State of Delaware Assessment of Municipal Solid Waste Recycling, Calendar Year 2020

FINAL REPORT | SEPTEMBER 2021

Prepared for:

Recycling Public Advisory Council
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Preface

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

RPAC established the Subcommittee on Measurement and Reporting (M&R Subcommittee)[1] to measure recycling and track progress in the State. The Subcommittee, with representation from DNREC, DSWA and RPAC, developed clear definitions on recycling activity, 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.

DSM Environmental Services, Inc. (DSM) first surveyed and reported on recycling and diversion activity in Delaware for DSWA in 2005 (*State of Delaware Assessment of Commercial and Industrial Recycling Activity*), 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-mail, 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.

In Calendar Year (CY) 2007, DSM was first contracted by RPAC to complete the *State of Delaware Assessment of MSW Recycling* (MSW Recycling Survey) and report on the annual state of recycling in Delaware, concentrating on those materials included in the EPA's definition of MSW(see Appendix A). However, reporting did not become mandatory until CY 2011.

This report represents the results of the CY 2020 MSW Recycling Survey. And, using detailed data on disposal provided by DSWA, calculates the Delaware MSW Recycling Rate, as well as estimates a separate recycling rate for the residential and commercial sectors for CY 2020.

[1] *The Subcommittee was originally named "Measurement and Methodology" and is referred to as the M&M subcommittee in past reports.*

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

EPA = Environmental Protection Agency

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

TSW = Total Solid Waste

Introduction

DSM Environmental Services, Inc. (DSM) was contracted to complete the *State of Delaware Assessment of MSW Recycling* for CY 2020. Consistent with previous years, DSM attempted to identify new potential reporters as well as remove entities that no longer fall under the reporting requirement.

The methodology used to calculate the CY 2020 recycling rate, the limitations encountered, and the data collected and analyzed follows.

Residential Versus Commercial Recycling Allocations

Residential (household) and commercial (business, industry, and institutional) recycling activities are accounted for separately in this report. All reporters are asked to identify the percentage of total tons of each material reported as derived from residential verses commercial sources. If they are not certain of the source because of how materials are consolidated (either collected from multiple locations or delivered to processing facilities), estimates must be made by the reporter.

For several materials, allocations to residential or commercial recycling are made based on a methodology agreed to by the M&R Subcommittee. To maintain consistency from one year to the next this approach has been carried forward each year. In the case of yard waste and trees and branches, a 2004 (updated in 2015) survey of landscapers, mulchers, and tree companies has been used to determine the source and develop an allocation. Table 1 shows these allocations and the source used to make these estimates.

TABLE 1: MATERIALS THAT USE STANDARD ALLOCATIONS FOR RESIDENTIAL VS. COMMERCIAL RECYCLING ACTIVITY

Material	% Residential	Source
Aluminum Cans	90%	RPAC, M&R
Retail Bags	100%	RPAC, M&R
Leaf and Yard Waste	90%	2015 Yard Waste Survey
Trees and Branches	50%	2015 Yard Waste Survey
Tires	80%	RPAC, M&R
Lead Acid Batteries	80%	RPAC, M&R
Oil Filters	80%	RPAC, M&R
Textiles	100%	Except for Industry Reports
Mattresses	100%	RPAC, M&R
Other Batteries	90%	RPAC, M&R
White Goods	90%	RPAC, M&R

Disposal Estimates

Estimates of MSW disposal must be made in order to calculate the recycling rate. To develop the estimate, disposal data is provided by DSWA for CY 2020 from all 6 DSWA facility scale houses.

Incoming vehicle data and annual weights by vehicle type at each of the six DSWA facilities is then allocated by DSM based on waste classification(s) per vehicle type. This data is then aggregated to estimate the total residential, commercial, and C&D waste deliveries made to DSWA facilities in CY 2020.[2]

Material Categories

This assessment covers all materials identified by the EPA as 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 EPA1996b)"*

The EPA guidance document further defines what is and what is not MSW (Table A, Appendix A of this report), and what does and does not count as MSW 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 reporters generate, collect, and/or process some materials that are not included in the EPA's definition of MSW recycling.

DSM's approach for the CY 2020 assessment has remained consistent with previous years in surveying and reporting on residential, commercial, and industrial activities that would be expected to generate and recycle materials that fall under the EPA's definition of MSW and recycling (as shown in Table 2 found at the end of this section).

In some instances, DSM requested surveys from reporters who generate, collect, or process both included and excluded materials. In these cases, the reporter is only asked to report on materials included in this survey. For example, DSM asks green waste companies to report *only* on leaf and yard waste, trees and branches, and clean wood and exclude any land clearing debris that may be processed at their facilities as land clearing debris does not mean EPA's definition of MSW.

Table 2 lists the material types consistent with the way EPA reports materials recycling. Column 2 of Table 2 provides a detailed description of what generally falls under the material type. Column 3 then identifies the primary generator of the material, either residential or commercial, and Column 4 details the typical reporting group per each material type.

