State of Delaware Assessment of Municipal Solid Waste Recycling For Calendar Year 2018
Table of Contents

Preface ............................................................................................................................................. 1
Acronyms ....................................................................................................................................... 1

Background and Limitations ............................................................................................................... 2

Introduction ...................................................................................................................................... 3
Residential versus Commercial Recycling Categories ....................................................................... 3
Disposal Estimates ............................................................................................................................ 3
Material Categories .......................................................................................................................... 4

Project Approach ............................................................................................................................... 6
Survey Methodology .......................................................................................................................... 6
  Excluded and Included Material Types ............................................................................................ 7
  Potential for Use as Energy Recovery ............................................................................................... 8
  Potential for Off-Site Disposal ......................................................................................................... 8
  Import and Export ............................................................................................................................ 8
Final Material Categories .................................................................................................................... 9
Study Limitations ............................................................................................................................... 10

Survey Results ................................................................................................................................. 11
  Paper Recycling .............................................................................................................................. 15
  Other Packaging Waste ................................................................................................................... 16
  Vehicle Waste ................................................................................................................................ 17
  Special Wastes ................................................................................................................................. 18
  Organic Waste: Food Waste ............................................................................................................ 18
  Organic Waste: Green Waste ........................................................................................................... 19
  Scrap Metal ..................................................................................................................................... 20
Residential vs. Commercial Recycling Activity .................................................................................. 20

Calculating the Recycling Rate for Delaware .................................................................................... 23
  Calculating the Denominator .......................................................................................................... 23
  Calculating the Recycling Rate ....................................................................................................... 24
Appendix

A: Scope of Materials and Activities Included in the Standard MSW Recycling Rate (Source EPA, 1996)
B: Description of Material Category and Sources of Material Generation
C: DNREC Letter on 2018 Annual Recycling Reporting, and CY 2018 Reporting Form
D: DSM Letter on 2018 Annual Recycling Reporting
Preface

The Delaware Recycling Public Advisory Council (RPAC) was originally established by former Governor Thomas R. Carper’s Executive Order No. 82 in September of 2000 and was charged with advising and assisting the Department of Natural Resources and Environmental Control (DNREC) and the Delaware Solid Waste Authority (DSWA) in achieving waste diversion goals. In 2010, the Delaware General Assembly (7 Del. Code, §6058) established requirements for universal recycling access and mandatory reporting on recycling activity to help track progress, as well as reformed the RPAC.

The RPAC Subcommittee on Measurement and Reporting (M&R Subcommittee)1 was established to measure progress on recycling in the State and began its work by defining recycling and differentiating between materials classified as municipal solid waste (MSW) following the United States Environmental Protection Agency (EPA) definition, and all other solid waste materials managed, whether they are recycled, diverted or disposed. Starting in Calendar Year (CY) 2007, contractor DSM Environmental Services, Inc. (DSM) followed the M&R Subcommittee’s charge to survey and report on recycling in Delaware and concentrate on materials included in the EPA MSW definition.

This report represents CY 2018 MSW recycling activity and using data on disposal calculates the State MSW Recycling Rate, as well as estimates a recycling rate for the residential and commercial sectors.2

DSM first surveyed and reported on recycling activity in Delaware in 2005 for the DSWA, attempting to quantify all types of non-hazardous waste materials being recycled or recovered for beneficial use in Delaware from all sources. The original 2005 study entailed on-the-ground surveys of most large generators and processors of recyclable material in Delaware and focused on materials recovery from the commercial and industrial sector. Subsequent annual surveys built on the original 2005 contact database, relying on the internet, e-mails, mail, and telephone calls to update contacts, remove organizations no longer operating in Delaware, and identify new organizations whose data will help to better track recycling activity in Delaware.

Acronyms

A few of the acronyms used throughout this report are:

C&D = Construction and Demolition (Waste)
CY = Calendar Year beginning January 1 and ending December 31
DNREC = State of Delaware, Department of Natural Resources and Environmental Control
DSM = DSM Environmental Services, the Contractor for Survey Implementation and Results Report
DSWA = Delaware Solid Waste Authority
ICI = Industrial, Commercial & Institutional Waste
M&R = Measurement and Reporting (Subcommittee of RPAC)
MSW = Municipal Solid Waste
RCRA = Resource Conservation and Recovery Act
RPAC = Recycling Public Advisory Council

1 The Subcommittee was originally named “Measurement and Methodology” and is referred to as the M&M subcommittee in past reports.
2 CY 2011 was the first year that reporting on recycling was mandatory.
Background and Limitations

In CY 2018, DSM undertook both the State of Delaware Survey of MSW Recycling (Annual Recycling Report to RPAC) as well as conducted an expanded survey to identify all other types of solid waste diversion. This report covers the results of the MSW Recycling in CY 2018 only.

By undertaking both surveys in the same year, DSM was able to identify new organizations that potentially generate or handle large quantities of materials that have been diverted from disposal. In CY 2018, DSM identified roughly 410 organizations that handle or generate significant quantities of materials recycled or diverted from disposal. Of these 410 organizations, 250 were targeted for the CY 2018 Annual Recycling Report to RPAC and roughly 220 submitted completed reports. Of the remaining 30, less than 10 did not submit reports (although they were all contacted) and the balance were deemed not needing to report for CY 2018.

Despite DSM’s continued efforts to identify all organizations required to report, the list of generators and handlers identified by DSM is not represented to be a complete list of organizations subject to the reporting requirement. DSM continues to focus on gaining participation from the larger recyclers, generators, and brokers in the Mid-Atlantic region who will tend to account for the vast majority of recyclables reported by the smaller organizations. Additionally, DSM continues to track business acquisitions and closings in attempt to identify any new organizations entering the regional economy.

As in previous years, DSM has continued to focus on identifying and tracking material flows by asking reporters to provide the specific end user location where their reported recyclables are going. With this information, DSM is better able to accurately track material flows and avoid the potential to double count materials. In some cases where confidentiality clauses are in place, organizations cannot provide DSM with generator and/or end user information and as a result these materials may be double counted.

Application of a consistent methodology to collect data, track recycling activity, and verify information has helped to improve data quality.

---

3 The expanded survey, known as the State of Delaware Total Solid Waste (TSW) Diversion Report, has occurred every 5 years and accounts for all other types of waste diversion activity including recovery of construction wastes, poultry wastes, biosolids and other non-hazardous industrial solid wastes.
Introduction

DSM Environmental Services, Inc. (DSM) was contracted to complete the CY 2018 recycling survey. DSM has attempted to both identify any new recyclers in Delaware as well as those no longer subject to the reporting requirement. DSM also attempted to disaggregate residential recycling activity (and volumes) from commercial activity.

As in previous years, the results are only as good as the data provided. DSM relies on reporters to submit accurate data on the types and volumes of materials recycled, and on the names and locations of end users (or handlers) to ensure that all recycled materials generated in Delaware are counted but that materials are not double counted.

The following report outlines the methodology followed to calculate the State of Delaware Recycling Rate, any limitations to these data, and the results.

Residential versus Commercial Recycling Categories

The Survey distinguishes between residential (households) and commercial (business, industry and institutional) recycling activity by requiring the reporter to identify the source for each material reported (% from residential vs commercial sources).

However in some cases, materials have been allocated to residential or commercial based on a methodology agreed to by the M&R Subcommittee. This approach has been carried forward each year to maintain consistency. And in the case of yard waste and trees and branches, a survey of landscapers, mulchers and tree companies (2004, updated in 2015) was used to determine the source and develop an allocation. The materials below follow the same allocation each year.

<table>
<thead>
<tr>
<th>Material</th>
<th>% Residential</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Cans</td>
<td>90%</td>
<td>RPAC, M&amp;R</td>
</tr>
<tr>
<td>Retail Bags</td>
<td>100%</td>
<td>RPAC, M&amp;R</td>
</tr>
<tr>
<td>Leaf and Yard Waste</td>
<td>90%</td>
<td>2015 Yard Waste Survey</td>
</tr>
<tr>
<td>Trees and Branches</td>
<td>50%</td>
<td>2015 Yard Waste Survey</td>
</tr>
<tr>
<td>Tires</td>
<td>80%</td>
<td>RPAC, M&amp;R</td>
</tr>
<tr>
<td>Lead Acid Batteries</td>
<td>80%</td>
<td>RPAC, M&amp;R</td>
</tr>
<tr>
<td>Oil Filters</td>
<td>80%</td>
<td>RPAC, M&amp;R</td>
</tr>
<tr>
<td>Textiles</td>
<td>100%</td>
<td>Except for Industry Reports</td>
</tr>
<tr>
<td>Mattresses</td>
<td>100%</td>
<td>RPAC, M&amp;R</td>
</tr>
<tr>
<td>Other Batteries</td>
<td>90%</td>
<td>RPAC, M&amp;R</td>
</tr>
<tr>
<td>White Goods</td>
<td>90%</td>
<td>RPAC, M&amp;R</td>
</tr>
</tbody>
</table>

Disposal Estimates

This report includes MSW disposal estimates for CY 2018. To determine the % residential versus commercial, DSM reviewed detailed weigh data from all 6 DSWA facility scale houses. Incoming vehicle data and weights are allocated at each facility based on waste classifications per vehicle type. Facility data is then aggregated to estimate total residential, commercial, and C&D waste deliveries in CY 2018.
These totals enable a CY 2018 MSW recycling rate calculation to be made for Delaware in addition to separate residential and commercial recycling rates.

**Material Categories**

This assessment encompasses all material identified by the EPA as Municipal Solid Waste (MSW) and defined in the EPA document, *Measuring Recycling, A Guide for State and Local Governments* (September 1997) as:

> “Wastes such as durable goods, nondurable goods, containers and packaging, food scraps, yard trimmings, and miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources such as appliances, automobile tires, old newspapers, clothing, disposable tableware, office and classroom paper, wood pallets and cafeteria wastes.” MSW “excludes solid waste from other sources, such as construction and demolition debris, auto bodies, municipal sludge, combustion ash, and industrial process wastes that might also be disposed of in MSW landfills or incinerators. (US EPA 1996b)”

The EPA guidance document further defines what is and what is not MSW (Table A, Appendix A of this report), and what counts as recycling and what does not count as recycling (Table B, Appendix A). While the EPA guidance document is helpful in delineating what materials to include in the measurement of MSW recycling, it is often the case that recycling generators, brokers and processors do not report, or keep records, sufficient to differentiate between materials that would be included or excluded from EPA’s definition of recycling.

DSM’s approach for this CY 2018 assessment is consistent with previous years’ surveying and reporting on residential, commercial and industrial activities that would be expected to generate and recycle materials that fall into EPA’s definition of MSW and recycling as shown in Table 1 below (in column 3 titled “EPA’s MSW”). In some cases, it was necessary to survey generators or recyclers who manage both included and excluded materials, in which case the generator/recycler was asked to estimate the quantity of included material(s) only for this survey.

For example, DSM asks scrap metal recyclers to only report on appliances, lead acid batteries and aluminum cans because it is almost impossible for them to disaggregate durable goods made of metal that would be considered MSW from other scrap metal not considered to be MSW.  

Table 1 lists each material type consistent with the way the EPA reports materials recycling. Check marks in Columns 3 (EPA’s MSW), 4 (Industrial) and 5 (C&D) identify which sector the material is most likely to be generated from. In the case where a material is classified as both “EPA’s MSW”, and therefore included, and as “Industrial” (e.g. industrial process waste) or “C&D” (e.g. construction and demolition wastes), and therefore excluded, the items excluded are noted in the second column.

Finally, in the case of metals the checkmark is centered between columns indicating that in most cases there is no way to determine the source of the material. For this reason, metals except for appliances and packaging containers have been excluded from further consideration. This approach results in the calculation of a slightly lower recycling rate than if durable metals (other than appliances) were counted toward MSW recycling but ensures construction metals as well as cars and other vehicles are not counted toward the MSW recycling rate.

---

4 While durable goods such as furniture and other household products could be counted toward the MSW recycling rate, scrap metal dealers do not track incoming or outgoing volumes by these categories and cannot make reliable estimates. Therefore, reports on all other types of scrap metal recycled are only requested once every five years when a report on Total Solid Waste recycling, including non-MSW materials, is requested. For CY 2018, an additional 290,000 tons of scrap metal were reported as part of this 5-year, Total Solid Waste Recycling Report, most of which from deconstruction.
### Table 1: Materials Included in Delaware Recycling Study, and Generator Category

