

Sorting out our waste problem

Insights from Hennepin County's waste sort

Hennepin County has a goal of recycling 75 percent of waste by 2030. The county adopted this goal to align with the goal established by the Minnesota state legislature for metropolitan counties. In an effort to increase recycling and make progress toward that goal, Hennepin County has expanded existing recycling programs and implemented new initiatives.

The county also realized that continued progress will require a detailed understanding of what is in the trash and what can realistically be recovered. To get this information, the county contracted with Foth to conduct a waste sort at the Hennepin Energy Recovery Center (HERC) in May 2016 to support a data-driven approach to policy and program development.

Key findings

1. Organics has the highest potential for diversion. Food waste is the most prevalent material in the trash by far, representing 19 percent of the trash sorted in the study. At the time of the study, only 4 percent of residential organic waste was being diverted from the trash.
2. Residents are doing a pretty good job recycling. The top 10 list of materials found in the trash by weight didn't include any traditional recyclables (i.e., cardboard, paper, plastic, metal and glass). However, there are still opportunities to improve recycling. Capture rates of mixed paper, boxes, and cardboard are relatively low.
3. There are also opportunities to improve recycling of materials that cannot be conveniently recycled at home using a city's curbside program. Recyclable plastic bags and film need to be taken to a participating retail or grocery store. An extra step is needed to donate clothes for reuse and recycling. Residents in most cities must use drop-off options for electronics, mattresses, and scrap metal.
4. There's a lot of trash in the trash. There are no current reuse opportunities or recycling markets for many materials that are in the top 10 list of materials found in the trash. This includes diapers, pet waste, non-recyclable plastic and paper, miscellaneous home improvement waste, and small items (those that are less than half an inch in size).
5. Achieving a 75 percent recycling rate is not possible with residential recycling within the current system, but there are clear opportunities to improve. Achieving a 50 to 60 percent recycling rate is more realistic but still quite challenging. This would be a significant increase from the 36 percent recycling rate that Minneapolis currently has. The best place to focus is on materials that have good existing markets or markets that could be improved relatively easily. This includes organic waste, paper and cardboard, textiles, and home improvement materials.



Study design

Overview

The waste composition study focused on residential waste from the City of Minneapolis. Waste was sorted from three different neighborhoods – Diamond Lake, Near North and Powderhorn – collected the week of May 8, 2016. Multiple samples were taken from three loads.

The sort

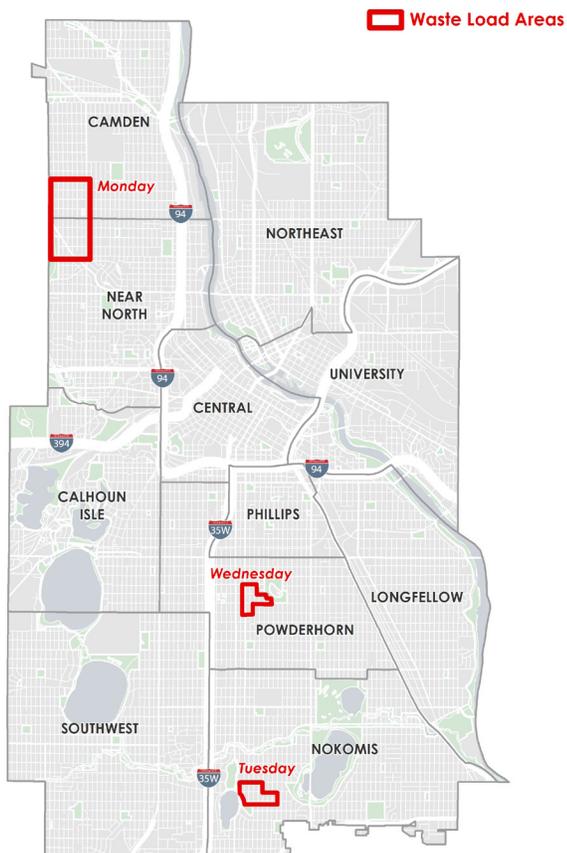
Waste was sorted in two ways:

- 55 primary sort categories provided extensive detail on what's in the trash in each major material type group. Groups included recyclables, organics, construction and demolition debris, and textiles.
- Secondary sort categories provided an additional layer of detail by classifying materials by retail origin (grocery, beauty and health, household essentials, etc.) or material sub-type (i.e., different types of plastic film).

