
| EPA | Environmental Protection Agency |
| FY22 | Fiscal Year 2022, occurring July 1, 2021, through June 30, 2022 |
| GHG | Greenhouse Gas |
| Hopper | Represents three cubic yards, with an average weight of 200 pounds |
| Landfill | Dubuque Metropolitan Area Solid Waste Agency Landfill, 101 Airborne Road |
| LIPU | Large Item Pick-Up |
| MSW | Municipal Solid Waste, also known as Trash or Waste |
| $MTCO_2E$ | Metric Tons of Carbon Dioxide Equivalent |
| OCC | Old Corrugated Cardboard |
| PAYT | Pay-As-You-Throw Trash |

The City of Dubuque (City) is committed to waste minimization efforts to reduce the amount of waste generated by its residents, businesses, and those visiting the City. The City provides residents with comprehensive solid waste services to further these efforts. In Fiscal Year 2022 (FY22), the City completed its first Waste Minimization Annual Report: Benchmarking FY22 (Benchmarking Report) to document existing programs and metrics related to solid waste in the community. The report served as a benchmark for future efforts and included specific goals identified by the City to advance waste minimization efforts.

The Waste Minimization Annual Report: FY23 provides detailed information about Fiscal Year 2023 (FY23), from July 1, 2022, through June 30, 2023, and compares metrics and program details to that of FY22 as well as newly implemented tactics to further minimize waste in the City.

## Collection Programming

The City continues to provide curbside collection of trash, recycling, yard waste, food scraps, and special large item pick-up (LIPU) to all single-family through six-plex multi-family households within the City limits. In FY23, the City population is 58,873 people[1] , and the City provides collection services to 20,658 customers, which is an increase of 192 households.

Since the Benchmarking Report, the City has made numerous changes and program improvements to further minimize waste. Efforts include transitioning to City-issued trash and recycling carts and implementing new technology to increase route and customer service efficiency.

The City also continued to invest in education, outreach, route efficiency, data management, and a pay-as-you-throw (PAYT) pricing model to further incentivize waste minimization efforts.

## Landfilling Operations

The City continues to have a strong partnership with the Dubuque Metropolitan Area Solid Waste Agency (DMASWA) to manage solid waste locally. The City's waste minimization goals and progress year over year aim to continue to reduce the amount of trash sent to the local Landfill and extend the capacity of this existing facility.

[1] *QuickFacts: Dubuque city, Iowa: Population Estimates, July 1, 2022*, United States Census Bureau, accessed 8/21/2023 https://www.census.gov/quickfacts/fact/table/dubuquecityiowa/PST045222

## Waste Generation

As noted in the Benchmarking Report, the City's customers produce significantly less trash and recycling than the national average for curbside collection. Collection data from FY23 shows this trend continuing with even less trash and recycling generated per customer for curbside collection, further reducing waste generated in the City. The average waste disposal per customer in Dubuque is 23.71 pounds of trash and 7.54 pounds of recycling per week. Dubuque customers are recycling approximately 24% of the materials generated. As compared to FY22, this is a decrease in trash tonnage generated of 3.9% and an increase in recycling tonnage per customer of 2.7%.

Increasing waste diversion will continue to be challenging, given the low quantity of trash and recycling produced by residents. The decrease in trash and increase in recycling collected curbside is noteworthy for this reason.