<table>
<thead>
<tr>
<th>Material Category</th>
<th>EPA Exclusion from MSW</th>
<th>Delaware Generators of Recycled Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EPA’s MSW</td>
</tr>
<tr>
<td></td>
<td>Paper Packaging</td>
<td></td>
</tr>
<tr>
<td>Corrugated Cardboard (OCC)</td>
<td>C&amp;D corrugated recycling</td>
<td>✓</td>
</tr>
<tr>
<td>Newspaper (ONP)</td>
<td>Print overruns</td>
<td>✓</td>
</tr>
<tr>
<td>Sorted Office Paper</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Mixed Paper (includes junk mail)</td>
<td>Print overruns and over issue</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non Paper Packaging</td>
<td></td>
</tr>
<tr>
<td>Plastic Film and Shrink Wrap</td>
<td>Pre-consumer plastic waste</td>
<td>✓</td>
</tr>
<tr>
<td>Plastic Bottles and Containers</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Mixed Plastics/Other Plastics</td>
<td>Pre-consumer plastic waste</td>
<td>✓</td>
</tr>
<tr>
<td>Aluminum Cans</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Glass Bottles and Jars</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Scrap Metal</td>
<td></td>
</tr>
<tr>
<td>Aluminum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Goods / Appliances</td>
<td>Nonferrous metals from industrial or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>construction sources, ferrous metals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>from transportation equipment or C&amp;D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>waste.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Automotive Wastes</td>
<td></td>
</tr>
<tr>
<td>Oil Filters</td>
<td>Excluded from MSW</td>
<td>✓</td>
</tr>
<tr>
<td>Waste Oil</td>
<td>Batteries from large equipment, boats,</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>heavy duty trucks and tractors, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>from industrial applications.</td>
<td></td>
</tr>
<tr>
<td>Tires</td>
<td>Bus and heavy farm and construction</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>equipment tires; tire derived fuel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic Waste</td>
<td></td>
</tr>
<tr>
<td>Food Waste</td>
<td>Food processing waste</td>
<td>✓</td>
</tr>
<tr>
<td>Fats, Oils, Grease</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Leaf and Yard Waste</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Tree Waste</td>
<td>C&amp;D stumps and trees and wood used</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>for biomass.</td>
<td></td>
</tr>
<tr>
<td>Clean Wood</td>
<td>Wood used for biomass.</td>
<td>✓</td>
</tr>
<tr>
<td>Pallets</td>
<td>Wood used for biomass and pallet repair and reconstruction.</td>
<td>✓</td>
</tr>
<tr>
<td>Textiles</td>
<td>Reuse of apparel</td>
<td>✓</td>
</tr>
<tr>
<td>Poultry Wastes, Sludges</td>
<td>Excluded from MSW</td>
<td>✓</td>
</tr>
<tr>
<td>Municipal Biosolids</td>
<td>Excluded from MSW</td>
<td>✓</td>
</tr>
<tr>
<td>Food Processing Waste</td>
<td>Excluded from MSW</td>
<td>✓</td>
</tr>
<tr>
<td>Bottom and Fly Ash</td>
<td>Excluded from MSW</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special Wastes</td>
<td></td>
</tr>
<tr>
<td>Electronics</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Florescent Bulbs</td>
<td>C&amp;D debris</td>
<td>✓</td>
</tr>
<tr>
<td>Other Batteries</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Carpet</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other Construction Wastes</td>
<td></td>
</tr>
<tr>
<td>Asphalt</td>
<td>Excluded from MSW</td>
<td>✓</td>
</tr>
<tr>
<td>Concrete and Brick</td>
<td>Excluded from MSW</td>
<td>✓</td>
</tr>
<tr>
<td>Soil and Stones</td>
<td>Excluded from MSW</td>
<td>✓</td>
</tr>
</tbody>
</table>

5 A single check mark used for metals, except appliances, indicates that it is impossible to disaggregate quantities reported by generator type (e.g. residential/commercial, industrial and/or C&D) which is required to classify recycled metals as MSW.
Project Approach

Survey Methodology

The survey methodology for CY 2018 is described below. Beginning in CY 2011, DNREC posted information on recycling reporting requirements, and assisted DSM in notifying potential generators, haulers, and processors of recyclable material of the new requirement. This included drafting a letter from DNREC for DSM to use in performing outreach. The survey process followed the steps below.

First, DSM updated the database of recycling contacts developed originally during the first 2005 survey and updated yearly to ensure that all major recyclers (and/or handlers/brokers) identified in previous years were included. As in the past, the 2018 survey was augmented by follow up with many of the largest generators of recyclable material in Delaware to verify where their recyclable material was being sent. This helps to eliminate double counting, ensures material recycled by large generators using out-of-state brokers are captured, and helps to identify and track consolidation within the recycling and brokering industries.

For CY 2018, DSM also attempted to identify any new recycling facilities and brokers of recyclables that were not already in the database to ensure any new businesses handling Delaware recyclables were not missed. The types of facilities included in DSM’s Annual Recycling Report to RPAC contact database fall into the following major categories:

- **Recycling haulers** that collect recyclables, single stream or source separated, as well as yard waste and other recoverable materials from small and large generators.

- **Processing facilities, brokers and end users** that either handle, process or buy recovered fiber, plastics, metals, glass, pallets, electronics and textiles from Delaware generators.

- **Large retailers and grocers** that generate large quantities of OCC, film, pallets, appliances, and/or lead acid batteries and who tend to backhaul these materials to internal central distribution centers for processing and marketing.

- **Financial institutions and insurance companies** that are large employers in Delaware and are likely to generate large quantities of paper waste and electronics for shredding, data destruction and recycling.

- **Large generators and processors of leaf and yard waste and natural wood waste** such as major landscaping companies, tree companies, composters and mulchers, who grind the material for resale, were contacted to report on yard waste and natural wood waste as well as attempt to allocate tree waste, especially, between MSW and non-MSW categories.

- **Large employers not listed above, including institutions and manufacturers** that may either generate paper, plastics, metals or other recyclable materials in sufficient quantities to utilize out-of-state handlers, or brokers that may not report.

In all cases survey respondents were offered the opportunity to request that their data be kept confidential. As such, data on quantities by individual firms are not included in this report but reported in aggregate.

Second, letters from DNREC and DSM were sent electronically, along with the survey form, by DSM to all recyclers and large generators in DSM’s database for which there was a valid e-mail address. A copy of the survey form was also made available for download on the DSM website and reporting guidance was available on the DNREC website.
In cases where DSM had no e-mail address or if the e-mail sent by DSM was returned, DSM made at least three telephone attempts to the company or contact person to try to obtain a correct contact and e-mail address. DSM then followed up by e-mail or in some cases facsimile or the U.S.P.S. mail service to send both the DSM and the DNREC letter along with the 2018 survey form.

Finally, DSM followed up the e-mails sent with telephone calls and subsequent e-mails to try to solicit survey responses. A copy of the letter from DNREC, DSM and the updated survey form are all attached as Appendix C and Appendix D.

Third, DSM updated the contact database with any new companies and recyclers identified during telephone interviews or listed in completed surveys. DSM also updated the contact database to remove any companies that had closed, were deemed not applicable for annual contact, merged, or were no longer operating in the State of Delaware. DSM also updated the database with any new contact names identified during telephone calls.

Fourth, DSM attempted to collect the following information from each survey participant (as noted on the survey form):

- Types of materials handled or recycled;
- Names of facilities or brokers used for processing or sent for end use in CY 2018 (to ensure double counting did not occur);
- Quantities recycled by material type for CY 2018 (in tons);
- Whether the material was classified as generated by the residential or commercial sector; and,
- Specific end uses of some materials to ensure that uses such as wood for biomass, and shredded paper to waste-to-energy facilities would be excluded from the totals reported.

Fifth, DSM collected all data from DSWA on recyclable materials handled through DSWA facilities, including the assumed source of the material (e.g. residential vs. commercial) and end users. Data reported by DSWA on recyclable materials is included in the total tonnages.

Finally, on a case-by-case basis, if a relatively large generator of recyclables failed to respond to the 2018 survey, data from 2017 was used as a placeholder, but only if DSM expected that no major changes to that company had occurred during 2018. However, companies that did not report in 2016 or 2017 were excluded in 2018. It should be noted that these decisions do impact quantities recycled and do have some impact on the recycling rate. DSM has attempted to be consistent with respect to this procedure to allow for a consistent methodology over time.

Excluded and Included Material Types
This recycling rate report concentrates on materials recycled from MSW only. Construction and demolition wastes as well as industrial process wastes are excluded from this report, however, these wastes are accounted for in the Total Solid Waste Survey that is completed on an every 5-year basis. In addition, gaseous and liquid wastes, infectious wastes, and Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous wastes are excluded.

---

6 Some large employers or small manufacturers were found to use an instate hauler for all or most of their recyclables and therefore annual reporting was not necessary. However, the company was left on the list so that every five years their status might be revisited.

7 The status of the firms that did not report for two consecutive years is unknown. Some may have gone out of business, but others were contacted multiple times but did not respond. Most of these firms represent relatively small quantities of material.
It should be noted here however, that to the extent that materials such as OCC generated from construction and demolition activities but collected for recycling are included as part of reports from brokers and processors, they would be included in the totals reported. To the same degree, OCC that was set aside in a C&D recycling container or sent to a C&D recycling facility would be excluded. An in-depth description of included material categories, generators, and vendors is included as section B of the Appendix.

**Potential for Use as Energy Recovery**

Materials that were reported as recycled but directly sent, or processed and sent for energy recovery were excluded. Examples of materials include wood and tires processed and sent for use as fuel.

**Potential for Off-Site Disposal**

Consistent with EPA guidelines, only those materials which would be disposed off-site if they were not beneficially reused or recycled, and therefore could potentially be delivered to a Delaware landfill, are included in the assessment. Examples include:

- Wood chips and stumps that are disposed on site are excluded while wood waste, including trees and stumps, that must be removed from the site are included. However, wood waste that would be disposed of with C&D waste was excluded in cases where DSM could confirm that this was the case. Note that, consistent with the EPA methodology, all *land clearing debris* was excluded even when it was managed off-site by a mulcher, assuming it was identified as land clearing debris.

- Plastic wastes reused on-site in a manufacturing process are excluded, but plastic wastes sent off-site for reclamation are included.8

- Pallets that are reused or rebuilt on-site (or off-site) are excluded, but damaged pallets that are shipped off-site for grinding for mulch are included in the totals.

**Import and Export**

In all cases the assessment excludes materials that are generated outside of Delaware but imported into the State for either recycling or beneficial reuse. Similarly, this report attempts to include recyclables generated in Delaware but exported out-of-state for recycling. However, in some cases accounting for materials exported out-of-state may not be possible because out-of-state processors may not be subject to the reporting requirement.

For example, recycled materials backhauled or transported from large generators in Delaware directly to out-of-state warehouses or recyclers are included (e.g., grocers and retail stores that backhaul cardboard to an out-of-state, central distribution facility) and any materials generated out-of-state but consolidated at a Delaware warehouse/recycler are excluded.

---

8 Plastic wastes from molders and extruders are considered manufacturing/industrial wastes and excluded, but plastics used in packaging by those same manufacturers and sent off site for recycling are included.
Final Material Categories

Brief descriptions of the material categories surveyed and tracked are listed in Table 2. For each material, the primary generator sector (residential/household or commercial/institutional) and the typical types of organizations who report that material are listed. More in-depth descriptions of the material categories and who generates and recycles these materials can be found in section B of the Appendix.

**Table 2: Brief Description of Final Material Categories**

<table>
<thead>
<tr>
<th>Material Category</th>
<th>Description</th>
<th>Primary Generator</th>
<th>Typical Reporters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper, Paper Packaging</td>
<td>Cardboard, baled and sorted</td>
<td>Commercial</td>
<td>Retailers, Grocers, Haulers, Recycling Processors, Brokers</td>
</tr>
<tr>
<td>Corrugated (OCC)</td>
<td></td>
<td></td>
<td>News Distributors, Recycling Processors, Brokers</td>
</tr>
<tr>
<td>Newspaper (ONP)</td>
<td>Newspaper, including inserts</td>
<td>Commercial</td>
<td>Document Destruction Businesses, Offices, Banks, Institutions, Brokers</td>
</tr>
<tr>
<td>Sorted Office Paper</td>
<td>Primarily white office paper</td>
<td>Commercial</td>
<td>Recycling Processors, Brokers</td>
</tr>
<tr>
<td>Mixed Paper</td>
<td>Print overruns, junk mail, etc.</td>
<td>Commercial</td>
<td>Retailers, Grocers</td>
</tr>
<tr>
<td>Packaging</td>
<td>Food and beverage bottles and containers</td>
<td>Commercial</td>
<td>Beverage Distributors, Recycling Processors</td>
</tr>
<tr>
<td>Glass</td>
<td></td>
<td></td>
<td>Retailers, Grocers, Haulers, Recycling Processors,</td>
</tr>
<tr>
<td>Plastic Film / Shrink Wrap</td>
<td>Plastic wrap utilized in the packaging process</td>
<td>Commercial</td>
<td>Retailers, Grocers, Haulers, Recycling Processors,</td>
</tr>
<tr>
<td>Retail Bags</td>
<td>Plastic retail bags</td>
<td>Residential</td>
<td>Retailers, Grocers</td>
</tr>
<tr>
<td>Plastic Containers</td>
<td>Plastic bottles and containers</td>
<td>Commercial</td>
<td>Manufacturers, Recycling Processors</td>
</tr>
<tr>
<td>Polystyrene Packaging</td>
<td>Styrofoam packaging and single use food packaging and cups</td>
<td>Residential</td>
<td>DSWA, Manufacturers</td>
</tr>
<tr>
<td>Aluminum Cans</td>
<td>Aluminum beverage cans</td>
<td>Residential</td>
<td>Scrap Metal Recyclers</td>
</tr>
<tr>
<td>Mulched Pallets</td>
<td>Pallet wood mulched NOT reused</td>
<td>Commercial</td>
<td>Pallet Recyclers</td>
</tr>
<tr>
<td>Mixed Recyclables</td>
<td>Single Stream or Co-Mingled paper and containers</td>
<td>Residential</td>
<td>Municipalities, Haulers, Offices, Manufacturers, Recycling Processors</td>
</tr>
<tr>
<td>Vehicle Waste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tires</td>
<td>Used Tires sent for recycling/reuse</td>
<td>Residential</td>
<td>Tire Recyclers</td>
</tr>
<tr>
<td>Lead Acid Batteries</td>
<td>Lead Acid Batteries sent for recycling</td>
<td>Residential</td>
<td>Manufacturers, Scrap Metal Recyclers, Universal Waste Processors</td>
</tr>
<tr>
<td>Oil Filters</td>
<td>Oil Filters drained and recycled</td>
<td>Residential</td>
<td>Universal Waste Processors</td>
</tr>
<tr>
<td>Special Wastes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpet</td>
<td>Carpet used as flooring</td>
<td>Commercial</td>
<td>Haulers</td>
</tr>
<tr>
<td>Textiles</td>
<td>Clothing donated for reuse or textile/fabric leftovers</td>
<td>Residential</td>
<td>Non-Profits, Manufacturers</td>
</tr>
<tr>
<td>Mattresses</td>
<td>Used Mattresses to be dismantled</td>
<td>Residential</td>
<td>Retailers</td>
</tr>
<tr>
<td>Florescent Bulbs</td>
<td>Florescent Bulbs containing mercury sent for recycling</td>
<td>Commercial</td>
<td>Universal Waste Processors, Manufacturers, Retailers</td>
</tr>
<tr>
<td>Electronic Goods</td>
<td>Computers, Cell Phones, TVs, and all other electronic devices recycled</td>
<td>Residential</td>
<td>Electronic Waste Processors, Retailers, Institutions</td>
</tr>
<tr>
<td>Other Batteries</td>
<td>Household or ‘other’ batteries not including lead acid</td>
<td>Residential</td>
<td>Manufacturers, Universal Waste Processors</td>
</tr>
<tr>
<td>Organic Wastes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fats, Oil, Grease</td>
<td>Resulting from food preparation</td>
<td>Commercial</td>
<td>Rendering Companies, Institutions, Restaurants</td>
</tr>
<tr>
<td>Food Waste</td>
<td>Expired/waste meats, vegetables and pre-made meals</td>
<td>Commercial</td>
<td>Grocers, Rendering Companies</td>
</tr>
<tr>
<td>Leaf and Yard Waste</td>
<td>Leaves, grass clippings, branches and shrubs with diameters that do not exceed 4”</td>
<td>Residential</td>
<td>Landscapers, Drop-Off Sites, Haulers</td>
</tr>
<tr>
<td>Trees and Branches</td>
<td>Branches greater than 4”, blow downs, tree removal</td>
<td>Residential /Commercial</td>
<td>Landscapers, Tree Companies, Drop-Off Sites</td>
</tr>
<tr>
<td>Clean Wood</td>
<td>Not treated, stained, or painted</td>
<td>Commercial</td>
<td>Haulers, Recycling Processors</td>
</tr>
<tr>
<td>Metals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Goods</td>
<td>Appliances</td>
<td>Residential</td>
<td>Scrap Metal Recyclers, Retailers</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Plastics</td>
<td>All Other Plastics</td>
<td>Commercial</td>
<td>Retailers, Recycling Processors, Manufacturers</td>
</tr>
</tbody>
</table>
Study Limitations

The methodology followed only counts materials reported to be recycled and does not make estimates based on a material flow methodology or on waste generation or recycling coefficients. This approach is more likely to under report materials recycling. As the same method is followed each year, comparisons of recycling activity between years are more accurate and informative.