Research questions

The following research questions were explored:

- What's in the trash?
- What are the biggest opportunities and challenges?
- How can we get to the 75 percent recycling rate goal?
- What can we find out about what people are buying and where waste is generated in the home?
- How do results vary by neighborhood?



Minneapolis residential solid waste and recycling program

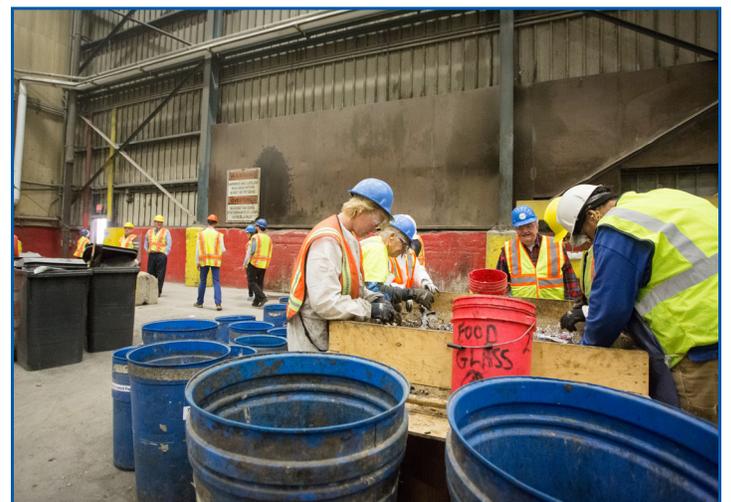
The City of Minneapolis has a mature curbside recycling program that has been operating since 1982. The city switched to one-sort recycling in 2012, and the citywide roll out of organics collection was completed in June 2016. The Powderhorn and Diamond Lake neighborhoods did not have organics service when the study was conducted, and the Near North neighborhood had received service only a month before. Yard waste collection is provided April through November. Trash is collected weekly, and the use of a smaller cart is incentivized. Services are provided by city crews and a consortium of private garbage haulers.

Minneapolis differs from other cities because it offers comprehensive curbside service and a unique program for disposal of household debris. Beyond the cart services include:

- Household batteries may be placed in a bag on top of the recycling cart.
- Curbside pickup of electronics, mattresses, appliances and scrap metal.
- A voucher program that includes construction and demolition debris drop off at the South Transfer Station.



Cart set up for Minneapolis solid waste and recycling program.



The waste sort in progress.

What's in the trash?

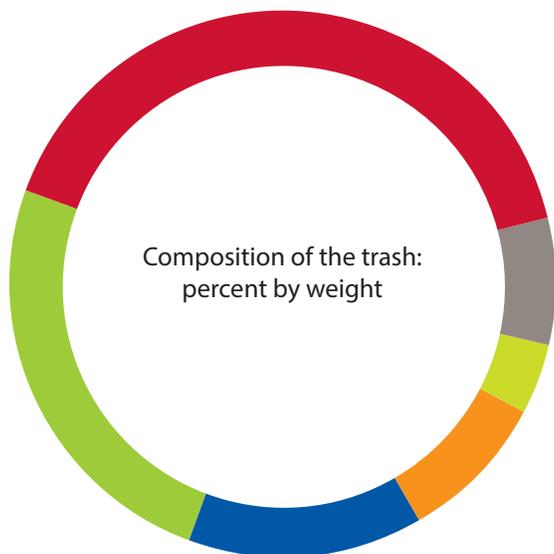
Food is the most prevalent material in the trash by far, and compostable paper ranks third. The amount of organics found in the trash in this waste sort is consistent with other studies. There are no traditional recyclables in the top 10. In fact, there are no recycling or reuse options for seven out of 10 of these materials.