Excluded and Included Material Types

As presented in Table 2, this report only includes materials recycled from MSW. All other materials, such as construction and demolition waste and industrial process waste are excluded (but are accounted for in the *Total Solid Waste Survey* completed on an every 5-year basis, most recently in 2018).

[2] In CY 2020, waste classifications per vehicle type were adjusted to reflect the estimated changes in the waste stream due to the impacts from the COVID-19 pandemic.

Additionally, gaseous and liquid wastes, infectious wastes, and Resource Conservation and Recovery Act (RCRA) Sub-title C hazardous wastes are excluded.

As presented in Table 2, most metals (except for appliances/white goods, lead acid batteries, and aluminum cans) are not counted towards MSW recycling. This approach results in a slightly lower recycling rate than if scrap metals (often collected by the same reporters), were also counted toward the MSW recycling rate.

It is important to note that this report relies on the haulers, brokers, and processors discretion as to the source of materials reported. For example, if cardboard is reported by a generator, hauler, or processor that reports on MSW recycling (and not on other C&D wastes), it would be included in the MSW recycling totals even if it may have come from a construction site. However, if cardboard is reported as going to a C&D recycling facility, or by a construction contractor, it would be excluded. Appendix A and B provide more detail on included material categories and generator classifications.

Potential for Use as Energy Recovery

Materials that were reported as recycled but directly sent (or processed and sent) for energy recovery were excluded. For example, tires sent for tire-derived fuel are not included in recycling or disposal tons to the degree that this end use can be identified. Oil recycling is also not included because most waste oil is recovered for use as fuel and not re-refined.

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 of recycling activity. For example, wood chips and branches that are disposed of on-site are excluded while branches and wood chips removed from a site are included. However, wood waste that would be disposed of with other C&D waste is excluded in cases where DSM could confirm that this was the case. Note that, consistent with the EPA methodology, DSM asks reporters to exclude all *land clearing debris* from their MSW recycling survey report even if has been managed off-site.

Import and Export

This assessment only includes materials that are generated in Delaware and does not include materials generated outside of Delaware even if they are imported into the State for recycling or beneficial reuse. This report does attempt to include all recyclables generated within Delaware but exported out-of-state for recycling.

In some instances, however, accounting for all exported recyclables is not always possible because it is unclear if out-of-state processors are subject to the reporting requirement, making it incumbent upon DSM or the processor to identify and survey all small generators located in Delaware to account for these small material flows.

For example, many businesses may recycle electronics through an out-of-state vendor that DSM is unable to identify and/or gain survey participation. It would be extremely time consuming to survey every small Delaware business to identify and account for these occurrences of electronics recycling that are outside of the electronics recyclers that do participate in the survey.

In addition, some of these recyclers/processors may not have the ability to track the origin and weights of the materials they process.

For example, a grocery or retail chain may backhaul materials such as retail bags and shrink wrap/film to a centralized distribution facility outside of Delaware where they are consolidated before sending to processors. In these cases, processors may only be able to identify the origin of materials as the distribution facility (outside of Delaware), and the load weights of the consolidated materials from an undisclosed number of store locations. In these cases, it is common for the original generator (grocery or retail chain) to submit a report for all of the Delaware store locations using an estimated average weight by material type for each store.

TABLE 2: MATERIALS INCLUDED IN DELAWARE RECYCLING STUDY, AND GENERATOR CATEGORY

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

Project Approach

Survey Participation

The *State of Delaware Assessment of MSW Recycling Survey* became mandatory in CY 2011. Each year DSM identifies additional reporting entities that fall under the reporting requirement.

Additionally, the targeted list of survey participants is updated annually to include only those organizations most likely to generate or handle large quantities of materials that have been diverted from disposal and meet the EPA's guidance on what is included in MSW recycling.

For this CY 2020 report, roughly 250 organizations were initially identified that may fall under the reporting requirement each year. Of these 250 organizations, 45 were excluded from the reporting process for CY 2020 due to one or more of the following reasons:

- They were under contract with a recycling hauler or send their material to a Delaware recycling facility that reports all of the materials that they recycle;
- They closed their Delaware location in CY 2019, or were acquired by an organization that already reports; and/or,
- They were assumed to generate very small quantities of material(s) in CY 2020 based on previously submitted reports and for most materials use Delaware haulers or recyclers that report.

The remaining 205 organizations were contacted and asked to complete a survey. Roughly 200 of these organizations responded to the reporting request either by submitting a full report or indicating that they did not source materials from Delaware in CY 2020 or were not operating in CY 2020.

The remaining 5 organizations did not submit reports despite multiple contact requests. This is discussed more in depth in the methodology section of this report.

Survey Methodology

The survey approach for this CY 2020 assessment is consistent with the previous year's methodology and is described in detail below.

First, DSM reviewed and updated the existing recycling contact database. Since the initial survey in 2005, the contact database has been reviewed annually and expanded on as new organizations are identified and businesses open, close, consolidate, or expand. DSM also verified and updated contact information for organizations that report annually with the contact information provided on the previous year's completed survey form or with information provided via e-mail or telephone by the previous year's reporter.