As in previous years, DSM has carried over some of the prior year’s (CY 2017) reported data from generators or recyclers that did not report for CY 2018 but were suspected or known to still be active recyclers. Companies that were known to be closed in CY 2018 were excluded from the results.

Mandatory reporting (now in its’ eighth year) has greatly improved data accuracy and participation, although changes in the organization and management of hauling, processing, and brokering companies can make collecting data from some companies challenging.

One of the major challenges in CY 2018 came from two companies who could not confirm whether their previous year’s reports were accurate and ultimately one company confirmed that CY 2017 materials recycling had been over-reported. In this case, CY 2017 materials tonnages were adjusted down in this report as shown in the Results Section. The other company could not provide an estimate as to the extent of CY 2017 over-reporting but reported significantly less tonnage for CY 2018. This is discussed more in depth in the Results Section.

As the recycling industry adjusts to China’s National Sword and related limitations in the overseas markets, companies must address the higher costs of recycling. These costs may lead to internal audits by outside recycling management companies which could identify previously mis-reported tonnages.

Without the ability to audit companies for this report, DSM relies on organizations (large and small) to provide accurate data and report in good-faith. While DSM does generally question any irregularities in data reported, providing follow-up by telephone and e-mail to understand potential causes of a significant increase or decrease in tonnages, there is little else DSM can do to verify figures.

As with previous years, DSM made a significant effort to identify appropriate contacts and obtain complete data for companies that must report but that use national recycling and waste management brokers. In these cases, DSM must not only identify the new contact but educate them on Delaware’s reporting requirement and obtain accurate end user locations. Additionally, brokers that handle recyclables from these national recycling accounts often have confidentiality clauses preventing them from providing end user information. Without the end user or intermediate processor listed, double counting can occur. DSM endeavored to identify situations where materials are likely being double counted and to address these instances on a case-by-case basis.

Finally, because brokers typically report materials sold that have been sorted for contamination, reported tonnages may not equal tons reported by the processors or generators using that broker (or end user). DSM endeavored to track material flow and match reports as feasible and identify and follow up on significant irregularities.

DSM has made every effort to correct a prior year’s number when irregularities or reporting errors are identified during the current survey year.

---

9 CY 2017 adjusted figures are shown in red text in Table 4.
Survey Results

Results of the CY 2018 Recycling Survey are summarized in Table 3 below and compare CY 2018 totals from major material categories to last year’s report (CY 2017).

### Table 3: Comparison of Material Recycled, CY 2017 – 2018 (Tons by Material)

<table>
<thead>
<tr>
<th>Material Category</th>
<th>2018 (Tons)</th>
<th>2017 (Tons)</th>
<th>Difference (Tons)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper, Paper Packaging</td>
<td>103,574</td>
<td>156,803</td>
<td>(53,230)</td>
<td>-34%</td>
</tr>
<tr>
<td>All Other Packaging</td>
<td>128,841</td>
<td>106,741</td>
<td>22,100</td>
<td>21%</td>
</tr>
<tr>
<td><strong>Net Packaging:</strong></td>
<td><strong>232,415</strong></td>
<td><strong>263,544</strong></td>
<td><strong>(31,129)</strong></td>
<td><strong>-12%</strong></td>
</tr>
<tr>
<td>Vehicle Waste</td>
<td>11,455</td>
<td>12,039</td>
<td>(584)</td>
<td>-5%</td>
</tr>
<tr>
<td>Special Wastes</td>
<td>6,325</td>
<td>15,737</td>
<td>(9,412)</td>
<td>-60%</td>
</tr>
<tr>
<td>Organic Wastes</td>
<td>163,267</td>
<td>185,679</td>
<td>(22,411)</td>
<td>-12%</td>
</tr>
<tr>
<td>Metals</td>
<td>28,256</td>
<td>34,941</td>
<td>(6,685)</td>
<td>-19%</td>
</tr>
<tr>
<td>Other</td>
<td>440</td>
<td>341</td>
<td>99</td>
<td>29%</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>442,158</strong></td>
<td><strong>512,280</strong></td>
<td><strong>(70,122)</strong></td>
<td><strong>-14%</strong></td>
</tr>
</tbody>
</table>

As shown in Table 3, the CY 2018 survey results indicate that material diverted for recycling decreased by roughly 14% (by weight) or 70,100 tons between CY 2017 and CY 2018. This decrease predominantly came from a decrease in the reporting of paper (including OCC) and of organic wastes.

Figure 1, (below) illustrates the breakdown of MSW materials recovery, by material type in Delaware for 2018. Figure 1 emphasizes the important role of paper/paper packaging, single stream (mixed recyclables), and green waste (all other organic waste) recycling in Delaware.

**Figure 1: Materials Recovery by General Material Category Included in EPA Definition of MSW Recycling (State of Delaware, CY 2018)**
Table 4 (found on the next page) presents detailed CY 2018 survey results, as well as provides the results from the prior three reporting years (2015, 2016 and 2017). Until CY 2016, DSWA tonnages were recorded separately and shown in a separate column on Table 4.¹⁰

The CY 2018 results detailed in Table 4 show that several material categories increased, while others fell. The material categories that saw increases are mixed office paper (MOP), mixed recyclables, and oil filters while those that saw decreases include newsprint (ONP), polystyrene, and textiles.

A detailed discussion of the specific increases and decreases in each material category by material type can be found in the next section of this report, following Table 4.

Table 4 is accompanied by detailed footnotes to help to clarify material categories and the changes in recycling collection activity and material flow that has occurred between years.

Following Table 4 is a breakdown of the results in each of the major material categories showing the CY 2018 and CY 2017 reported tonnages and the difference in reporting quantities. For each category and material type, a discussion of the possible reasons for these fluctuations is listed.

¹⁰ In CY 2017, RPAC determined to group DSWA materials in the totals and not show them separately. Details on materials recycled by DSWA can be found in their Annual Reports which can be accessed at: http://dswa.com/about-us/annual-reports/
### Table 4: Comparison of MSW Materials Recycled in Delaware, CY 2018, 2017, 2016 & 2015

<table>
<thead>
<tr>
<th>Material Category</th>
<th>CY 2018 Total (tons)</th>
<th>CY 2017 Total (tons)</th>
<th>CY 2016 Total (tons)</th>
<th>CY 2015 Total (tons)</th>
<th>Difference, 2018-2017 (tons)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper, Paper Packaging (1)</td>
<td>72,796</td>
<td>94,520</td>
<td>105,925</td>
<td>90,285</td>
<td>(21,724)</td>
<td>-23%</td>
</tr>
<tr>
<td>Corrugated (OCC) (2)</td>
<td>2,601</td>
<td>22,413</td>
<td>8,190</td>
<td>2,733</td>
<td>(19,812)</td>
<td>-88%</td>
</tr>
<tr>
<td>Newspaper (ONP)</td>
<td>2,601</td>
<td>22,413</td>
<td>8,190</td>
<td>2,733</td>
<td>(19,812)</td>
<td>-88%</td>
</tr>
<tr>
<td>Sorted Office Paper</td>
<td>12,720</td>
<td>32,391</td>
<td>32,841</td>
<td>25,576</td>
<td>(19,671)</td>
<td>-61%</td>
</tr>
<tr>
<td>Mixed Paper</td>
<td>15,456</td>
<td>7,479</td>
<td>5,164</td>
<td>6,911</td>
<td>7,977</td>
<td>107%</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td><strong>103,574</strong></td>
<td><strong>156,803</strong></td>
<td><strong>152,120</strong></td>
<td><strong>125,506</strong></td>
<td><strong>(33,283)</strong></td>
<td><strong>-21%</strong></td>
</tr>
<tr>
<td>All Other Packaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass (3)</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>2,136</td>
<td>(2)</td>
<td>-100%</td>
</tr>
<tr>
<td>Plastic Film /Wrap (4)</td>
<td>2,066</td>
<td>2,428</td>
<td>2,278</td>
<td>3,008</td>
<td>(622)</td>
<td>-15%</td>
</tr>
<tr>
<td>Retail Bags</td>
<td>284</td>
<td>254</td>
<td>201</td>
<td>228</td>
<td>30</td>
<td>12%</td>
</tr>
<tr>
<td>Plastic Containers</td>
<td>1,772</td>
<td>2,957</td>
<td>2,816</td>
<td>129</td>
<td>(1,185)</td>
<td>-40%</td>
</tr>
<tr>
<td>Polystyrene Packaging (5)</td>
<td>16</td>
<td>72</td>
<td>57</td>
<td>108</td>
<td>(51)</td>
<td>-78%</td>
</tr>
<tr>
<td>Aluminum Cans (6)</td>
<td>421</td>
<td>543</td>
<td>585</td>
<td>490</td>
<td>(122)</td>
<td>-23%</td>
</tr>
<tr>
<td>Pallets</td>
<td>3,980</td>
<td>4,136</td>
<td>3,697</td>
<td>2,940</td>
<td>(156)</td>
<td>-4%</td>
</tr>
<tr>
<td>Mixed Recyclables (7)</td>
<td>120,303</td>
<td>96,349</td>
<td>100,733</td>
<td>106,933</td>
<td>23,953</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td><strong>128,841</strong></td>
<td><strong>106,741</strong></td>
<td><strong>110,369</strong></td>
<td><strong>115,973</strong></td>
<td><strong>22,100</strong></td>
<td><strong>21%</strong></td>
</tr>
<tr>
<td>Vehicle Waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tires</td>
<td>9,080</td>
<td>8,513</td>
<td>8,039</td>
<td>2,301</td>
<td>567</td>
<td>7%</td>
</tr>
<tr>
<td>Lead Acid Batteries (8)</td>
<td>2,011</td>
<td>3,286</td>
<td>2,422</td>
<td>3,164</td>
<td>(1,275)</td>
<td>-39%</td>
</tr>
<tr>
<td>Oil Filters</td>
<td>364</td>
<td>240</td>
<td>333</td>
<td>203</td>
<td>124</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td><strong>11,455</strong></td>
<td><strong>12,039</strong></td>
<td><strong>10,794</strong></td>
<td><strong>5,668</strong></td>
<td>(584)</td>
<td>-5%</td>
</tr>
<tr>
<td>Special Wastes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpet</td>
<td>78</td>
<td>98</td>
<td>187</td>
<td>19</td>
<td>(20)</td>
<td>-21%</td>
</tr>
<tr>
<td>Textiles (9)</td>
<td>4,189</td>
<td>13,631</td>
<td>13,629</td>
<td>16,737</td>
<td>(9,441)</td>
<td>-69%</td>
</tr>
<tr>
<td>Mattresses</td>
<td>180</td>
<td>201</td>
<td>189</td>
<td>183</td>
<td>(12)</td>
<td>-6%</td>
</tr>
<tr>
<td>Florescent Bulbs</td>
<td>24</td>
<td>36</td>
<td>28</td>
<td>68</td>
<td>(13)</td>
<td>-34%</td>
</tr>
<tr>
<td>Electronic Goods (10)</td>
<td>1,709</td>
<td>1,679</td>
<td>1,650</td>
<td>1,431</td>
<td>30</td>
<td>2%</td>
</tr>
<tr>
<td>Other Batteries</td>
<td>145</td>
<td>92</td>
<td>79</td>
<td>72</td>
<td>54</td>
<td>58%</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td><strong>6,325</strong></td>
<td><strong>15,737</strong></td>
<td><strong>15,761</strong></td>
<td><strong>18,510</strong></td>
<td><strong>(9,412)</strong></td>
<td><strong>-60%</strong></td>
</tr>
<tr>
<td>Organic Wastes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fats, Oil, Grease</td>
<td>3,641</td>
<td>3,594</td>
<td>4,110</td>
<td>3,565</td>
<td>47</td>
<td>1%</td>
</tr>
<tr>
<td>Food Waste</td>
<td>1,550</td>
<td>1,735</td>
<td>2,125</td>
<td>8,509</td>
<td>(185)</td>
<td>-11%</td>
</tr>
<tr>
<td>Leaf and Yard Waste (11)</td>
<td>104,903</td>
<td>107,721</td>
<td>142,520</td>
<td>110,690</td>
<td>(2,818)</td>
<td>-3%</td>
</tr>
<tr>
<td>Trees and Branches (12)</td>
<td>50,969</td>
<td>70,742</td>
<td>73,786</td>
<td>83,383</td>
<td>(19,773)</td>
<td>-28%</td>
</tr>
<tr>
<td>Clean Wood</td>
<td>2,205</td>
<td>1,887</td>
<td>1,742</td>
<td>1,318</td>
<td>317</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td><strong>163,267</strong></td>
<td><strong>185,679</strong></td>
<td><strong>224,282</strong></td>
<td><strong>207,466</strong></td>
<td><strong>(22,411)</strong></td>
<td><strong>-12%</strong></td>
</tr>
<tr>
<td>Metals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Goods (13)</td>
<td>28,256</td>
<td>34,941</td>
<td>27,025</td>
<td>24,573</td>
<td>(6,668)</td>
<td>-19%</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td><strong>28,256</strong></td>
<td><strong>34,941</strong></td>
<td><strong>27,025</strong></td>
<td><strong>24,573</strong></td>
<td><strong>(6,668)</strong></td>
<td><strong>-19%</strong></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Plastics</td>
<td>440</td>
<td>341</td>
<td>884</td>
<td>1,667</td>
<td>99</td>
<td>29%</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td><strong>440</strong></td>
<td><strong>341</strong></td>
<td><strong>884</strong></td>
<td><strong>1,667</strong></td>
<td><strong>99</strong></td>
<td><strong>29%</strong></td>
</tr>
<tr>
<td><strong>Total (14)</strong></td>
<td><strong>442,158</strong></td>
<td><strong>512,280</strong></td>
<td><strong>541,234</strong></td>
<td><strong>499,363</strong></td>
<td><strong>(70,122)</strong></td>
<td><strong>-14%</strong></td>
</tr>
</tbody>
</table>
TABLE 4 NOTES:

1. Paper, Paper Packaging: All paper and paper packaging was included as MSW even in cases where processors did not reveal sources (therefore some printer overruns may be included). Note that mixed recyclables including different types of paper and paper packaging reported and therefore the totals for paper, paper packing do not include this material.
2. Corrugated: Includes baled and loose OCC.
3. Glass: Reported glass tonnages as a separate category have remained low and are likely accounted for in the mixed recyclables tonnages.
4. Plastic Film/Wrap: Prior to 2014 this category also included retail bags in the total. As of 2014, retail bags are broken out separately as estimated by the reporter.
5. Polystyrene Packaging: Includes Styrofoam generated in the agricultural and retail industries as part of food packaging as well as electronics and other materials packaging reported as recycled by businesses.
6. Aluminum Cans: Reported primarily by scrap metal recyclers but also are included in the mixed recyclables totals.
7. Mixed Recyclables: Single stream or comingled material collected from municipal curbside recycling programs and by subscription haulers from both households and businesses. This category totals all reported incoming tonnages from Delaware collectors and generators, and therefore residue has not been subtracted from the total. See the discussion of residue in the following section entitled “Other Packaging Waste”.
8. Lead Acid Batteries: Accounts for lead acid batteries reported as recycled, and as in previous years this number is assumed to be under reported.
9. Textiles: Most of this tonnage is used clothing (including shoes) exported for recycling or reuse. These end uses change based on textile quality and market conditions and no breakdown of the actual end uses is available. Red figures indicate a correction made for CY 2017 tonnage that was identified in CY 2018.
10. Electronic Goods: Used electronics reported as recycled. It is important to note that as technology advances electronics have gotten lighter, thus, the tonnages reported may reflect a higher per unit recycling rate versus previous years.
11. Leaf and Yard Waste: Reported primarily by green waste companies. In many cases these companies do not have scale data and thus, the leaf and yard waste reported is an estimate and, for this reason, can vary year-to-year.
12. Trees and Branches: Reported primarily by green waste companies but may include some small amount of land clearing debris as some green waste companies are not aware of the source of materials handled. CY 2017 tonnages (shown in red) have been adjusted to reflect a reporting error identified in CY 2018.
13. White Goods: Appliances reported primarily by scrap metal yards as recycled. Many reporters estimate these figures based on a percentage of Light Iron sold.
14. Numbers may not add due to rounding.
Aggregated data shows a 34 percent decrease in the total Paper and Paper Packaging material reported as recycled in CY 2018. Overall, paper recycling decreased by roughly 53,000 tons however mixed paper increased a reported roughly 8,000 tons.

While some of the decrease in paper reported, including cardboard, may be accounted for in the mixed recyclables tonnages reported (see next section), several other factors may have contributed to changes from reported CY 2017 tonnages to the CY 2018 figures including:

- China’s restrictions on imports of recycled paper (and plastics) have decreased U.S. exports into China, resulting in a flood of available paper in the North American recycled paper market. This oversupply has led to a decrease in the value of paper which may decrease the amount and types of paper that brokers sourced from Delaware in CY 2018. In addition, some processors may be stockpiling paper hoping it may sell in the near future at a higher profit.

- Sorted Office Paper (SOP) declined by roughly 19,700 tons, some of which may reflect the struggling paper market in CY 2018. However, 10,500 tons of SOP was not carried over in CY 2018 from a company that did not submit a report in CY 2017 but was operational in Delaware for at least part of CY 2017 (and believed to handle and recycle SOP). Additionally, part of the decline in SOP tons is due to another company whose contracts fluctuate, with these operations generating (and sending for recycling) variable amounts of SOP year to year.

- In CY 2017 Newsprint (ONP) increased by roughly 14,200 tons primarily due to a new reporter who had not been previously identified and was sourcing from Delaware. However, that company (among other brokers and paper mills) was no longer sourcing ONP from Delaware in CY 2018 due to the lack of a market. This material may be accounted for in the MOP tons. Overall, however, newsprint generation continues to decline.

- As technology becomes a mainstay in most workplaces, waste paper generation in offices is expected to continue to decrease as companies switch from hardcopy files to digital storage.
Other Packaging Waste

<table>
<thead>
<tr>
<th>Material Category</th>
<th>2018 (Tons)</th>
<th>2017 (Tons)</th>
<th>Difference</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Other Packaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>-</td>
<td>2</td>
<td>(2)</td>
<td>-100%</td>
</tr>
<tr>
<td>Plastic Film/Wrap</td>
<td>2,066</td>
<td>2,428</td>
<td>(362)</td>
<td>-15%</td>
</tr>
<tr>
<td>Retail Bags</td>
<td>284</td>
<td>254</td>
<td>30</td>
<td>12%</td>
</tr>
<tr>
<td>Plastic Containers</td>
<td>1,772</td>
<td>2,957</td>
<td>(1,185)</td>
<td>-40%</td>
</tr>
<tr>
<td>Polystyrene Packaging</td>
<td>16</td>
<td>72</td>
<td>(56)</td>
<td>-78%</td>
</tr>
<tr>
<td>Aluminum Cans</td>
<td>421</td>
<td>543</td>
<td>(122)</td>
<td>-23%</td>
</tr>
<tr>
<td>Pallets</td>
<td>3,980</td>
<td>4,136</td>
<td>(156)</td>
<td>-4%</td>
</tr>
<tr>
<td>Mixed Recyclables</td>
<td>120,303</td>
<td>96,349</td>
<td>23,953</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>128,841</strong></td>
<td><strong>106,741</strong></td>
<td><strong>22,100</strong></td>
<td><strong>21%</strong></td>
</tr>
</tbody>
</table>

Recycling of packaging materials increased by roughly 22,000 tons due in part to recycling companies closing and consolidating facilities in central locations, changing the material streams they accept, and adjusting to the recovering recycling markets. In CY 2018, there was an increase in the number of organizations reporting recycling mixed recyclables or single stream, who previously may have reported materials separately. *These figures may include large amounts of paper reported as mixed recyclables.*

As in previous years, the “Mixed Recyclables” or single stream figures reported by most facilities (and listed in Table 3) includes residue. Residue includes both materials that are not accepted for recycling but collected with other recyclables as well as materials that could be recycled but are not due to process inefficiencies. Residue has not been subtracted from the totals reported for single stream materials (mixed recyclables) or for any other materials, but is included in the denominator as disposed MSW.\(^{11}\)

For example, paper bales may have 2 percent or more residue, and textiles and appliances (among other materials) may have some residual materials that cannot be recycled and need to be disposed. *While residue has not been subtracted from any totals reported, single stream recycling has the potential for much higher residue rates and because of this, when benchmarking Delaware against other regions, the issue of residue should be considered.*

Potential explanations for the change in reported CY 2018 packaging waste recycling figures include:

- Mixed Recyclables tonnages increased by roughly 24,000 tons primarily due to the expansion of a Delaware based recycling processor (who was acquired by an out-of-state company) who now offers commercial single stream collection and processing. This material may be composed of primarily paper.\(^{12}\)

- Recycling of glass was not reported separately by any company in CY 2018, but are captured in the mixed recyclables category and DSM is told most glass is sent to an end user out-of-state.

---

\(^{11}\) All processing facilities located in Delaware send residue to a DSWA facility. Residue from single stream processed out-of-state may not be captured in the denominator however most single stream is processed in Delaware.

\(^{12}\) As the industry realigns to the changed recycling market and companies finetune their profitability potential, acquisitions and consolidations within the market are expected. These changes can make capital available to expand services and invest in equipment and other processing infrastructure. This activity may continue in the coming years as companies vie for market shares within the Mid-Atlantic.
Plastic container recycling has decreased by roughly 40 percent in CY 2018. This may be a response to the lower price of HDPE containers per bale. As with glass it is assumed that plastic containers are also being accounted for in the mixed recyclables category.

Vehicle Waste

**TABLE 4-3: VEHICLE WASTE**

<table>
<thead>
<tr>
<th>Material Category</th>
<th>2018 (Tons)</th>
<th>2017 (Tons)</th>
<th>Difference</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tires</td>
<td>9,080</td>
<td>8,513</td>
<td>567</td>
<td>7%</td>
</tr>
<tr>
<td>Lead Acid Batteries</td>
<td>2,011</td>
<td>3,286</td>
<td>(1,275)</td>
<td>-39%</td>
</tr>
<tr>
<td>Oil Filters</td>
<td>364</td>
<td>240</td>
<td>124</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>11,455</strong></td>
<td><strong>12,039</strong></td>
<td><strong>(584)</strong></td>
<td><strong>-5%</strong></td>
</tr>
</tbody>
</table>

Overall there was a 5% decrease in the quantity of vehicle waste reported as recycled primarily due to a decrease in lead acid battery recycling. However, oil filter recycling increased by roughly 125 tons or 52 percent.

DSM believes that lead acid batteries and oil filter recovery continue to be underreported. For example, in CY 2018, 2,000 tons (rounded) of lead acid batteries were reported as recycled, and, as in past years, included in these estimates may be any batteries from large equipment, boats, and tractors because recyclers could not break out counts by generator type. (Note that the total amount of material recycled includes both lead and the polypropylene battery casing.) The decrease in CY 2018 was primarily due to one company that reported a significant decrease in lead acid batteries being collected and recycled from Delaware and had no explanation as to the cause. According to the Battery Council International, 98 percent of the lead in lead acid batteries is recovered. Using EPA’s per capita estimate of lead acid battery generation and recovery, Delaware’s population would account for over 9,670 tons recovered.13

In addition, DSM believes that oil filter recycling may be underreported. Utilizing oil filter generation data from Cal Recycle14, DSM estimates that generation of oil filters in Delaware based on their CY 2018 population should be roughly 630 tons. It is important to note that advances in engine and oil technology have increased the intervals between oil changes, moving from the traditional oil filter change every 3,000 miles to up to every 10,000 miles. The increased mileage per oil filter may impact the total generation of used oil filters.

Reports of scrap tire recycling have increased in the past few years with the totals reported now relatively close to an estimate that can be made utilizing the U.S. Tire Manufacturers Association’s 2017 U.S. Scrap Tire Management Summary. Utilizing data in the 2017 Summary, DSM estimates waste tire generation for Delaware in CY 2018 at roughly 12,440 tons with a total recovery to market of 10,129 tons. Delaware reported roughly 9,100 tons of scrap tires recycled, and while an increase of roughly 570 tons over CY 201715 scrap tire recycling, is still below the national average.

Scrap tires have many recycling uses including crumb rubber for athletic fields, and rubber-modified asphalt. This report only accounts for scrap tires sent for recycling and does not include scrap tire

---

13 In addition, the Battery Council reports that new lead-acid batteries typically contain 60 to 80 percent recycled content (lead and plastic, mainly polypropylene).

14 Cal Recycle. Used Oil and Filter Facts. California Department of Resources Recycling and Recovery.

15 CY 2017 tons reported includes tires sent to a hauler for processing that cannot be confirmed, it is assumed that they are not being landfilled.
tonnages sent for Tire Derived Fuel (TDF). It is important to note that TDF demand has declined steadily with a 22.7 percent decline in demand since 2015.\textsuperscript{16}

Special Wastes

\textbf{TABLE 4-4: SPECIAL WASTES}

<table>
<thead>
<tr>
<th>Material Category</th>
<th>2018 (Tons)</th>
<th>2017 (Tons)</th>
<th>Difference</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpet</td>
<td>78</td>
<td>98</td>
<td>(20)</td>
<td>-21%</td>
</tr>
<tr>
<td>Textiles</td>
<td>4,189</td>
<td>13,631</td>
<td>(9,441)</td>
<td>-69%</td>
</tr>
<tr>
<td>Mattresses</td>
<td>180</td>
<td>201</td>
<td>(21)</td>
<td>-11%</td>
</tr>
<tr>
<td>Florescent Bulbs</td>
<td>24</td>
<td>36</td>
<td>(13)</td>
<td>-34%</td>
</tr>
<tr>
<td>Electronic Goods</td>
<td>1,709</td>
<td>1,679</td>
<td>30</td>
<td>2%</td>
</tr>
<tr>
<td>Other Batteries</td>
<td>145</td>
<td>92</td>
<td>54</td>
<td>58%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>6,325</td>
<td>15,737</td>
<td>(9,412)</td>
<td>-60%</td>
</tr>
</tbody>
</table>

Overall special waste recycling decreased by 60 percent primarily driven by the decrease in textile recycling.