Top 10 most prevalent materials in the trash

Material	Percent by Weight
1. Food	19.0%
2. Materials < ½" in size	6.3%
3. Compostable paper	5.7%
4. Diapers and hygiene products	4.9%
5. Pet waste	4.9%
6. Treated wood and plywood	4.3%
7. Yard waste	4.2%
8. Non-recyclable plastic film	3.8%
9. Non-recyclable paper	3.0%
10. Non-recyclable durable plastic	2.7%

Food is the most prevalent material in the trash by far.

Composition of the trash



■ Trash 40.8%	■ Construction and demolition 8.9%
■ Organics 24.9%	■ Yard waste 4.2%
■ Recyclables 13.8%	■ Other 7.4%:
	Textiles 3.1%
	Scrap metal, electronics, mattress 3.1%
	Recyclable plastic bags and film 0.9%
	Household hazardous waste 0.3%

Disposal options

	<p>Organics</p> <p>These materials are accepted for composting in the Minneapolis organics recycling program.</p>
	<p>Recyclables</p> <p>These materials are accepted for recycling in the Minneapolis recycling program.</p>
	<p>Construction and demolition debris</p> <p>These materials have potential for more diversion; however, only a small percentage of it is recyclable.</p>
	<p>Yard waste</p> <p>Yard waste is compostable at drop-off sites or through curbside pickup programs. Residents generally do a good job of diverting yard waste from the trash, but more could be done.</p>
	<p>Textiles</p> <p>Textiles can be donated for reuse or recycling. The amount of textiles in the trash highlights opportunities to increase reuse and recycling of items such as clothing.</p>
	<p>Scrap metal, electronics and mattresses</p> <p>These items are recyclable at drop-off locations, and some of these items are accepted curbside in Minneapolis.</p>
	<p>Recyclable plastic bags and film</p> <p>These materials are recyclable at drop-off locations such as retail and grocery stores.</p>
	<p>Household hazardous waste</p> <p>These materials should be brought to a drop-off facility or event for proper disposal.</p>
	<p>Trash</p> <p>There is still a lot of trash in the trash. This includes materials like diapers, pet waste, materials less than a half-inch in size, and non-recyclable plastic film, paper and durable plastics for which good waste reduction, reuse and recycling options don't currently exist. Processing this waste at waste-to-energy facilities is preferable to sending the trash to a landfill. Processing waste produces more energy and recovers scrap metal for recycling.</p>

Organics recycling

Organic material, which includes food and compostable paper, has the highest potential for diversion. Organics is not only the most prevalent material in the trash by weight, it also has the lowest capture rate of any recyclable material. At the time of the waste sort study, only 4 percent of all residential organics generated was being recovered.

What types of organic material are in the trash?

Type of organic material	Percent of total organics by weight
Food	57.8%
Paper foodware and packaging*	20.9%
Tissues, napkins, paper towels	19.5%
Certified compostable items	1.8%

* Uncoated plates, cups, and containers; paper egg cartons; pizza boxes

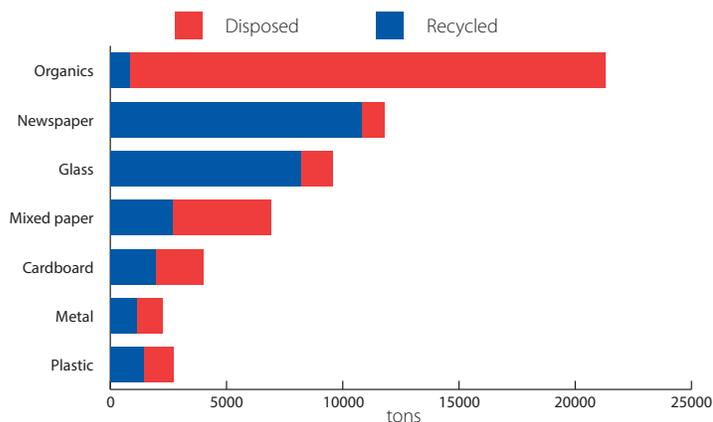
Recycling

Overall, residents are doing a good job with recycling. There were no traditional recyclables in the top 10 list of materials found in the trash by weight. However, there are still opportunities to improve.