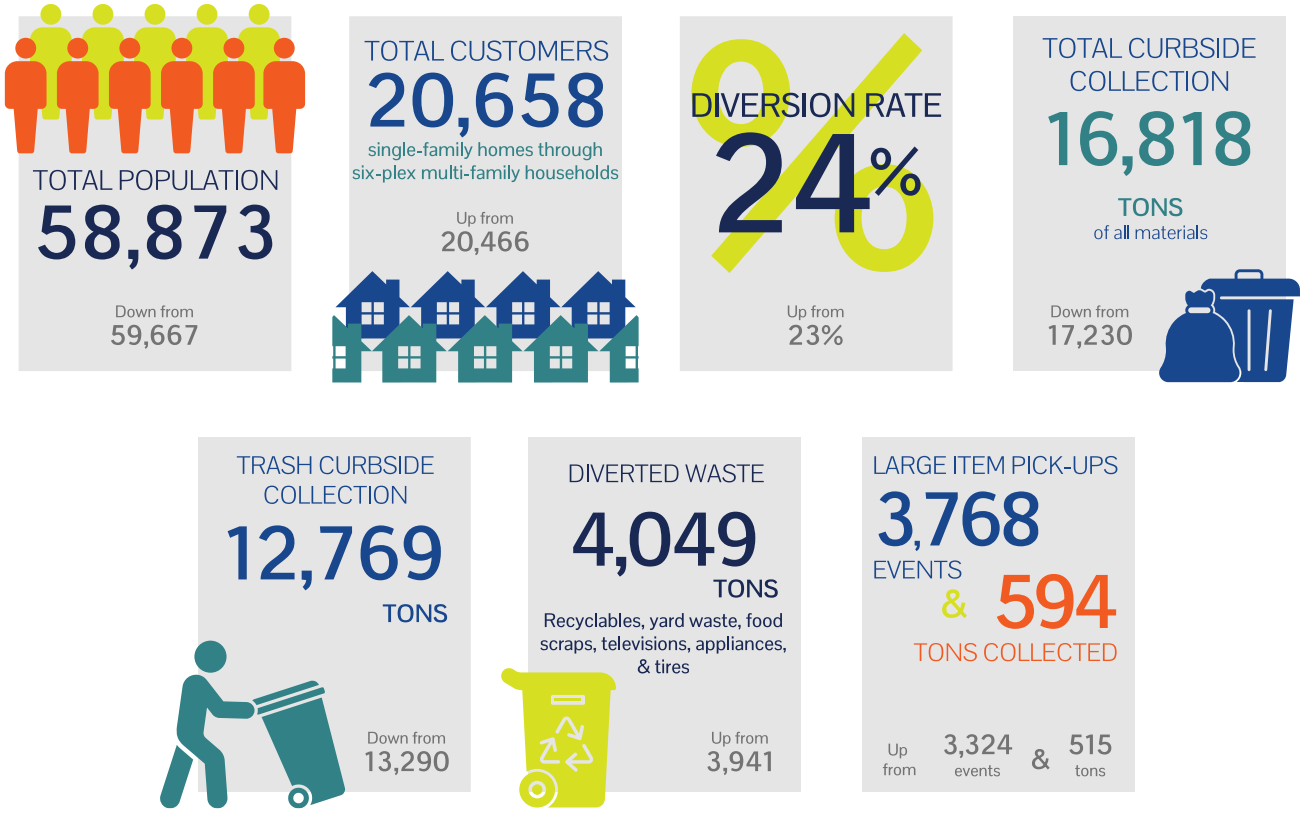

The City documented a decrease in curbside collection of trash and an increase in recycling as compared to FY22. Trash generated per week by the average household decreased from 25 pounds to 23.7 pounds. Recycling generated per week by the average household increased from 7.4 to 7.5 pounds.

## Waste Minimization Goals

The City identified specific goals to track its waste minimization to landfill progress in the Benchmarking Report, which includes annual goals to increase waste diversion to landfill, reduce trash per customer, and incorporate greenhouse gas (GHG) emissions reductions into waste minimization outcomes. The City's progress on each of these goals as compared to FY22 is included in this Annual Report.

### By The Numbers

Key metrics from FY23 provide a comparison to FY22.[2]




## WASTE MINIMIZATION EFFORTS

The City identified specific goals for waste reduction, and this report will compare data on the existing state of trash to landfill, diversion, recycling, and GHG emissions in the Benchmarking Report. Metrics specific to FY23 are included in this report to show progress made on existing goals and continued areas for improvement. The City invested in new technology, programs, and community engagement to further waste minimization efforts.

### Stakeholder Involvement & Community Engagement

The City offers comprehensive curbside collection of trash, recycling, yard waste, food scraps, and special large item pick-ups (LIPU) for residential customers. Engagement and outreach to customers continues to be a priority for the City to increase education and provide valuable services to residents. The City has put an emphasis on community engagement and involvement in order to serve its customers well and increase waste diversion. The City continues to provide educational information related to solid waste, sends direct mailing educational pieces, and utilizes the City's website and social media. In FY23, the City posted 25

2 Trash Curbside Collection includes 37.9 tons of trash collected from nuisance clean-up events.

times on its social media specific to solid waste, and those posts received 466 likes and 221 shares. These metric increases as compared to FY22, indicating a higher level of online engagement with residents and a broader reach of information.

The City's curbside collection website page received an average of 1,265 views per month in FY23. This is an increase of 117 views on average per month compared to FY22. The increase in website traffic and engagement online is likely a result of increased outreach to customers. Additionally the City's REThink Waste Dubuque search tool provides convenient information to customers. In FY23, the REThink Waste Dubuque search tool received 11,769 hits, averaging 981 hits per month.

Figure 1 Online Engagement

| Fiscal Year | Social Media Posts | Total Website Views | Search Tool Hits |
|---|---|---|---|
| FY22 | 18 | 1,149 | 8,133 |
| **FY23** | 25 | 1,265 | 11,769 |

In FY23, the City invested in additional education and placed decals on all recycling carts and bins in addition to existing trash decals. The recycling decals include images of what can and cannot be recycled, along with a QR code link to the REThink Waste Dubuque app. The trash decals state "Trash Only" and include a QR code link to the City website for proper cart placement. The City has noted an increase in website traffic as a result of these decals, providing residents with educational information about proper recycling practices.

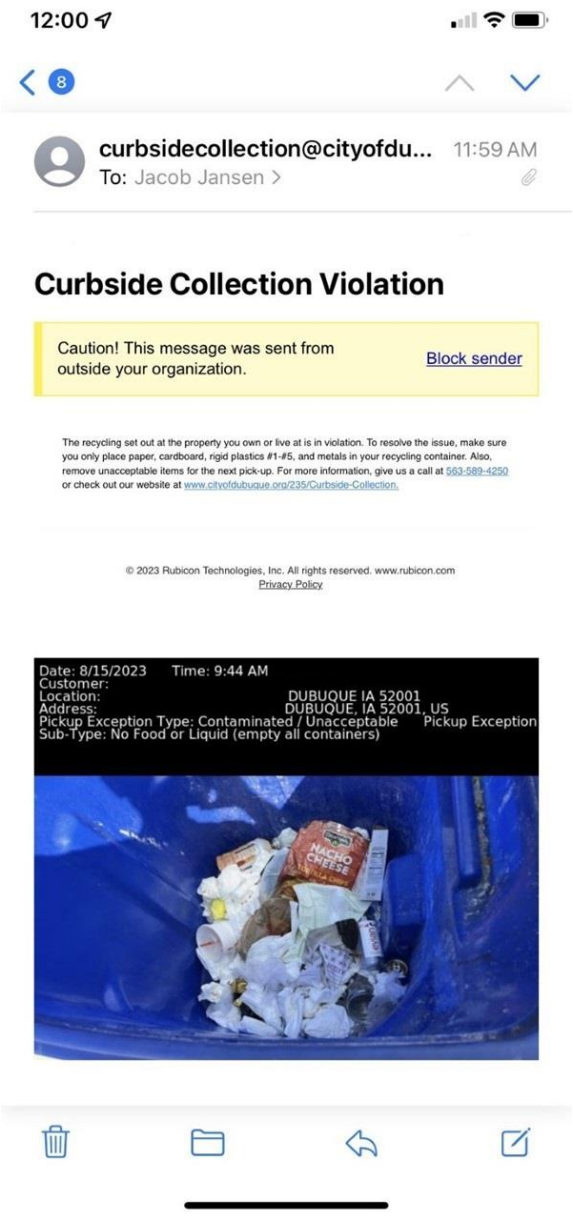
Figure 2: Trash and Recycling Cart Decals