Reported textile recycling decreased by roughly 9,400 tons and was primarily due to a significant decrease in one thrift store’s report which they attributed to the closing of one busy location (and related overall decreases in donations received). While DSM is not convinced this is an accurate representation of textile recycling in Delaware, without on-site audits and only subsequent follow up conversations to address these inconsistencies, DSM can only report the data received.

Additionally, textile recycling may have been overreported in previous years by this same organization. Utilizing per capita recovery estimates developed by the Institute of Scrap Recycling Industries, Inc. (ISRI), it is estimated that Delaware’s recovery in CY 2018 should have been roughly 5,800 tons\textsuperscript{17}.

Additional but small decreases in reported tons were also seen in carpet, mattresses, and florescent bulb recycling. These categories tend to fluctuate annually and do not account for a large portion of the total tons recycled in Delaware.

It is important to note that while electronics recycling only increased by 3 percent, the newer electronics on the market are lighter by weight than those previously developed. While a 3 percent increase may not seem significant, it may represent a larger number of units being recycled compared to previous years.

Organic Waste: Food Waste

\textbf{TABLE 4-5: FOOD WASTE}

<table>
<thead>
<tr>
<th>Material Category</th>
<th>2018 (Tons)</th>
<th>2017 (Tons)</th>
<th>Difference</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fats, Oil, Grease</td>
<td>3,641</td>
<td>3,594</td>
<td>47</td>
<td>1%</td>
</tr>
<tr>
<td>Food Waste</td>
<td>1,550</td>
<td>1,735</td>
<td>(185)</td>
<td>-11%</td>
</tr>
<tr>
<td>Food Donations</td>
<td>1,364</td>
<td>1,513</td>
<td>(149)</td>
<td>-10%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>6,555</td>
<td>6,841</td>
<td>(286)</td>
<td>-4%</td>
</tr>
</tbody>
</table>


\textsuperscript{17} The Scrap Recycling Industry: Textiles. 2018. Institute of Scrap Recycling Industries, Inc.
Food waste diversion continues to decline in Delaware. For CY 2018 food waste diversion to composting decreased by 185 tons and donations of food decreased by 149 tons. However, consistent with EPA methodology, only food waste reported as diverted to composting is included in the MSW recycling rate calculation.

DSM continued to track food donations in an attempt to better understand food waste diversion activity. Food donations were primarily made by grocery stores and hospitals and are all assumed to be fit for human consumption. While grocery stores and institutions may receive pressure to divert food waste and do not have composting options readily available to them, there is a limit to how much food waste can be donated, since much of commercial food waste is not fit for human consumption.

In contrast, fats, oil, and grease increased by roughly 50 tons due to one company who reported no business in Delaware in CY 2017 but serviced customers in previous years and were again in Delaware in CY 2018.

The challenges faced by food waste composting facilities has had a significant impact on the costs to and ability of some Delaware supermarkets, restaurants and institutions to find a compost facility to send their food waste. As food waste makes up a large portion of the waste stream and represents a large portion of the weight of waste being disposed of, the increased access to more readily available food waste composting options would have a strong positive impact on the overall recycling rate for Delaware.

**Organic Waste: Green Waste**

<table>
<thead>
<tr>
<th>Material Category</th>
<th>2018 (Tons)</th>
<th>2017 (Tons)</th>
<th>Difference</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf and Yard Waste</td>
<td>104,903</td>
<td>107,721</td>
<td>(2,818)</td>
<td>-3%</td>
</tr>
<tr>
<td>Trees and Branches</td>
<td>50,969</td>
<td>70,742</td>
<td>(19,773)</td>
<td>-28%</td>
</tr>
<tr>
<td>Clean Wood</td>
<td>2,205</td>
<td>1,887</td>
<td>317</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Total</strong>:</td>
<td><strong>158,076</strong></td>
<td><strong>180,350</strong></td>
<td><strong>(22,274)</strong></td>
<td><strong>-12%</strong></td>
</tr>
</tbody>
</table>

CY 2018 saw an overall decrease of 12 percent or roughly 22,300 tons of green waste reported. Leaf and yard waste decreased by roughly 2,800 tons whereas trees and branches decreased by roughly 20,000 tons.

The decline is largely due to one large processor who does not have a scale and had been relying on estimation. An on-the-ground audit by a Delaware government office identified that they had been significantly over-estimating incoming volumes. Additionally, this facility was required to reorganize their yard, limiting the amount of new materials they could accept.

Other factors contributing to the decline include:

- One large processor stopped accepting materials for part of the year as their yard was full.
- Many haulers and handlers do not know where the materials they transport or receive come from, which can result in land clearing debris being reported as trees and branches, or, in trees and branches being reported as land clearing. DSM works with the green waste reporters to do their best to verify the tonnages however errors can occur.
In addition, handlers operating without the use of scales must measure volume and material handling in cubic yards and then allocate total volume to yard waste versus tree waste (and exclude any land clearing debris). Some estimate cubic yards based on the size(s) of incoming vehicles and total loads delivered. These estimates vary from year to year. While DSM consistently uses the same reference densities, as yard waste totals reported have grown, DSM recognizes that differences in density have a direct impact on the final green waste material tonnages reported.

Since the closure of the Wilmington Organics Recycling Center (WORC) who had a scale, DSM has relied heavily on the information submitted by smaller green waste reporters, which, as mentioned above, is sometimes submitted in cubic yards. Therefore, having the correct densities by material category is critical to the accuracy of the final reported tonnages for green waste material.

**Scrap Metal**

<table>
<thead>
<tr>
<th>Material Category</th>
<th>2018 (Tons)</th>
<th>2017 (Tons)</th>
<th>Difference</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>28,256</td>
<td>34,941</td>
<td>(6,685)</td>
<td>-19%</td>
</tr>
<tr>
<td>White Goods</td>
<td>28,256</td>
<td>34,941</td>
<td>(6,685)</td>
<td>-19%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>28,256</td>
<td>34,941</td>
<td>(6,685)</td>
<td>-19%</td>
</tr>
</tbody>
</table>

White goods (appliances) reported as recycled decreased by roughly 6,700 tons between CY 2017 and CY 2018. This decrease may be attributed to a number of factors including changes in appliance components as well as economic and construction trends.

The economy attributes to changes in appliance recycling rates with a strong economy bringing more purchases and more kitchen remodels, resulting in more discards and recycled units. And the lifespan of newer appliances is generally shorter requiring consumers to replace appliances more frequently.

However, newer appliances generally have more plastic and electronic components making them harder to recycle. They are also assembled with less metal, and therefore carry lower weights counteracting any increases in the number of units discarded and recycled.

**Residential vs. Commercial Recycling Activity**

DSM estimated the percentage of each material recycled and classified as MSW generated by a residential as opposed to a commercial source. These allocations are shown in Table 5. below.

While in some cases the source of the material was clear, in others DSM was required to make our best professional judgment as to the source of the material. Since EPA does not attempt to quantify residential and commercial recycling separately, generally acceptable guidelines for allocation of materials recycling to the residential and commercial sector are not available. To address this, DSM worked with RPAC in past years to agree upon acceptable allocations of materials recycling to the commercial and residential sectors as explained in the Methodology section of this report.
### TABLE 5: ESTIMATE OF RESIDENTIAL VS. COMMERCIAL MSW RECYCLING ACTIVITY (CY 2018)

<table>
<thead>
<tr>
<th>Material Category</th>
<th>Residential (tons)</th>
<th>Commercial (tons)</th>
<th>Total MSW (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper (1)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrugated (OCC)</td>
<td>378</td>
<td>72,418</td>
<td>72,796</td>
</tr>
<tr>
<td>Newspaper (ONP)</td>
<td>0</td>
<td>2,601</td>
<td>2,601</td>
</tr>
<tr>
<td>Sorted Office Paper</td>
<td>49</td>
<td>12,670</td>
<td>12,720</td>
</tr>
<tr>
<td>Mixed Paper</td>
<td>14</td>
<td>15,442</td>
<td>15,456</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td>442</td>
<td>103,132</td>
<td>103,574</td>
</tr>
<tr>
<td><strong>Packaging</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Plastic Film / Shrink Wrap (2)</td>
<td>0</td>
<td>2,066</td>
<td>2,066</td>
</tr>
<tr>
<td>Retail Bags</td>
<td>284</td>
<td>0</td>
<td>284</td>
</tr>
<tr>
<td>Plastic Containers</td>
<td>0</td>
<td>1,772</td>
<td>1,772</td>
</tr>
<tr>
<td>Polystyrene Packaging</td>
<td>12</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Aluminum Cans</td>
<td>379</td>
<td>42</td>
<td>421</td>
</tr>
<tr>
<td>Mixed Recyclables (3)</td>
<td>74,209</td>
<td>46,093</td>
<td>120,303</td>
</tr>
<tr>
<td>Mulched Pallets</td>
<td>0</td>
<td>3,980</td>
<td>3,980</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td>74,884</td>
<td>53,957</td>
<td>128,841</td>
</tr>
<tr>
<td><strong>Green Waste</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaf and Yard Waste (4)</td>
<td>94,413</td>
<td>10,490</td>
<td>104,903</td>
</tr>
<tr>
<td>Trees and Branches (5)</td>
<td>25,484</td>
<td>25,484</td>
<td>50,969</td>
</tr>
<tr>
<td>Clean Wood</td>
<td>0</td>
<td>2,205</td>
<td>2,205</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td>119,897</td>
<td>38,179</td>
<td>158,076</td>
</tr>
<tr>
<td><strong>Food Related Wastes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Waste</td>
<td>0</td>
<td>1,550</td>
<td>1,550</td>
</tr>
<tr>
<td>Fats, Oil, Grease</td>
<td>0</td>
<td>3,641</td>
<td>3,641</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td>0</td>
<td>5,191</td>
<td>5,191</td>
</tr>
<tr>
<td><strong>Vehicle Waste (6)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tires</td>
<td>7,264</td>
<td>1,816</td>
<td>9,080</td>
</tr>
<tr>
<td>Lead Acid Batteries</td>
<td>1,609</td>
<td>402</td>
<td>2,011</td>
</tr>
<tr>
<td>Oil Filters</td>
<td>291</td>
<td>73</td>
<td>364</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td>9,164</td>
<td>2,291</td>
<td>11,455</td>
</tr>
<tr>
<td><strong>Special Wastes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textiles (7)</td>
<td>3,776</td>
<td>414</td>
<td>4,189</td>
</tr>
<tr>
<td>Electronics</td>
<td>1,253</td>
<td>456</td>
<td>1,709</td>
</tr>
<tr>
<td>Mattresses</td>
<td>180</td>
<td>0</td>
<td>180</td>
</tr>
<tr>
<td>Carpet (8)</td>
<td>0</td>
<td>78</td>
<td>78</td>
</tr>
<tr>
<td>Florescent Bulbs</td>
<td>0</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Other Batteries</td>
<td>131</td>
<td>15</td>
<td>145</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td>5,340</td>
<td>986</td>
<td>6,325</td>
</tr>
<tr>
<td><strong>Metals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Goods (9)</td>
<td>25,431</td>
<td>2,826</td>
<td>28,256</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td>25,431</td>
<td>2,826</td>
<td>28,256</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Plastics</td>
<td>0</td>
<td>440</td>
<td>440</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td>0</td>
<td>440</td>
<td>440</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>235,157</td>
<td>207,001</td>
<td>442,158</td>
</tr>
</tbody>
</table>
TABLE 5. NOTES (NUMBERS MAY NOT ADD DUE TO ROUNDING):

(1) Paper is allocated by the reporting entity and are generally estimates from grocers and retailers as well as brokers as together they represent the largest end users. However, brokers are not involved in the regular collection of paper and thus, it is generally reported that 100% of their material is commercial.

(2) Plastic Film/Shrink Wrap is assumed to be 100% commercial and a resulting bi-product of packaging.

(3) Mixed Recyclables or “Single Stream” through Wilmington and other municipalities is assumed to be 100% residential although a very small percentage of small business material may be included. All other single stream recycling reported was estimated as residential or commercial by the reporting entity, including haulers and processors. The total tons reported includes residue.

(4) Leaf and Yard waste allocations were made consistent with the 2015 State of Delaware Yard Waste Study, 90% residential and 10% commercial.

(5) Trees and branches waste allocations were made consistent with the 2015 State of Delaware Yard Waste Study, 50% residential and 50% commercial.

(6) All vehicle wastes recycled are assumed to be 80% residential and 20% commercial consistent with past reports, consistent with RPAC recommendations.

(7) Textiles are assumed to be 100% residential except for those textiles reported by manufacturing companies which are listed as commercial.

(8) Carpet is assumed to be 100% commercial.

(9) White Goods are assumed to be 90% residential and 10% commercial consistent with RPAC recommendations.
Calculating the Recycling Rate for Delaware

Calculating the Denominator

To determine total MSW disposal from Delaware generators for CY 2018, DSM analyzed data from DSWA facilities. While in the past, DSM included the small amount of waste disposed out-of-state, under flow control instituted for Delaware waste is no longer transported out-of-state for disposal.

DSM reviewed all scale data kept by DSWA on deliveries to the three landfills and the three transfer stations during CY 2018. DSM then followed a protocol (consistent with past years) to disaggregate construction and demolition waste delivered to DSWA facilities in order to make an estimate of total MSW disposal in Delaware, as well as to allocate MSW disposed by the residential versus the commercial sector. The protocol follows these steps.

First, DSM obtained CY 2018 data on solid waste deliveries to each DSWA transfer station and landfill. This included data on whether the waste was classified (at the scale house) as municipal solid waste (MSW) or construction and demolition wastes (C&D) at each DSWA facility.

Second, DSM obtained data on the quantity of solid waste delivered by each vehicle type to each DSWA facility (e.g. front-end loader, rear end loader, side loader, roll-off, pick-up truck, etc.). Using 2011 and 2015 survey data on the typical source of waste coming into each facility by vehicle type, DSM allocated the annual waste tonnages for 2018 for each vehicle type to residential, commercial, C&D or self-haul categories. For example all cars are allocated to self-haul as they are only allowed in the self-haul area of the facility.