Looking at the capture rate of recyclable materials – that is the total recyclables generated and the percent recovered for recycling – provides a better sense of recycling performance. Materials with a high capture rate are subject to diminishing returns. Materials with low capture rates should be targeted for increased recycling.

For example, glass was the third most prevalent recyclable material in the trash by weight, but additional analysis estimated that people recycle 85 percent of all the glass bottles and jars they generate, which is an excellent capture rate. Capture rates of mixed paper, boxes, and cardboard are relatively low, and plastics recycling is still a source of confusion. Organics was included in the chart below to illustrate the opportunity to increase diversion of this material compared to traditional recyclables.

Recycling performance by material type



Two recyclables that need more recycling: Mixed paper (including boxes) and cardboard.

Beyond the cart

Not everything can be conveniently recycled at home using a city's curbside program. Recyclable plastic bags and film need to be taken to a participating retail or grocery store. An extra step is needed to donate clothes for reuse and recycling. Residents in most cities must use drop-off options for electronics, mattresses, appliances and scrap metal. Despite the challenges of diverting these items from the trash, it is important to promote recycling of these materials because they make up a significant portion of the trash.



Clockwise from top: Participating in organics recycling is the best way to reduce our trash; plastic bags can be dropped off at participating retailers for recycling; clothing can be donated for reuse or recycling; electronics like TVs should be dropped off for recycling; we could be recycling more paper, boxes and cardboard.

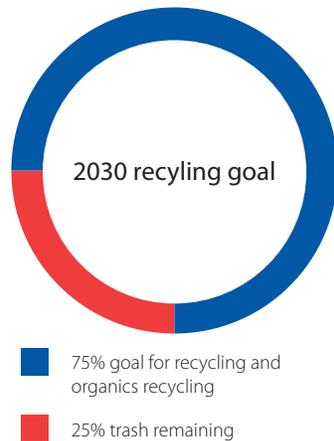
The 75% recycling rate goal

The City of Minneapolis had a residential recycling rate of 36 percent in 2015. In other words, of all the residential solid waste generated, 36 percent was recycled. The city has a goal of recycling and composting 80 percent of waste by 2030, which is above the county and state goal of 75 percent by 2030. A primary objective of the waste sort study was to determine if a 75 percent recycling rate is possible for residential waste trash.

What does it take to get to 75%?

The study found that reaching the 75 percent recycling rate goal would require recycling 100 percent of the following materials:

- Recyclables
- Organics
- Yard waste
- Construction and demolition debris
- Textiles
- Scrap metal
- Appliances
- Electronics
- Mattresses
- Recyclable plastic bags and film



Given the obvious technical and practical constraints of recovering 100 percent of everything that can be recycled, meeting a 75 percent recycling rate goal in the residential sector is not possible within the current system, but there are clear opportunities to recycle more and reduce landfilling.

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What is a realistic goal?

The waste sort study determined what the maximum achievable recycling rate by 2030 would be by setting aggressive capture rate goals for each material. The capture rates are based on significant improvements within existing programs while also including optimistic assumptions for recovery and market development for new materials. The study found that achieving a residential recycling rate in excess of 60 percent is unlikely even with aggressive capture rate assumptions.

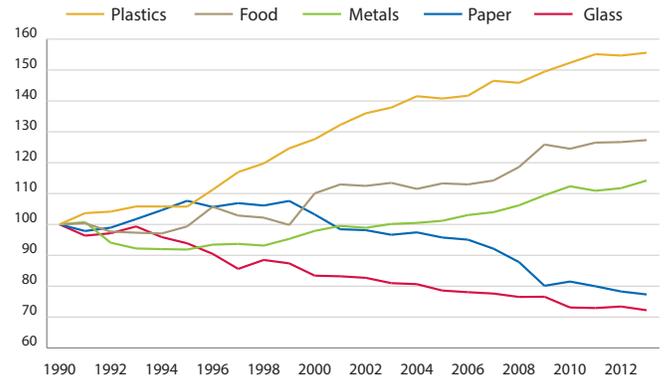
Trends in waste management

The county's ability to meet its recycling goals is impacted by trends in the waste management and recycling industries. Those trends include changes in the material mix, packaging getting lighter, processing costs increasing, and commodity prices falling.