Additional resident interactions are achieved through community outreach events. In FY23, City staff attended three neighborhood association meetings and attended one classroom presentation. The events allow City staff to engage with residents and answer questions specific to solid waste collections and operations.

## RUBICONSmartCity Technology

Beginning in FY23, the City invested in the use of RUBICONSmartCity™ technology to manage the trash and recycling fleet. The technology has increased efficiencies in route collection and improved safety for City crews serving the community. Additionally, the technology provides data for participation, collection, customer service, and more. This valuable data continues to be used to help the City better understand the current waste stream, common issues, and increase routing operations and efficiency. Collection drivers are able to document curbside collection issues in real-time via the RUBICONSmartCity technology mobile app using iPhones. Drivers take photos of problems such as extra bags of trash, bulky waste, contamination, improper storage of carts, and more, which is used to generate emails sent directly to customers notifying them of the issue. Since January 2023, the City has sent 4,433 curbside collection violation notifications addressing solid waste issues, as seen in Figure 3. The system has made notification easier and allows City staff to document concerns through photos. The process also provides customer education about improper solid waste practices through the email notification process. The emails include information about additional services, correct cart placement, and other information to address common issues. The most common issues noted are materials not out on time (“not-outs”) and unscheduled large items at the curb. The City sends 739 emails on average per month. City staff has noted increased efficiency in addressing issues and an increase in education to customers regarding common issues.

Figure 3: Curbside Collection Violation Email




The RUBICONSmartCity system also allows the City to properly document materials that are not paid for

through their PAYT program. Photo documentation has provided a mechanism to enforce service charges in an efficient manner.

Figure 4: Solid Waste Issues Communications

| Observed Issue | January | February | March | April | May | June | Total |
|---|---|---|---|---|---|---|---|
| **Extra Materials** | 170 | 177 | 243 | 221 | 159 | 176 | **1,146** |
| **Large Items without an Appointment** | 115 | 75 | 131 | 68 | 85 | 90 | **564** |
| **Not-Outs** | 187 | 198 | 539 | 341 | 212 | 198 | **1,675** |
| **Carts left at Curb for Longer than 24-Hours** | - | 24 | 57 | 5 | 41 | 45 | **172** |
| **Improper Set-Outs** | 26 | 29 | 74 | 40 | 44 | 66 | **279** |
| **Contaminated Carts** | 20 | 28 | 55 | 34 | 56 | 43 | **236** |
| **Overweight Bags** | 49 | 44 | 62 | 43 | 18 | 17 | **233** |
| **Others** | 9 | 17 | 20 | 24 | 22 | 25 | **117** |
| **Total** | **576** | **592** | **1,181** | **776** | **646** | **662** | **4,433** |

## Customer Service

The City's customer service operation also provides information via phone calls directly to the City with solid waste-related questions and issues. In FY23, the City specifically addressed 19,048 customer service phone calls related to solid waste. Public works staff saw an increase in call volumes in FY23 due to the cart roll-out. The RUBICONSmartCity aimed to reduce the number of calls received by the City and increase efficiency by using email notification of violations instead of phone calls.

Figure 5: Customer Service Metrics

| Fiscal Year | Total Number of Customers | Number of Customer Service Calls |
|---|---|---|
| FY22 | 20,466 | 17,233 |
| **FY23** | 20,658 | 19,048 |

## Improved Recycling

The City continues to offer curbside recycling at no additional charge to residents living in single-family homes through six-plex multi-family households for the collection of plastics (#1-#5), cardboard, scrap metal, and paper. In FY23, the City continues to use a mix of 18-gallon bins used by approximately 10,000-15,000 households, and 96-gallon wheeled carts used by approximately 3,400 households. The City purchases more carts annually to distribute to interested customers, and demand for the larger carts is still outpacing the available supply for customers. The City has also sought funding for the purchase of additional carts and automated side-loader recycling trucks to address the demand for carts in the community.

The City aims to better understand recycling participation of customers and plans to explore options for evaluating curbside recycling collection rates in the future. RUBICONSmartCity has capabilities to provide automated participation information and the City plans to explore this data in FY24.

The City provides curbside collection of food scraps as an additional service for waste diversion by reducing trash produced by residents. The City has 562 food scrap customers, an increase of over five percent from FY22. The City also provides curbside collection of yard waste and collected 1,290 tons of both food and yard waste in FY22, an increase from FY22.