Third, DSM totaled residential, commercial, C&D, and self-haul quantities for each facility calculated by the vehicle type allocations made, and from the weights delivered by those vehicles, to calculate the total tons of residential, commercial, C&D, and self-haul waste delivered statewide for 2018.

Finally, the self-haul total was allocated equally to residential, commercial and C&D sources consistent with past surveys of facility self-haul areas. Table 6-1 and 6-2 show these steps.

<table>
<thead>
<tr>
<th>Table 6-1: Self-Haul, Residential, Commercial, and C&amp;D Waste Deliveries to DSWA Facilities¹⁸ Based on Vehicle Type (2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DSWA Facility</strong></td>
</tr>
<tr>
<td><strong>Self Haul</strong> (tons)</td>
</tr>
<tr>
<td>NSWMC</td>
</tr>
<tr>
<td>CSWMC</td>
</tr>
<tr>
<td>SSWMC</td>
</tr>
<tr>
<td>PTCTS</td>
</tr>
<tr>
<td>MTS</td>
</tr>
<tr>
<td>RTSTS</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
</tr>
</tbody>
</table>

¹⁸ Facility Acronyms used are NSWMC = Northern or Cherry Island Landfill; CSWMC = Central or Sandtown Landfill; SSWMC = Southern or Jones Crossroads Landfill; PTCTS = Pine Tree Corners Transfer Station; MTS = Milford Transfer Station; and, RT5TS = Route 5 Transfer Station.
TABLE 6-2: REALLOCATION OF SELF-HAUL WASTE TO RESIDENTIAL, COMMERCIAL, AND C&D SECTOR TO ESTIMATE TOTAL RESIDENTIAL AND COMMERCIAL WASTE DELIVERIES TO DSWA FACILITIES (CY 2018)

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>Total, from Table 12-1 2018 (tons)</th>
<th>Reallocation of Self-haul 2018 (tons)</th>
<th>TOTAL MSW (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>332,024</td>
<td>18,116</td>
<td>350,140</td>
</tr>
<tr>
<td>Commercial</td>
<td>364,357</td>
<td>18,116</td>
<td>382,474</td>
</tr>
<tr>
<td>C&amp;D</td>
<td>200,390</td>
<td>18,116</td>
<td>218,506</td>
</tr>
<tr>
<td>Self Haul</td>
<td>54,349</td>
<td></td>
<td>54,349</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>951,120</td>
<td>54,349</td>
<td>732,614</td>
</tr>
</tbody>
</table>

Calculating the Recycling Rate

Using totals from Table 5 for residential and commercial recycling activity in the numerator and the results of Tables 6-1 and 6-2 in the denominator, the residential and commercial recycling rates are calculated along with Delaware’s overall MSW recycling rate. This is shown in the last column of Table 7.

TABLE 7: CALCULATION OF RESIDENTIAL AND COMMERCIAL RECYCLING RATE, AND THE TOTAL MSW RECYCLING RATE (CY 2018)

<table>
<thead>
<tr>
<th>Sector</th>
<th>(A) Recycling (tons)</th>
<th>(B) Disposal (tons)</th>
<th>(A) + (B) Total Generation (tons)</th>
<th>A / (A + B) Recycling Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>235,155</td>
<td>350,140</td>
<td>585,295</td>
<td>40%</td>
</tr>
<tr>
<td>Commercial</td>
<td>207,003</td>
<td>382,474</td>
<td>589,476</td>
<td>35%</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>442,158</td>
<td>732,614</td>
<td>1,174,771</td>
<td>38%</td>
</tr>
</tbody>
</table>
Appendix A

SCOPE OF MATERIALS AND ACTIVITIES INCLUDED IN THE STANDARD MSW RECYCLING RATE
SOURCE: EPA, 1996

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>WHAT IS MSW</th>
<th>WHAT IS NOT MSW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Scraps</td>
<td>Unateen food and food preparation wastes from residences and commercial establishments (restaurants, supermarkets, and produce stands), institutional sources (school cafeterias), and industrial sources (employee lunchrooms).</td>
<td>Food processing waste from agricultural and industrial operations.</td>
</tr>
<tr>
<td>Glass Containers</td>
<td>Containers; packaging; and glass found in appliances, furniture, and consumer electronics.</td>
<td>Glass from transportation equipment (automobiles) and construction and demolition (C&amp;D) debris (windows).</td>
</tr>
<tr>
<td>Lead-Acid Batteries</td>
<td>Batteries from automobiles, trucks, and motorcycles.</td>
<td>Batteries from aircraft, military vehicles, boats, and heavy-duty trucks and tractors.</td>
</tr>
<tr>
<td>Tin/Steel Cans and Other</td>
<td>Tin-coated steel cans; strapping; and ferrous metals from appliances (refrigerators), consumer electronics, and furniture.</td>
<td>Ferrous metals from C&amp;D debris and transportation equipment.</td>
</tr>
<tr>
<td>Ferrous Metals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum Cans and Other</td>
<td>Aluminum cans; nonferrous metals from appliances, furniture, and consumer electronics; and other aluminum items (foil and lids from bimetal cans).</td>
<td>Nonferrous metals from industrial applications and C&amp;D debris (aluminum siding, wiring, and piping).</td>
</tr>
<tr>
<td>Nonferrous Metals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td>Old corrugated containers; old magazines; old newspapers; office papers; telephone directories; and other paper products including books, third-class mail, commercial printing, paper towels, and paper plates and cups.</td>
<td>Paper manufacturing waste (mill broke) and converting scrap not recovered for recycling.</td>
</tr>
<tr>
<td>Plastic</td>
<td>Containers; packaging; bags and wraps; and plastics found in appliances, furniture, and sporting and recreational equipment.</td>
<td>Plastics from transportation equipment.</td>
</tr>
<tr>
<td>Textiles</td>
<td>Fiber from apparel, furniture, linens (sheets and towels), carpets and rugs, and footwear.</td>
<td>Textile waste generated during manufacturing processes (mill scrap) and C&amp;D projects.</td>
</tr>
<tr>
<td>Tires</td>
<td>Tires from automobiles and trucks.</td>
<td>Tires from motorcycles⁴, buses, and heavy farm and construction equipment.</td>
</tr>
<tr>
<td>Wood</td>
<td>Pallets; crates; barrels; and wood found in furniture and consumer electronics.</td>
<td>Wood from C&amp;D debris (lumber and tree stumps⁵) and industrial process waste (shavings and sawdust).</td>
</tr>
<tr>
<td>Yard Trimmings</td>
<td>Grass, leaves, brush and branches, and tree stumps.⁵</td>
<td>Yard trimmings from C&amp;D debris.</td>
</tr>
<tr>
<td>Other</td>
<td>Household hazardous waste (HHW)⁴, oil filters, fluorescent tubes³, mattresses, and consumer electronics.</td>
<td>Abatement debris, agricultural waste, combustion ash, C&amp;D debris, industrial process waste, medical waste, mining waste, municipal sewage and industrial sludges, natural disaster debris³, used motor oil, oil and gas waste, and preconsumer waste.</td>
</tr>
</tbody>
</table>
TABLE A. NOTES

1 Composite materials are categorized according to their main constituent; however, they can be designated as a separate category under Other MSW if they cannot be otherwise categorized.

2 These wastes are not considered MSW due to one or more of the following reasons: (1) they are not defined as MSW in EPA’s Characterization of Municipal Solid Waste in the United States, (2) they have not been historically handled and disposed of as MSW, (3) they are regulated as hazardous waste, and/or (4) they were generated by a preconsumer source. These non-MSW wastes are referred to as Other Solid Waste in this guide and on the survey forms and worksheets.

3 Carpets are categorized as Textiles when discarded in MSW and are included in the rate calculation. When carpets are discarded in C&D debris, they are not considered MSW and are excluded from the rate calculation.

4 Tires from motorcycles are not defined as MSW because they historically have not been characterized as MSW in EPA’s Characterization of Municipal Solid Waste in the United States.

5 Tree stumps are categorized as Yard Trimmings when discarded in MSW and are included in the rate calculation. When tree stumps are discarded in C&D debris, they are not considered MSW and are excluded from the rate calculation.

6 HHW includes paints, stains, varnishes, solvents, pesticides, and other materials or products containing volatile chemicals that catch fire, react, explode under certain circumstances, or that are corrosive or toxic. Specific examples include oil-based paint, antifreeze, household cleansers, and bug sprays. Used motor oil is excluded.

7 Fluorescent tubes are categorized as Other MSW when found in MSW and are included in the rate calculation. When fluorescent tubes are discarded in C&D debris, they are not considered MSW and are excluded from the rate calculation.

8 Natural disasters include earthquakes, floods, hurricanes, and tornadoes. Heavy storms are not considered natural disasters.
<table>
<thead>
<tr>
<th>RECYCLABLE MATERIAL</th>
<th>WHAT COUNTS AS RECYCLING</th>
<th>WHAT DOES NOT COUNT AS RECYCLING¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Scraps</td>
<td>Composting of food scraps from grocery stores, restaurants, cafeterias, lunchrooms, and private residences, and the use of food scraps to feed farm animals.</td>
<td>Backyard (on-site) composting of food scraps, and the use of food items for human consumption (food banks).</td>
</tr>
<tr>
<td>Glass</td>
<td>Recycling of container and packaging glass (beverage and food containers), and recycling of glass found in furniture, appliances, and consumer electronics into new glass products such as containers, packaging, construction materials (aggregate), or fiberglass (insulation).</td>
<td>Recycling of glass found in transportation equipment and construction and demolition (C&amp;D) debris, recycling of preconsumer glass or glass from industrial processes, and reuse of refillable glass bottles.</td>
</tr>
<tr>
<td>Lead Acid Batteries</td>
<td>Recycling of lead-acid batteries found in cars, trucks, or motorcycles into new plastic and lead products.</td>
<td>Recycling of lead-acid batteries used in large equipment, aircraft, military vehicles, boats, heavy-duty trucks and tractors, and industrial applications.</td>
</tr>
<tr>
<td>Metals</td>
<td>Recycling of aluminum and tin/steel cans, and recycling of metals found in appliances and packaging into new metal products.</td>
<td>Reuse of metal containers, packaging, furniture, or consumer electronics, and recycling of metals found in transportation equipment (autobodies) and C&amp;D debris.</td>
</tr>
<tr>
<td>Paper</td>
<td>Recycling of paper products (old newspapers and office papers) into new paper products (tissue, paperboard, hydromulch, animal bedding, or insulation material).</td>
<td>Reuse of paper products, recycling of preconsumer or manufacturing waste (trimmings, mill broke, print overruns, and oversize publications), and combustion of paper for energy recovery.</td>
</tr>
<tr>
<td>Plastic</td>
<td>Recycling of plastic products (containers, bags, and wraps), and recycling of plastic from furniture and consumer electronics into new plastic products (fiber fill and plastic lumber).</td>
<td>Reuse of plastic products (storage containers and sporting equipment), recycling of preconsumer plastic waste or industrial process waste, and combustion of plastics for energy recovery.</td>
</tr>
<tr>
<td>Textiles</td>
<td>Recycling of textiles into rags, and recycling of apparel and carpet fiber² into new products such as linen paper or carpet padding.</td>
<td>Reuse of apparel.</td>
</tr>
<tr>
<td>Tires</td>
<td>Recycling of automobile and truck tires into new products containing rubber (trash cans, storage containers, and rubberized asphalt), and use of whole tires for playground and reef construction.</td>
<td>Recycling of tires from motorcycles, buses, and heavy farm and construction equipment, retreading of tires, and combustion of tire chips for energy recovery.</td>
</tr>
<tr>
<td>Wood</td>
<td>Recycling of wood products (pallets and crates) into mulch, compost, or similar uses.</td>
<td>Repair and reuse of pallets, combustion of wood for energy recovery, recycling of industrial process waste (wood shavings or sawdust), and recycling of wood from C&amp;D debris.</td>
</tr>
<tr>
<td>Yard Trimmings</td>
<td>Offsite recycling of grass, leaves, brush or branches³, and tree stumps⁴ into compost, mulch, or similar uses; and landspraying of leaves⁵.</td>
<td>Mulching of tree stumps⁴ from C&amp;D debris, backyard (on-site) composting, grasscycling, landspraying of leaves⁵, and combustion of yard trimmings for energy recovery.</td>
</tr>
<tr>
<td>Other</td>
<td>Household hazardous waste (HHW)⁶, oil filters, fluorescent tubes⁷, mattresses, circuit boards, and consumer electronics⁸.</td>
<td>Recycling of used oil, C&amp;D debris (asphalt, concrete, and natural disaster debris), transportation equipment (autobodies), municipal sewage sludge, and agricultural, industrial, mining, and food processing waste.</td>
</tr>
<tr>
<td>Notes</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>These activities are not considered recycling due to one or more of the following reasons: (1) they are not defined as recycling in EPA's <em>Characterization of Municipal Solid Waste in the United States</em>, (2) they involve the recycling of materials that are not part of MSW, (3) they involve reuse or source reduction, and/or (4) they involve the recycling of preconsumer waste.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Carpets are categorized as Textiles when discarded in MSW and are included in the rate calculation. When carpets are discarded in C&amp;D debris, they are excluded from the rate calculation.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Includes woody material such as branches, brush, and whole trees such as Christmas trees.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tree stumps are categorized as Yard Trimmings when discarded in MSW and are included in the rate calculation. When tree stumps are discarded in C&amp;D debris, they are excluded from the rate calculation.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Landspreading of leaves counts as recycling if the manner of the application allows timely biodegradation of the organic plant material. Landspreading of leaves does not count as recycling if the manner of the application precludes the timely biodegradation of the organic plant material.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>HHW includes paints, stains, varnishes, solvents, pesticides, antifreeze products, and other materials or products containing volatile chemicals that catch fire, react, explode under certain circumstances, or that are corrosive or toxic. Specific examples include oil-based paint, antifreeze, household cleaners, and bug sprays. Used motor oil is excluded.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fluorescent tubes are categorized as Other MSW when discarded in MSW and are included in the rate calculation. When fluorescent tubes are discarded in C&amp;D debris, they are excluded from the rate calculation.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Composite materials are categorized according to their main constituent; however, they can be designated as a separate category under Other if they cannot be otherwise categorized.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B
DESCRIPTION OF MATERIAL CATEGORIES AND SOURCES OF MATERIALS REPORTED

Description of Final Material Categories

A detailed description of the final material categories surveyed and tracked, the specific materials in each major category, and the potential generators or reporters of these materials is discussed in this section.