The change in material mix – known as the evolving ton – is particularly challenging. Plastic has become increasingly prevalent in the waste stream. Food waste continues to increase, but few people have the opportunity to participate in organics recycling. Meanwhile the amount of paper in the waste stream continues to decline. All of these changes mean that there are less traditional recyclables by weight per ton of waste generated. So people need to recycle more and better in order to maintain or increase the recycling rate. The good news is that the amount of recycling being diverted from the trash has increased, and there are clear opportunities to improve.

The evolving ton

Changes in waste generation of specific materials compared to a 1990 baseline.



Limitations

The waste sort evaluated only the residential waste from Minneapolis. The 75 percent recycling goal applies to the entire solid waste stream; not just residential waste. Commercial trash has a higher proportion of recyclable and compostable materials. However, the viability of the state goal remains to be demonstrated even with optimistic assumptions about new recovery technologies, the development of new markets, and significant enhancements to collection programs.

Planning for progress

In 2017, Hennepin County will develop a solid waste master plan and participate in the development of a regional master plan. These plans will be developed in response to the Minnesota Pollution Control Agency's Metropolitan Solid Waste Management Master Policy Plan, which will be revised by the end of this year. The state plan will set goals and policies for the solid waste management system in the metro area.

Together these plans will provide statewide, regional, and county-specific strategies to meet 2020 goals and lay the foundation for achieving a long-term vision. As a part of the master plan process, the county will gather feedback from stakeholders in an extensive public engagement process.

Secondary sort of materials

To learn more about what people are buying and where waste is generated in the home, a secondary sort was performed to classify materials by retail origin (e.g., grocery, beauty and health, household essentials, etc.) or material sub-type (e.g., different types of plastic film).

Plastic bottles and containers were sorted into four retail types. Almost 75 percent of all plastic bottles and containers were grocery-related items, which indicates the waste was generated in the kitchen at home. Approximately 20 percent of plastic bottles and containers were classified as beauty, health, and pharmacy items or as household essentials. This indicates they were likely generated in the bathroom or laundry room. The county's Recycle Everywhere campaign has encouraged people to recycle more in their bathrooms and laundry rooms in addition to the kitchen.



Mixed paper and boxes were sorted into three categories: mail, grocery item, or other. About 25 percent was mail and 25 percent was grocery related. Over half originated from other sources, such as packaging for bathroom items or toys.



Most of the plastic film in the trash was not recyclable. More than half of the plastic film was non-recyclable packaging and an additional 20 percent was trash bags. Recyclable plastic bags and film accounted for 16 percent of the total film in the trash. The weight (and corresponding prevalence) of plastic film is prone to being overstated because of moisture and particulate contamination.



Results by neighborhood

The three neighborhoods in the waste sort study have a range of demographic and socio-economic characteristics. A multitude of complex factors influence waste generation and recycling behaviors. The results show that there are differences in the amount and type of waste generated and the recycling rate of each neighborhood. This suggests that there are opportunities for Minneapolis to partner with neighborhood groups to deliver customized outreach tailored to the specific characteristics of different neighborhoods.

Moving forward

Current trends in consumer product packaging and the rise of digital media have led to a decline in recyclable materials as a percent by weight in the waste stream. In other words, there are less recyclables by weight per ton of waste generated. This phenomenon, known as the evolving ton, means that more and better recycling is needed to maintain the same recycling rate. However, opportunities to divert materials from the trash still exist.

The following materials should be the focus of diversion efforts to make progress toward the state's weight-based recycling rate goal:

1. Organics
2. Mixed paper, boxes, and cardboard
3. Construction and demolition debris
4. Textiles



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