## Incentivizing Waste Reduction

The City's pay-as-you-throw (PAYT) pricing model for collection incentivizes producing less trash and opting for the right size cart with lower costs for smaller trash carts. Between FY22 and FY23, the City distributed 9,781 new 35-gallon carts to customers across the city. As noted previously, customers in the City produce less trash than the national average, and the smallest size carts have been well received by customers. The City has invested in additional 35-gallon carts to accommodate their specific customers' needs. Currently, 52% of customers are utilizing the smallest 35-gallon cart option. In FY23, 16% of customers still utilize basic service without city-issued carts, down significantly from 70% of customers in FY22.

Figure 6: Trash Carts in Service in FY22 & FY23

| | Basic Service Customers without Carts | 35 Gal. Trash | 48 Gal. Trash | 64 Gal. Trash | 96 Gal. Trash | Total Carts |
|---|---|---|---|---|---|---|
| **FY22** | 14,303 | 922 | 1,170 | 3,055 | 1,021 | 6,168 |
| **Perctage of Service** | 70% | 4% | 6% | 15% | 5% | |
| **FY23** | **3,265** | **10,703** | **1,947** | **3,395** | **1,348** | **17,393** |
| **Percentage of Service** | **16%** | **52%** | **9%** | **16%** | **7%** | |

Figure 7: Curbside Collection Carts

Figure 8: Right Size Your Cart Graphic


Research has demonstrated that volume-based pricing incentivizes diversion and increases recycling.[3] The Environmental Protection Agency (EPA) considers a strong PAYT pricing model to have more than a $5 price difference between cart sizes.[4] The City's current pricing structure and proposed fees for FY24 include variable differences between cart sizes, with a larger price differential as cart sizes get larger. Appendix 1 details the City's collection fees for FY23.

[3] "Sustainable Materials Management (SMM) Web Academy Webinar: Pay-As-You Throw: Growth & Opportunity for Sustainable Materials Management," EPA, 2015, epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-pay-you-throw-growth-opportunity
[4] "Pay-As-You-Throw Variable Rates for Trash Collection," Econservation Institute, 2015 epa.gov/sites/default/files/2015-09/documents/skumatz.pdf

## Diversion of Significant Economic or Environmental Value

The City provides curbside LIPU for a fee to residential customers for the collection of bulky items and recycling of materials, including appliances, electronics, and automobile tires. Large items that cannot be recycled are taken to the Landfill. In FY23, the City provided 3,768 LIPUs, collecting approximately 593.9 tons of material, based on an average three cubic yard hopper weight of 200 pounds. The total tonnage includes the recycling of 732 televisions and 242 appliances. The number of LIPU events and tonnage continues to increase annually.

Figure 9: Large Item Pick-Up Metrics

| **Fiscal Year** | FY22 | **FY23** |
|---|---|---|
| **Total LIPU Events** | 3,324 events | **3,768 events** |
| **Total LIPU Landfill Trash** | 515.4 tons | **593.9 tons** |
| **Total LIPU Recycling** | 66.7 tons | **56.0 tons** |
| **Total LIPU Tonnage** | 582.1 tons | **649.9 tons** |

Figure 10: LIPU Collection

## Additional Diversion

Beginning in FY23, the City's solid waste department began providing clean-up services for nuisance properties as identified by the City. City crews are contracted for this service, and it is not part of the standard curbside collection program. Data collection for each event includes staff time, equipment used, and fees, which are assessed to the property. The fee for each hopper of trash is $10 for the first and $12.50 for each additional hopper of material. Appliances, automobile tires, and electronics have additional fees. In FY23, the City completed 133 nuisance clean-up events and collected 37.92 tons of trash.

Figure 11: Nuisance Clean-Up Events

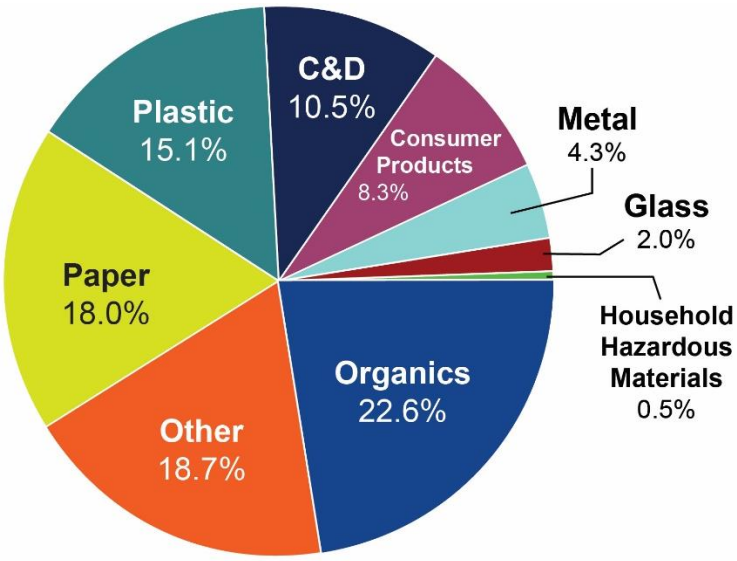
| Fiscal Year | FY23 |
|---|---|
| Total Nuisance Events | 133 |
| Total Nuisance Tonnage | 37.9 tons |

## Additional Diversion Potential for Recycling and Organics

### Targeted Materials

The Iowa Department of Natural Resources completed the 2022 Statewide Material Characterization Study to analyze waste disposed of in the state. DMASWA was one of ten facilities selected for participation in the study. Figure 11 summarizes the residential statewide municipal solid waste (MSW) composition.