Paper, Paper Packaging

The paper, paper packaging category tracks corrugated cardboard, newspaper, sorted office paper, and mixed office paper. This category is primarily considered to be commercial waste.

Corrugated Cardboard (OCC): Large reporters and generators of OCC include recycling haulers and processors as well as large retailers and grocers. DSM surveys haulers, processing facilities, brokers, retailers, and grocers to account for the majority of the OCC reported generated in Delaware. Haulers generally collect OCC from residents and smaller retailers and then eventually selling it to processors/brokers, whereas many of the largest retailers (i.e. Home Depot, Best Buy) and grocers (i.e. Food Lion, Giant Foods) backhaul their OCC to distribution centers from which they sell it direct-to-mill.

Newspaper (ONP): ONP is primarily reported by organizations that are involved in the printing of newspaper or brokers that are sourcing materials for specific paper mill clients.

Sorted Office Paper (SOP): DSM receives reports including SOP generation from primarily professional offices, secure document destruction firms, and large brokers that are sourcing for clients. Professional offices such as banks or insurance companies generate a large quantity of sorted office paper as a result of account processing, this paper is initially sent to secure document destruction firms to ensure customer confidentiality. Annual tonnages of SOP reported can vary based on contracts held by these offices that may result in additional processing of paper-reliant information such as credit cards.

Mixed Office Paper (MOP): MOP includes print overruns and junk mail and is a catchall for reported paper that does not fall in the SOP or ONP categories. Primary reporters of MOP are brokers and recycling processors.

All Other Packaging

The all other packaging category tracks reported tons for glass, plastic film/wrap, retail bags, plastic containers, polystyrene packaging, aluminum cans, pallets, and mixed recyclables. As with the Paper, Paper Packaging category, All Other Packaging is primarily considered to be commercial waste.

Glass: Glass is primarily accounted for as part of the mixed recyclables category.

Plastic Film/Wrap: Grocers and large retailers are the largest reporters of plastic film/wrap. Plastic film/wrap is primarily used in the shipping and packaging process for retail and food items. Many of the grocers and large retailers backhaul their plastic film/wrap to central distribution centers and bale and broker their own materials.

Retail Bags: Retail Bags are primarily generated by grocers and large retailers and are generally backhauled to distribution centers where they are sold to plastic processors.
Plastic Containers: DSM receives reports containing plastic container tons from large manufacturers and recyclers in the State. Plastic containers are also included in the mixed recyclables tons reported.

Polystyrene Packaging: Polystyrene Packaging is used to package large fragile electronics and furniture as well as used as an inexpensive way to package foods. Polystyrene packaging is likely also included in the tonnages of mixed recyclables reported however is not an accepted part of the mixed recyclables stream and is considered contamination.

Aluminum Cans: Scrap metal dealers are the largest reporters of aluminum cans recycled. Aluminum cans are also included in the mixed recyclables category.

Pallets: Only the pallets or parts of pallets that are mulched and not rebuilt into new pallets are counted in the Other Packaging category. Reporters of mulched pallets are usually companies who specialize in repairing/rebuilding pallets, but also do mulch pallets that they are unable to repair. Many large retailers and grocers backhaul their pallets to distribution centers which would not be included under ‘pallets’ unless they specified that they were mulching them.

Mixed Recyclables: Mixed recyclables include single stream recycling and comingled recyclables and is reported by municipalities, retailers, grocers, banks, manufacturers, haulers, and processors. Mixed recyclables are processed at material recycling facilities (MRFs) where they are separated by material type and sold to be reprocessed into new materials.

Vehicle Waste

Vehicle Waste includes tires, lead acid batteries, and oil filters that are reported to be recycled.

Tires: DSM contacts companies who specifically manage tire diversion, as well as large tire retailers that may generate enough tires for recycling that they are able to broker their own. The tire recycling industry previously recycled tires as Tire Derived Fuel (TDF), however, they have begun to expand into other uses such as landscaping, drainage, and other engineering products which are considered recycling under the EPA definition.

Lead Acid Batteries: Primary reporters of lead acid batteries are scrap metal recyclers as well as companies focused on vehicle waste recycling. Lead acid batteries continue to be underreported in Delaware due to the difficulty in identifying all of the participating companies in the region that may be accepting materials from Delaware.

Oil Filters: Oil filters are reported by generators of oil filters for recycling as well as processors of oil filters. DSM believes that much like lead acid battery recycling; oil filter recycling continues to be underestimated in part because scrap metal recyclers who properly drain and market oil filters are unable to disaggregate this material from their ferrous metals.

Special Wastes

The special waste category is a catch-all for all other materials that are being recycled. Materials reported in this category are carpet, textiles, mattresses, florescent bulbs, electronic goods, and other batteries.

Carpet: Carpet is primarily reported by haulers and is considered to be 100% commercial.

Textiles: DSM receives reports on textile recycling from large non-profits that operate thrift stores and rely on donated clothing as well as non-profits that collect and donate textiles abroad. Due to the nature of the textile industry, DSM in many cases is unable to track the end user location, however, it is not
suspected that double counting is occurring in this material category. Textiles being sent for export are either being sold in bales for re-sale in another country or being repurposed into rags and other non-clothing textiles.

**Mattresses**: Mattress recycling is tracked primarily through retail furniture stores that may offer to recycle new-customers mattresses. Mattress recycling is difficult to track and is estimated to be underreported as not all of the companies processing mattresses have been identified.

**Florescent Bulbs**: Florescent bulb recycling is primarily reported by large retailers/grocers as well as the processors of florescent bulbs.

**Electronic Goods**: As with florescent bulbs, DSM tracks electronic goods recycling through reports submitted by retailers and companies processing electronic goods.

**Other Batteries**: Other batteries are reported separately from lead acid batteries and are reported by large manufacturers as well as processors of batteries. This category is a catch-all for any batteries reported that are not lead acid.

**Organic Wastes**

The organic wastes category has two sub-categories. Food Related Waste tracks fats, oils, grease (FOG) and food waste. Green Waste tracks leaf and yard waste, trees and branches, and, clean wood.

**Food Related Waste**

**Fats, Oils, Grease**: Reported by agricultural companies, food manufacturers, and processors of FOG. It should be noted that FOG collected from restaurants is not explicitly addressed in the EPA Guidance Document. DNREC agreed with DSM’s proposal in 2004 to include this material. EPA’s definition of food scraps includes liquid fats, so DSM has included fats, oil, and grease recovered from food preparation, mainly restaurants, in the MSW totals.

**Food Waste**: Food waste is reported primarily by grocers and does not attempt to estimate any backyard composting that may be taking place in Delaware. Food waste includes expired and waste meats, vegetables, and pre-made meals from grocery stores, convenience stores, and slaughterhouses. Food waste in Delaware that is being recycled is being hauled out-of-state due to the lack of available options in Delaware.

**Green Waste**

**Leaf and Yard Waste**: Leaf and Yard Waste tons are primarily reported by independent landscapers, yard-waste drop off sites, haulers who provide municipal and subscription yard waste pick up, as well as yard waste dropped off at DSWA facilities and yard waste sites operated by DNREC. Materials included in this category are leaves, grass clippings, and branches and shrubs with diameters that do not exceed 4 inches. This category includes both commercial and residential generators.

**Trees and Branches**: DSM receives reports with trees and branches tonnages from landscapers, tree companies, and some drop off sites. Materials included in this category are branches greater than 4 inches, trees/branches that were blown down or removed as the result of strong storms, and tree removal. DSM only includes tons that were delivered to grinding operations for mulching.

**Clean Wood**: Clean wood is primarily reported by haulers and recyclers. Clean wood is wood that is not treated, stained, or painted.
**Metals**

**Appliances/White Goods:** DSM only includes appliance/white goods recycling in the assessment of municipal recycling. The primary reporters of appliance/white good recycling are scrap metal recyclers who generally report it as an estimated percentage of their light iron, and retailers who may recycle customers old appliances.

**Other**

**Mixed Plastics:** Mixed Plastics are reported in the ‘other’ category and is essentially a catch-all for plastics reported that do not fit in the plastic container category. Mixed plastics are reported by retailers, recyclers, and manufacturers and are considered to be all commercial.
Appendix C

LETTER FROM DNREC AND RECYCLING ACTIVITY REPORT FORM (CY 2018)

January 7, 2019

Subject: Required Recycling Report Due February 15, 2019

Dear Sir/Madam:

This letter serves as a reminder that your organization’s calendar year 2018 recycling activity data is due February 15, 2019. The Delaware Solid Waste Recycling Law (a.k.a. Universal Recycling Law), specifically 7 Del. C. §6056(1), requires anyone who collects/transports, processes, or markets recyclables to report annually on the type and quantity of recyclables managed, methods used, and location of facilities used. The CY 2018 reporting form is attached to this letter.

Please remember that this mandatory reporting is on-going: each February 15th the data for the previous calendar year is due.

If you are amongst the majority of respondents that reported recyclables generation data previously, thank you for your response! Accurate information is critical to calculating the statewide recyclables diversion rate, tracking progress toward the State’s established recycling goals, and making practical policy recommendations. These cannot be achieved if those persons responsible for managing recyclables fail to report.

If you did not respond previously, please be aware that reporting is mandatory and that 7 Del. C. § 6059 affords the Department enforcement authority, inclusive of the ability to impose monetary fines of $100 to $500 for each day of violation. The Department intends to pursue one-hundred percent compliance going forward.

DSM Environmental Services, Inc. (DSM) worked with Delaware’s Recycling Public Advisory Council (RPAC) to design the reporting survey and has used the survey to collect and aggregate data on an annual basis, under both voluntary and mandatory reporting requirements, for several years now. Under strict agreement with DSM, survey participants have the option of keeping their report confidential.

DSM also aggregates the survey data in an annual report to the RPAC to assure that individual company data are not reported. DSM does analyze the data to ensure double counting does not occur and to determine the total quantity of materials recycled in Delaware. Please complete the “end user” column on your reporting form so DSM can ensure that material and tonnages are not double-counted. This aggregated, statewide data is then supplied to the RPAC for the purpose of verifying and reporting Delaware’s recyclables diversion rate. The RPAC annual report to the Governor provides an overview of recent recycling activities and can be found at: RPAC Sixteenth Annual Report.

In addition, every five years information is also requested on recycling of solid waste materials that are not considered part of the municipal solid waste stream. These materials include:

- Construction and demolition waste (including asphalt, brick and concrete and land clearing debris),
- All types of scrap metals (not just appliances and packaging),
- Agricultural related wastes;
- Food processing, including brewery, wastes,
- Biosolids; and,
- Other types of manufacturing and industrial solid waste streams.

If you generate any of the above materials, please also provide the data by February 15, 2019 on a separate reporting form (Delaware Expanded Recycling Activity Report Form). If you have already reported this information to DSM, please disregard this second request, however please be aware that you will still need to report tonnages for the regular CY 2018 annual report. For more information on all types of solid waste recycling activity in Delaware and how the expanded recycling information will be used, please visit: All Materials Recycling Study: Total Solid Waste

Attached to this letter you will find DSM’s letter requesting the CY 2018 recycling data and the 2018 reporting form (due February 15, 2019). Also attached, is the solid waste materials reporting form. If you have any questions regarding completion of the reporting form(s) please call Natalie Starr or Marissa Ambrosi of DSM at 802-674-2840. If you have questions about the mandatory recycling reporting requirements please contact Don Long of my staff at 302-739-9403 x8. I thank you in advance for your cooperation and we commend you for your ongoing recycling efforts.

Sincerely,

[Signature]
Timothy Ratsep
Acting Director

cc: Stan Mills, Chair RPAC
    Mike Parkowski, DSWA
Delaware Annual Recycling Activity Report Form
REPORT FORM FOR CALENDAR YEAR 2018

If you have any questions about this form, please call the third party consulting firm, DSM Environmental, at (802) 674-6915.
If you have questions about the reporting requirement, please contact DNREC’s Solid and Hazardous Waste Management Section at (302) 739-9403 x8.

COMPANY INFORMATION

Company Name ____________________________

Subsidiary of ____________________________

Mailing Address ____________________________

Contact Name ____________________________

City ____________ State ____________ Zip ____________

Phone ____________________________

Company Type:

Recyclables Collector/ hauler ____________________________

Processor ____________________________

Maniciple ____________________________

Self Marketing Generator ____________________________

End User ____________________________

If you use a waste hauler or recycling service(s) to collect your recyclables, please indicate the company (or companies) name, address, and contact information and no further information is required unless we are unable to obtain quantities from your reported waste hauler or recycling service(s):

MATERIALS RECYCLED (Between January 1 and December 31, 2018)

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Annual Tons Recycled 2018</th>
<th>Please list the company where each material is sorted for recycling, processing or end use</th>
<th>Percent Commercial</th>
<th>Percent Residential</th>
<th>Approx, percent of material originating from Delaware ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Populated by State Recyclers only.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|               |                           | 1. List each Material Type: Corrugated; Newspaper; Office Paper; Mixed Paper; Glass; Plastic Film/Shrink Wrap; Retail Bags; Plastic Containers; EPS Packaging; Aluminum Cans; Pallets (recycled, not rebuilt); Mixed Recyclables/Simple Stream; White Goods/Appliances; Leaf and Yard Waste (including branches < 4”); Trees and Branches (but no landscaping debris); Clean Wood (but no construction debris); Tires; Lead Acid Batteries; Other Baste; Oil Filters; Textiles; Electronics; Florescent Bulbs; Carpet; Fats-Oil-Grease; Food Waste; Mixed Plastics (Non-industrial); Mattresses.

2. This information is important so that DSM does not double count material that a handled by another recycler that participates in our survey.

3. If you handle recycling materials generated outside the state of Delaware, estimate the percent of material from Delaware only.