Figure 12: Residential Statewide MSW Material Composition[5]




[5] *2022 Iowa Statewide Waste Characterization Study*. Iowa Department of Natural Resources, SCS Engineers, October 2022. https://www.iowadnr.gov/Portals/idnr/uploads/waste/faba_wastecharacterization2022.pdf

The study identified the top five materials components in residential MSW that comprised the largest portion of overall materials, listed below. These same materials were also the top materials in commercial, institutional, and industrial waste.

**Statewide Top Five Material Composition**

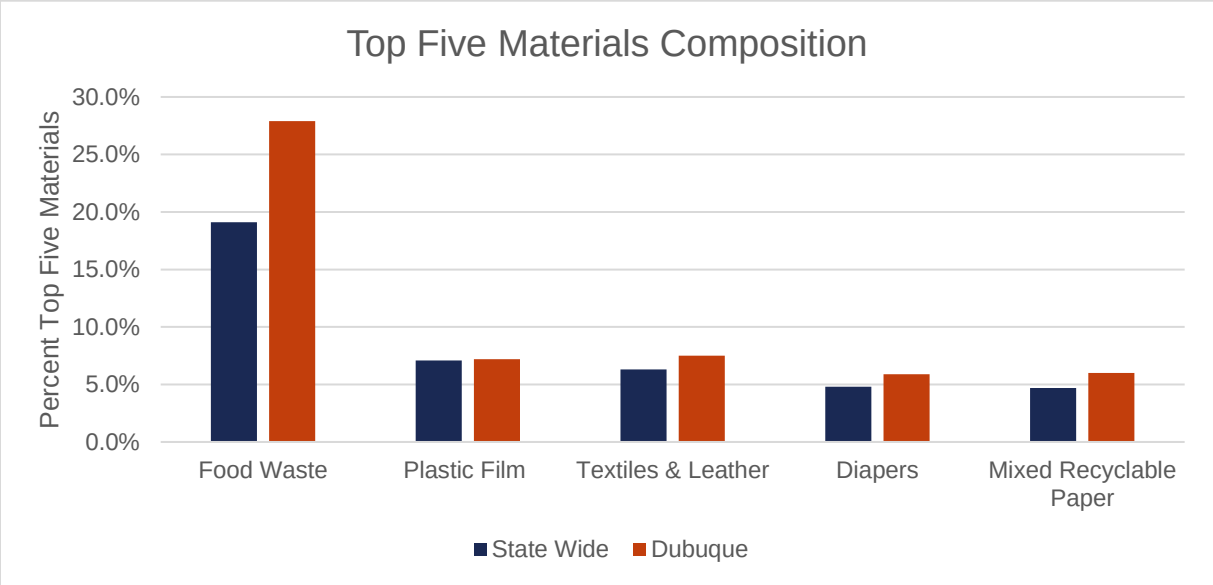
1. Food waste, including both food waste packaged and loose: 19.1%
2. Plastic film, including retail shopping bags and plastic film: 7.1%
3. Textiles and leather: 6.3%
4. Diapers: 4.8%
5. Mixed Recyclable Paper: 4.7%

The study included nine residential samples from the City of Dubuque's collection service. It resulted in the same top five materials comprising the largest portion of the overall materials, however, in a different order, listed below.

**Dubuque Top Five Material Composition**

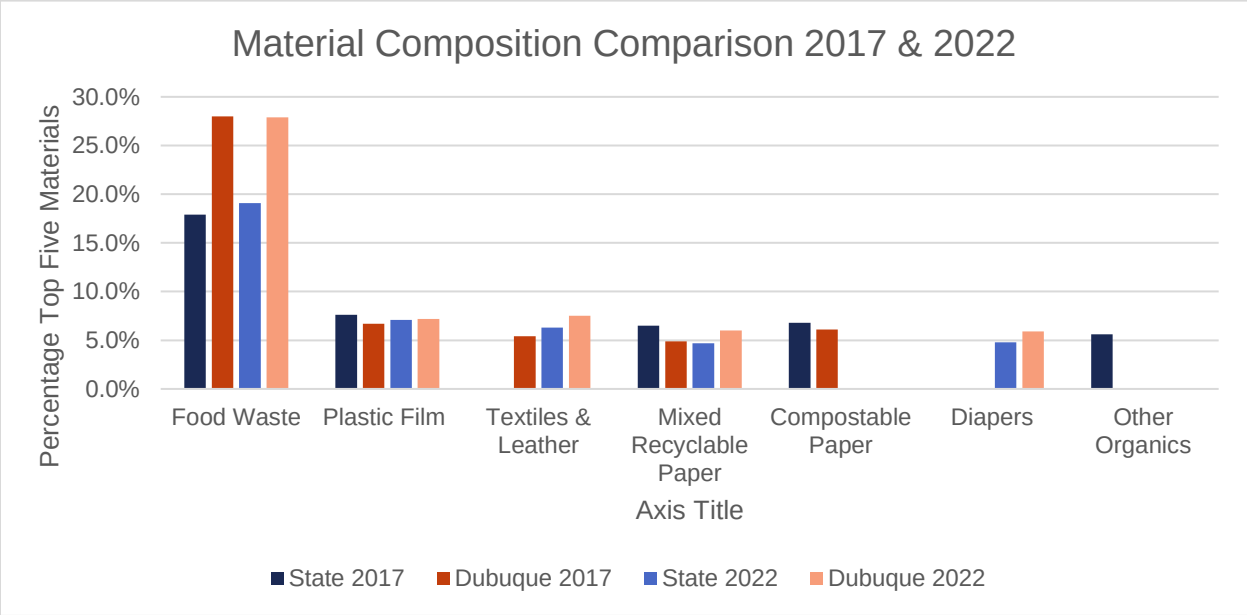
1. Food waste, including both food waste packaged and loose: 27.89%
2. Textiles and leather: 7.5%
3. Plastic film, including retail shopping bags and plastic film: 7.16%
4. Mixed Recyclable Paper: 6.0%
5. Diapers: 5.93%

Figure 13 Figure Material Composition Comparison



The data observed in the 2022 report is similar to that of the statewide report completed in 2017, as referenced in the Benchmarking Report. In both reports, food waste was the largest portion of the trash stream and continues to be an opportunity for additional waste diversion. Diapers were nearly six percent of the trash stream in 2022 but were not in the top five materials in the 2017 report of City-specific data. Mixed recyclable paper was slightly higher in the 2022 as compared to the 2017 report. Textiles and leathers increased by about two percent as compared to the 2017 study as well.

Figure 14 Material Composition Comparison



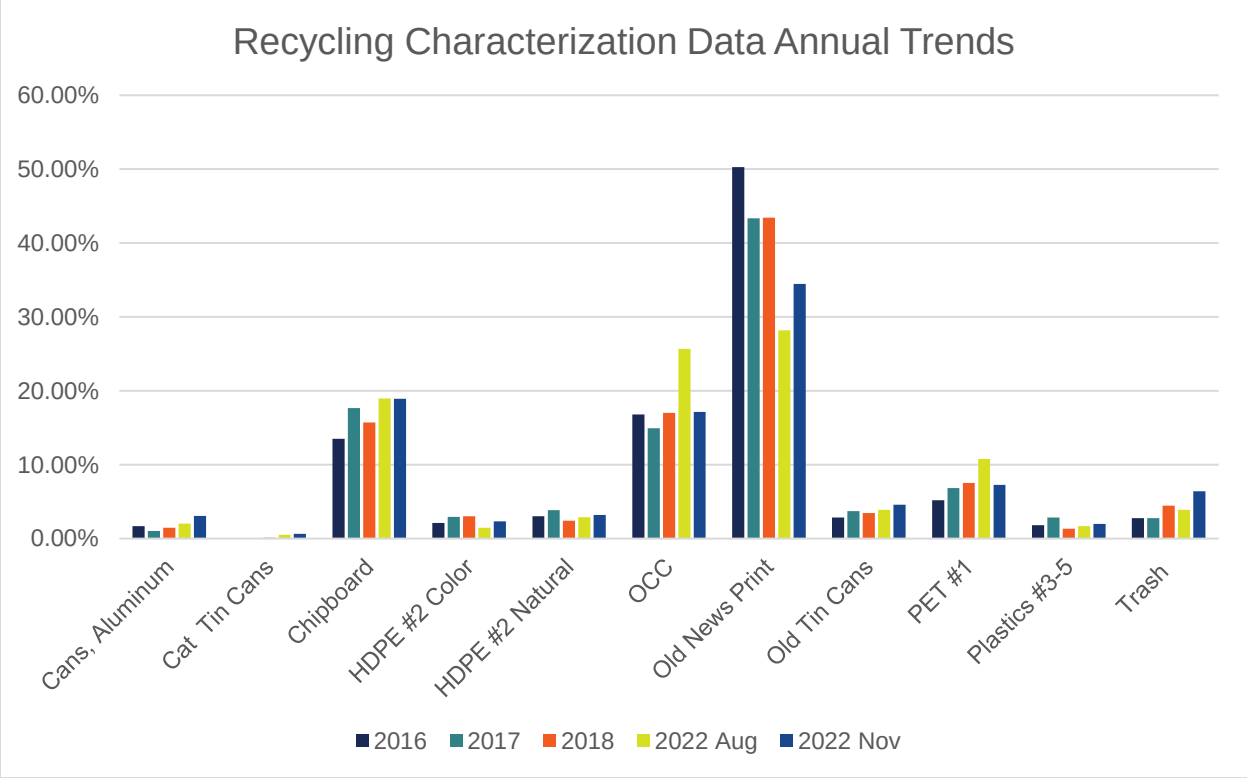

Material composition studies continue to provide insight into the City's trash stream, as well as trends in trash throughout the state. Food waste represents an opportunity for waste diversion in the City. The City has 562 food scrap customers, which is over a five percent increase from FY22 yet represents only 2.7% of all customers.

## Recycling Data

Additional data about the City's recycling is available due to the recycling characterization studies completed by the City's Solid Waste Division in 2016, 2017, 2018, and twice in 2022. In FY23, City staff conducted two recycling characterization studies in August and November. Each event last five days and consisted of 50 samples collected at random from curbside collection, consisting of 40 yellow 18-gallon bins and ten blue 96-gallon carts. The City has previously observed that household with 96-gallon carts recycle more materials than households with 18-gallon bins. The materials were sorted at the Municipal Service Center and weighed by categories, including cans and aluminum, cat tin cans, chipboard, HDPE #2 color, PDHE #2 natural, old corrugated cardboard (OCC), old newsprint, old tin cans, PET #1, plastics #3-#5, and trash. Data is reported as the percentage of the total recycling stream represented by each material type by weight. The average weights of the two FY23 sorting events were used to help calculate the percentages of materials for the City's recycling agreement with Dittmer

Recycling. The recycling characterization data shows that the most common materials tend to be chipboard, OCC, old newsprint, and PET #1. The data also shows a decline in the percentage of old news print, from approximately 50% of the overall stream in 2016 to only approximately 30% in 2022. With less of this materials in the recycling tonnage, the data indicates a change in tonnage to include other materials.