NON-DISCLOSURE

The information provided is confidential. Check one:

□ Yes

□ No

DSM Environmental Services, Inc. (DSM) will hold confidential any information and data provided, unless you specify, as confidential, as part of the Delaware Statewide Municipal Recycling Annual Report that DSM is conducting for the Delaware Recycling Public Advisory Council (RPAC). The purpose of the study is to develop reasonable and professional estimates of the quantity of materials recycled for recycling from residential and non-residential activities located in Delaware and to ensure no double counting of material occurs. Data provided to DSM will be aggregated with all other materials quantified and reported to develop a single, annual quantity (in tons) of material recycled for each material type which will be reported in RPAC’s annual report.

E-mail completed form to: DSM@DSMEnvironmental.com
Or Fax completed form to DSM at: (802) 674-6915

DSM Environmental Services, Inc.
P.O. Box 2 Windsor, VT 05089
802.674.2840 – 802.674.4015
www.dsmenvironmental.com
Appendix D
DSM Letter on 2018 Annual Recycling Reporting

January 7, 2019

Re: Delaware Recycling Report for Calendar Year 2018

To Whom It May Concern:

DSM Environmental Services, Inc. (DSM), with funding from the Delaware Solid Waste Authority, is once again working with the Delaware Department of Natural Resources and Environmental Control (DNREC) and the Delaware Recycling Public Advisory Council (RPAC) to complete the annual survey of all generators, haulers and brokers of recyclables in the State of Delaware during calendar year 2018. As indicated in the letter from DNREC, annual reporting is mandatory and due by February 15, 2019. The survey data will be compiled to become part of RPAC’s required annual report to the Legislature on Delaware’s recycling rate. For more information on RPAC’s recycling reports, see: https://dnrec.alpha.delaware.gov/waste-hazardous/recycling/recycling-public-advisory-council/

DSM is once again acting as an independent third party to carry out the survey and offer survey participants the opportunity for their data to remain confidential. Survey data collected will be aggregated by the weight of each material type for reporting purposes. No individual company data will be reported. Please refer to Table 2, 3, and 4 of the following web link to view how the data collected will be reported to and used by RPAC: http://www.dnrec.delaware.gov/dwhs/Recycling/Documents/2017-delaware-recycling-report.pdf

Please report the weight of material collected, either by direct measurement or by determining the weight of material sold or otherwise sent off-site or used on-site for recycling during the calendar year 2018, adjusted by the difference in weight of material held in inventory on the first and last day of the calendar year. If you are unable to provide exact weight information, reasonable estimates allocating the weight of recyclable material from each source should be made. If you are using estimation methods to report, we request that you follow the same protocol from year to year to maintain consistency.

Along with the letter from DNREC explaining the mandatory reporting requirement, also enclosed is the reporting form for 2018. Please fill out the form with the amount of material your company recycled in 2018 and email or fax it back to DSM. We also ask you to please be sure to list where materials are sent for processing or marketing so that we can avoid double counting of material reported. This has been a potential problem in the past that we hope to solve. Please do not hesitate to contact us if you have any concerns about this.

A copy of the form is also available for download on our website. There is both an electronic version of the CY 2018 recycling survey and a hard copy of the CY 2018 recycling survey. A direct link is: http://www.dsmenvironmental.com/active-project-resources

In addition to the Annual Recycling Report, every five years information is also requested on recycling of solid waste materials that are not considered part of the municipal solid waste stream. These materials include:

- Construction and demolition waste (including asphalt, brick and concrete and land
clearing debris);
• All types of scrap metals (not just appliances and packaging);
• Agricultural related wastes, including poultry processing wastes;
• Food processing wastes, including brewery wastes;
• Biosolids; and,
• Other types of manufacturing and industrial solid waste streams that are diverted from disposal.

A full list of materials included in the Expanded Recycling Report is in this information package under Expanded Recycling Report Material List. If you generate any of included materials, please also provide the data by February 15, 2019 on a separate reporting form. If you have already reported this information to DSM, please disregard this second request. Please be aware you will still need to report other tonnages for the CY 2018 annual report.

Additional information about the reporting form, reporting categories, and the materials list for the Annual Recycling Report are included below.

Please e-mail, fax or mail back the completed survey form to DSM. Do not send the form to DNREC.

You can either e-mail the form to: DSM@DSMEvironmental.com

Fax it back to our office at: (802) 674-6915

Or mail it to: DSM Environmental Services, Inc.
PO BOX 2
Windsor, VT 05089

Need More Information?

If you have any questions about completion of the reporting form, please contact Marissa Ambrosi by e-mail at marissa@DSMEnvironmental.com or call Marissa directly at (802) 674-2840 ext. 103.

If you have questions about the reporting law or the deadline, please contact Don Long at DNREC at 302-739-9403 x8.

Thank you for your help on this important initiative for Delaware.

Regards,
DSM Environmental Services, Inc.

Natalie Starr
Additional Information on the Recycling Survey Form:

If you use the electronic form, be sure to follow these instructions so that your information displays correctly, and that you can save a copy for your records:

1. Download and save the form to your desktop.
2. Open the saved form from your desktop in Adobe.
3. Fill out the relevant fields as you normally would.
4. Once you have completed the form, double check your work before you save the form.
5. Submit the completed saved form to DSM via e-mail (DSM@DSMEenvironmental.com), you will need to attach the form to your e-mail.
6. Within one business day you should receive a confirmation e-mail.
7. Following submission, we recommend you save a copy of the completed PDF file and/or print a hard copy for your records.

Additional Description of Information Requested for the Annual Recycling Report

(Materials Recycled – See the following page for a list of materials to report and a description)

Company where you send the material for Recycling, Processing or End Use – This information is important so that DSM does not double count material that is handled by another recycler that participates in the survey. Due to the importance of this information it is now mandatory that you include the end-user for materials and the tonnage of material going to each end-user. Your report will not be considered complete or in compliance with the reporting requirement if this information is not included or if you only provide a geographical location in your submitted report. Additionally, please understand that we still may need to contact you for more information to confirm that double counting has not occurred.

Percent Commercial (%) – Percentage of each material listed originating from businesses, industry, or institutions. This is important so that a commercial recycling rate can be separately calculated for Delaware.

Percent Residential (%) – Percentage of each material listed originating from residential sources. This is important so that a residential recycling rate can be separately calculated for Delaware.

Approximate percent of material originating from Delaware only: Percentage of each material listed originating from generators located in Delaware as opposed to out of the State. The recycling rate must be calculated from Delaware generated materials that are recycled only.
<table>
<thead>
<tr>
<th>Material Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PAPER AND PAPER PACKAGING</strong></td>
<td></td>
</tr>
<tr>
<td>OCC (old corrugated containers)</td>
<td>Corrugated boxes (including cardboard containers, computer packaging cartons, and sheets and pieces of boxes and cartons) and Kraft paper bags include paper grocery bags, un-soiled fast food bags, and department store bags and heavyweight sheets of Kraft paper.</td>
</tr>
<tr>
<td>ONP (old newspapers)</td>
<td>All newspapers and glossy inserts, and all items made from newspaper, such as free advertising guides, election guides, plain news packing paper, stapled college schedules of classes, and tax instruction booklets.</td>
</tr>
<tr>
<td>Sorted Office Paper</td>
<td>High-grade paper (such as uncolored and or lightly colored bond, rag, printer/copier or stationary grade paper) of which most is reported by document destruction companies or health care or financial institutions.</td>
</tr>
<tr>
<td>Mixed Paper (1)</td>
<td>All other types of paper including magazines and catalogs, phone books and directories, junk mail, chipboard and all other recyclable paper packaging.</td>
</tr>
<tr>
<td>Mixed Glass (bottles)</td>
<td>Clear, green, amber or other colored glass beverage and food containers. Examples include whole or broken soda, beer, wine and liquor bottles, fruit juice bottles, peanut butter, mayonnaise and other food containers and jars.</td>
</tr>
<tr>
<td>Plastic Film / Shrink Wrap</td>
<td>Film that can be recycled, and has not been greatly contaminated by other materials during its use. Examples include clean, recyclable plastic film, such as bread, grocery, newspaper, and dry cleaner plastic film bags, film packaging or wraping, and stretch wraps used for shipping and containerizing pallets.</td>
</tr>
<tr>
<td>Plastic Retail Bags</td>
<td>Plastic retail and grocery sacks collected through retail collection sites.</td>
</tr>
<tr>
<td>Plastic Bottles and Containers (all Rosins Except #6, Polystyrene)</td>
<td>Bottles, jars, containers and tubs including clear or colored PETE (polyethylene terephtalate), natural and colored HDPE (high-density polyethylene) and all other plastic (5-7) bottles, jars and containers that have the potential to be recycled. This includes soft drink and water bottles, some liquor bottles, cooking oil bottles, milk and juice containers, laundry, detergent and shampoo bottles, food jars and containers, yogurt and take-out containers, and large jugs (well drained) used for vehicle and equipment fluids. This also includes clamshell, thermoform and press mold plastic packaging that has the potential for recycling.</td>
</tr>
<tr>
<td>Polystyrene Packaging</td>
<td>All expanded and rigid polystyrene packaging used for product packaging or food packaging. This includes clamshell, thermoform and press mold EPS/PS packaging that has the potential for recycling.</td>
</tr>
<tr>
<td>Aluminum Cans and Food Containers</td>
<td>Food or beverage containers made mainly of aluminum including aluminum soda or beer cans, and some pet food cans. This subtype does not include bimetal containers with steel sides and aluminum ends.</td>
</tr>
<tr>
<td>Ferrous/Bimetal Cans</td>
<td>Rigid containers made mainly of steel and other ferrous metals and may be used to store food, beverages, and a variety of other household and consumer products including empty spray paint and other aerosol containers, and bimetal containers with steel sides and aluminum ends.</td>
</tr>
<tr>
<td>Single Stream or Mixed Recyclables</td>
<td>Recyclables reported as collected as a single stream or mixture of different categories of recyclables.</td>
</tr>
<tr>
<td>Pallets, mulched and other</td>
<td>Unpainted wood pallets, crates, and packaging made of lumber/engineered wood and ground for mulch or use in composting. Do not include rebuilt pallets.</td>
</tr>
<tr>
<td><strong>CLEAN WASTE</strong></td>
<td></td>
</tr>
<tr>
<td>Leaf and Yard Waste</td>
<td>Plant material from public or private landscapes that is no bigger than 4 inches in diameter. Examples include leaves, grass clippings, sea weed, and plants, pruning, shrubs, and small branches with branch diameters that do.</td>
</tr>
<tr>
<td>Tree Waste</td>
<td>Woody plant material, branches, and stumps that exceed four inches in diameter from any public or private landscape. DO NOT INCLUDE LAND CLEARING DEBRIS.</td>
</tr>
<tr>
<td>Land Clearing Debris</td>
<td>Trees, stumps and branches from trees removed for land clearing that are mulched or composted. THIS DOES NOT NEED TO BE REPORTED.</td>
</tr>
<tr>
<td>Clean Wood</td>
<td>All untreated and unpainted wood, including clean lumber and natural wood that is used for mulch, compost or other products.</td>
</tr>
<tr>
<td><strong>FOOD AND RELATED WASTE</strong></td>
<td></td>
</tr>
<tr>
<td>Food Waste</td>
<td>Food material resulting from the processing, storage, preparation, cooking, handling, or consumption of food.</td>
</tr>
<tr>
<td>Fats, Oils, Grease</td>
<td>Liquid or solid, composed primarily of fat, oil, and grease from animal or vegetable source.</td>
</tr>
<tr>
<td><strong>VEHICLE WASTE</strong></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tires</td>
<td>Tires from trucks, automobiles, motorcycles, heavy equipment, and bicycles. For tires on rims, an attempt to estimate the portion that is rubber tire vs. the ferrous rim should be made.</td>
</tr>
<tr>
<td>Lead Acid batteries</td>
<td>Lead-acid batteries from passenger cars, trucks, and motorcycles and small equipment when reported separately.</td>
</tr>
<tr>
<td>Oil Filters</td>
<td>Oil filters from vehicles.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SPECIAL WASTES</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Textiles</td>
<td>Items made of thread, yarn, fabric, or cloth including clothes, fabric trimmings, draperies, and all natural and synthetic cloth fibers.</td>
</tr>
<tr>
<td>Electronics/Electronic Goods</td>
<td>Large and small electronic goods including microwaves, stereos, VCRs, DVD players, radios, and non-CRT televisions (such as LCD televisions); as well as computer related electronics such as processors, mice, keyboards, laptops, disk drives, printers, modems, and fax machines; and other small consumer goods such as PDAs, cell phones, phone systems, computer games and other electronic toys, portable CD players, camcorders, and digital cameras.</td>
</tr>
<tr>
<td>Mattresses</td>
<td>Mattresses and box springs processed for reclaiming the components including steel, foam, wood and fibers.</td>
</tr>
<tr>
<td>Carpet</td>
<td>Any material consisting mainly of carpet or carpet padding including flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material as well as plastic, foam, felt, and other materials used under carpet to provide insulation and padding.</td>
</tr>
<tr>
<td>Florescent Bulbs</td>
<td>Mercury containing bulbs and ballasts recycled.</td>
</tr>
<tr>
<td>Other Batteries</td>
<td>Consumer batteries of various sizes and types. Examples include flashlight, small appliance, watch, and hearing aid batteries.</td>
</tr>
<tr>
<td>Other Glass</td>
<td>Glass windshields, CRT Glass or other non-container glass that can be recycled.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>METALS</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Products</td>
<td>Any item made of aluminum other than cans or construction waste including aluminum furniture, tools, and household items.</td>
</tr>
<tr>
<td>White Goods / Appliances</td>
<td>Metal appliances including refrigerators and air conditioners (with Freon removed), as well as stoves, water coolers, water heaters and other small (mostly) metal appliances.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>OTHER</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Plastics/Other Plastics</td>
<td>Plastic products such as coat hangers, plastic toys and furniture, other non-durable plastics and non-food plastic packaging as well as mixed plastic packaging reported.</td>
</tr>
</tbody>
</table>