Figure 15 Recycling Characterization Study Results




## Operational Changes

In addition to targeting specific materials to increase waste diversion, the City could consider operational changes to advance waste minimization goals. The City has seen an increase in participation and tonnage from households that have changed from the smaller 18-gallon to the larger 96-gallon cart recycling collection. Yet, overall recycling tonnage has declined from 2017 to 2023. Adding more carts can potentially increase waste diversion, spark renewed interest, and provide a more convenient option for customers.

Reducing barriers to participation in recycling services could increase recycling tonnage. Currently, residents must call the City or submit an online form to receive either a recycling cart or bin. Research indicates that changing from opt-in programs to opt-out where all customers receive recycling services automatically removes barriers and increases recycling. Research

has shown a 30% increase in recycling in communities that automatically provide recycling services to customers.[6]

## Additional Diversion Programs

In order to increase waste diversion, the City should consider new programs and policies to reduce waste and increase recycling, including the following:

- Invest in increased outreach and education to increase participation in existing programs, including curbside recycling, yard waste, and food scraps service
- Promote and reduce barriers to participation in yard waste and food scraps recycling programs
- Promote reuse in the community
  - Support and promotion of local reuse and donation stores
  - Host Fix-It Clinics to promote local fixing for reuse
  - Organize clothing/material exchange events
  - Explore food reuse or donation opportunities
  - Support local reuse and repair organizations
- Consider expanding City recycling services to greater than six-unit plus multi-family households or work with commercial haulers to provide recycling services through ordinance changes.

[6] *Single-Stream Recycling Collection Methods: Bins vs. Carts.* Broome County New York, R. W. Beck, accessed 4/5/2023 gobroomecounty.com/sites/default/files/dept/dpw/pdfs/Issue%20Paper%20%2310%20-%20Bins%20vs%20Carts%20Final.pdf

# QUANTITATIVE BENCHMARKING

The City has identified three specific waste minimization goals. The information included in the report includes benchmarking data from FY22 and updated metrics from FY23.

## Goal #1: Increase the overall waste diversion rate, including recycling, yard waste, and food scraps.

The waste diversion rate includes all residential waste collected by the City from customers living in single-family homes through six-plex multi-family households. This represents the best available data from the City and will be reported consistently in future reporting years.

Figure 16: FY23 Waste Diversion Rate

| Fiscal Year | Total Curbside Waste Generation (tons) | Total Trash (tons) | Total Recycling (tons) | Total Organics (tons) | Total TVs (tons) | Total Appliances (tons) | Total Tires (tons) | Total Diverted (tons) | Diversion Rate |
|---|---|---|---|---|---|---|---|---|---|
| FY22 | 17,230.46 | 13,289.70 | 2,831.70 | 1,042.60 | 44.87 | 20.78 | 0.81 | 3,940.76 | 22.87% |
| **FY23** | **16,818.01** | **12,769.01** | **2,704.05** | **1,289.98** | **33.67** | **18.15** | **3.15** | **4,049.00** | **24.10%** |

In FY23, the City's waste diversion rate is 24.10%, accounting for diversion from landfilling via curbside recycling collection, curbside organics (yard waste and food scraps) collection, and LIPU curbside collection of televisions, appliances, and tires.

**In FY23, the City documented an increase of 1.23% in waste diversion, meeting its goal to increase diversion by one percent annually.**

## Goal #2: Reduce per customer annual waste disposal based on landfilled waste and total annual waste generation

The City serviced 20,658 customers in FY23 and tracked annual waste generation, including trash and all recyclables. Each customer represents one household, ranging from single-family homes to six-plex multi-family households.

Figure 17: FY23 Per Customer Annual Waste Disposal

| Fiscal Year | Total Number of Customers | Total Curbside Waste Generation (tons) | Total Trash Tonnage to Landfill | Per Customer Trash Annually (pounds) | Diverted Tonnage (all recyclables) | Per Customer Recycling Annually (pounds) |
|---|---|---|---|---|---|---|
| FY22 | 20,466 | 17,230.46 | 13,289.70 | 1,298 | 3,940.76 | 385 |
| **FY23** | **20,658** | **16,818.01** | **12,769.01** | **1,233** | **4,049.00** | **392** |
| **Percent Change - 2.4% Decrease** | | | | | | |

In FY23, the per customer waste disposal was approximately 1,230 pounds of trash and almost 400 pounds of recycling annually. On average, customers generated 23.71 pounds of trash and 7.54 pounds of recycling per week. This data is specific to the curbside collection provided by the City.

**The City identified the goal of reducing customer annual waste disposal and met that goal in FY23 with a decrease of 2.4% overall curbside waste generated.**

Additionally, there was a decrease in customer trash generated of 3.9% and an increase in per customer recycling collected curbside of 2.7%. As noted in the Benchmarking Report, Dubuque customers produce significantly less trash and recycling than the national average.

In FY23, the average customer (estimating 2.5 people per household/customer) produced 1.78 pounds of solid waste per day, which is 0.07 pounds less than in FY22. Dubuque residents produce 76% trash and 24% recycling. The City documented additional waste diversion and reduced annual waste disposal, even given the low amount of waste generated.

## Goal #3: Incorporate greenhouse gas reduction initiative into waste minimization planning using WARM analysis specific to waste diversion efforts.

The EPA's Waste Reduction Model (WARM)[7] provides high-level estimates of potential greenhouse gas (GHG) emissions reductions, energy savings, and economic impacts related to waste management practices. The model compares a baseline scenario, where all materials are landfilled, with an alternative scenario, where some materials are diverted via recycling, composting, anaerobic digestion, waste-to-energy, or source reduction. WARM calculations show the benefits of diverting material from landfilling. WARM is a policy and planning tool that is used for comparison of different scenarios based on a life cycle perspective.

The model includes inputs specific to the City, including the following:

- Distance to the landfill, materials recovery facility, and composting site
- Presence of a landfill gas recovery system at the landfill
- Annual precipitation rate (moderate = between 20 and 40 inches of precipitation per year), as moisture conditions impact the decay rate for decomposition of organic waste in landfill

The inputs listed in Figure 17 show the quantities included in the baseline and alternative scenarios for FY23.

Figure 18: WARM Inputs

| Material | Quantity in FY23 (tons) | Baseline Scenario Management | Alternative Scenario Management |
|---|---|---|---|
| **Mixed MSW** | 12,769.0 | Landfilled | Landfilled |
| **Mixed Recyclables** | 2,704.1 | Landfilled | Recycled |
| **Mixed Organics** | 1,289.9 | Landfilled | Composted |
| **Mixed Electronics** | 51.82 | Landfilled | Recycled |
| **Tires** | 3.2 | Landfilled | Recycled |

The WARM results in the table below compare the GHG emissions produced when all materials are landfilled (Baseline Scenario) and the Alternative Scenario in which recyclable materials are recycled. The model indicated that the City's efforts to recycle and compost have resulted in a net decrease in GHG emissions of 7,310 metric tons of carbon dioxide equivalent ($MTCO_2E$).

As shown in Figure 18, the WARM results for FY23 show a slightly lower net GHG benefit compared to FY22 (approximately 300 $MTCO_2e$). This appears to be due to overall waste reduction in the City in FY23 compared to FY22. While WARM can account for source reduction for certain materials, the model does not have an option for source reduction of mixed MSW. Therefore, the net benefit of reducing overall waste generation by approximately 400 tons

[7] *Waste Reduction Model (WARM)* Version 15, United States Environmental Protection Agency, accessed 8/30/2023, epa.gov/warm

between FY22 and FY23 cannot be quantified by the model. The difference in incremental GHG emissions reductions between FY22 and FY23 is primarily due to a slight reduction in mixed recyclables.

Figure 19: WARM GHG Emissions Data

| Fiscal Year | GHG Emissions from Baseline | GHG Emissions from Alternative Management | Incremental GHG Emissions |
|---|---|---|---|
| FY22 | 1,094 $MTCO_2E$ | (6,525) $MTCO_2E$ | (7,619) $MTCO_2E$ |
| **FY23** | **1,071 $MTCO_2E$** | **(6,239) $MTCO_2E$** | **(7,310) $MTCO_2E$** |

The total change in GHG emissions represents the emissions savings that result from the City's current waste diversion programs. These emissions savings are equivalent to the following:

- Removing annual emissions from 1,552 passenger vehicles, or approximately one passenger vehicle for every 13 customers
- Conserving 822,602 gallons of gasoline
- Conserving 304,603 cylinders of propane used for home barbeques

## SUMMARY AND NEXT STEPS

The City has documented progress toward waste minimization goals in FY23. Curbside collection of waste, including trash and recycling, continues to be low as compared to the national average, and Dubuque residents generate less waste than average communities. The City's commitment to improvements and efficiencies can be seen in the FY23 report and will continue to provide benefits to the City in years to come. Each additional ton of waste diverted from landfilling will continue to take deliberate planning and funding. Using the waste characterization study will help provide needed insight into what remains in the trash and is available for diversion.

Future years will document the same metrics to track the City's continued efforts to meet their waste minimization goals.

## Appendix 1: City of Dubuque Curbside Collection Fees FY23 (July 1, 2022 – June 30, 2023)

| City of Dubuque Curbside Collection Fees FY 2023 | | |
|---|---|---|
| **Service** | **Revenue Type** | **FY23 Rates** |
| **Trash** | 35 gallon cart/bag/can | $15.38 |
| | 48 gallon cart | $17.22 |
| | 64 gallon cart | $20.65 |
| | 96 gallon cart | $29.00 |
| | 35 gallon alley cart | $15.38 |
| | 48 gallon alley cart | $15.38 |
| | 64 gallon alley cart | $16.65 |
| | 96 gallon alley cart | $24.00 |
| | Single-Use Sticker for Excess Trash | $1.50 |
| **Yard Waste & Food Scraps** | Annual Yard Waste Decal | $35.00 |
| | 64 gallon cart | $11.00 |
| | 48 gallon K-12 Schools | $8.00 |
| | Commercial 13 gallon food scrap | $4.00 |
| | Commercial 48 gallon food scrap | $15.00 |
| | Commercial 64 gallon food scrap | $20.00 |
| | 13 gallon food scrap | $1.00 |
| | Leaf Rake-Out | $20.00 |
| | Yard waste brush ties | $1.30 |
| | single-use yard waste stickers | $1.30 |
| **Recycling** | Recycling Only – Residential | $6.00 |
| | Recycling – Commercial | $6.00 |
| **Large Item** | 1 Hopper - 3 Cubic Yd of Trash | $10.00 |
| | Additional Hoppers | $12.50 |
| | Large Electronics & Appliances (Stoves, TVs, laptops, dishwashers, Refrigerators, dehumidifiers, dryers, microwaves, trash compactors, water heaters, furnaces, freezers) | $10.00 - $20.00 |
| | Tires | $6.00 |
| | Off Route/Non Customer Charge | $10.00 |