As with previous years, in CY 2020 DSM attempted to identify any new facilities based in or operating in Delaware that fall into the following major categories:

- ***Recycling haulers*** that collect recyclables (single stream, co-mingled, or source separated), as well as yard waste, tires, clean wood, and other recyclable materials from large and small generators.
- ***Processing facilities, brokers, and end users*** that either handle, process, or buy recovered fiber, plastics, batteries, oil filters, tires, etc. from Delaware generators.
- ***Large retailers and grocers*** that generate large quantities of cardboard (OCC), shrink wrap/film, pallets, appliances, and/or lead acid batteries. Organizations falling under this category generally backhaul their recyclables to a central distribution center where they are consolidated and then sent for recycling at regional processing facilities.
- ***Data Management Companies*** *(*such as those working within the health care industry) or ***Large Financial Institutions*** that handle large quantities of confidential paper or electronic records that need to be shredded or otherwise wiped from equipment.
- ***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.
- ***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, DSM offers survey participants the opportunity for their data to remain confidential. Survey data collected is aggregated by the weight of each material type and no individual company data is reported. However, participating company names and participation status may be reported to RPAC if requested.

Second, DSM and DNREC wrote letters and DSM sent them (along with the survey form) electronically to all organizations in the contact database that had a valid e-mail address. The survey form was also made available for download on DSM's website and reporting guidance was available on the DNREC website.

Initial outreach was done using the electronic application MailChimp, allowing DSM to identify which reporters had or had not opened the outreach e-mail and if an e-mail was bounced. Contacts that had not opened the MailChimp e-mail were e-mailed directly by DSM with a read receipt request, again, allowing DSM to confirm that they had received and opened the email with the outreach information.

In cases where DSM had no e-mail address, an invalid e-mail address, or no confirmation that the contact had opened the outreach e-mail, DSM made at least 3 telephone attempts to the organization or contact person to try to obtain a correct e-mail address or confirm receipt of the outreach documents. Near the February 15th deadline, DSM also sent reminder e-mails and made telephone calls to those contacts that had not yet submitted a report to remind them of the upcoming deadline, giving them the opportunity to request an extension.

A copy of the letter from DNREC and DSM, and the CY 2020 survey form are all attached as Appendix C and Appendix D of this report.

Third, as completed surveys were submitted, DSM confirmed receipt of the surveys with the reporter via e-mail or phone. DSM then updated the contact database with any new organizations that were listed in the surveys as receiving materials from Delaware generators. DSM also updated the contact database to note any companies that had closed, were deemed not applicable for annual contact, merged, or

were no longer operating in the State of Delaware.[3] DSM also updated the database with any new contact names identified during telephone calls or on submitted report forms.

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

- Types of materials handled or recycled;
- Quantities recycled of each material type for CY 2020 (in tons);
- Names of facilities or brokers where materials were sent for processing or end use in CY 2020 (to ensure double counting did not occur);
- 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 tires for tire derived fuel and shredded paper to waste-to-energy facilities would be excluded from the recycling totals reported.

While this information is requested on the survey form, in many cases DSM needed to follow up with reporters by telephone or e-mail when incomplete survey forms were submitted. The most common follow up request was to ask where materials reported were sent, or whether reported material included specific generators. This helped to avoid double counting materials when the data was aggregated. In some cases, companies were unable to provide this information due to confidentiality agreements. In all cases DSM has attempted to identify any instances of material being double counted and address those in the process of aggregating data.

Fifth, DSM collected data from DSWA on recyclable materials handled through DSWA facilities, including the assumed source of the material (residential vs. commercial) and the end users. Data reported by DSWA is included in the aggregated tonnages.[4]

Finally, on a case-by-case basis, if a relatively large generator of recyclables failed to respond to the 2020 survey, data from 2019 was used as a placeholder, but only if DSM expected that no major changes to that company had occurred during 2020. However, companies that did not report in both 2018 and 2019 were excluded in 2020.[5] 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.

Final Material Categories

Brief descriptions of the material categories surveyed and tracked are listed in Table 2 of this report. For each material, the primary generator sector (residential/household or commercial/institutional) and the typical types of organizations who report that material as recycled are listed. More in-depth

[3] *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.*
[4] *Mixed Recyclables reported by Republic's MRF are not specified by material type, and therefore are reported by DSM as mixed recyclables. These mixed recyclables include paper, plastics, tin cans, aluminum, and glass collected through Delaware's single stream recycling program by private haulers.*
[5] *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.*

descriptions of the material categories and who typically generates and recycles these materials can be found in Appendix B.

Limitations to Results

As with previous years, DSM has continued to follow the same methodology that counts only materials reported to be recycled. While it is possible to make estimates based on a material flow methodology or on the use of waste generation or recycling coefficients, DSM continues to only count materials that are reported by organizations to be recycled. Assuming that materials are not double counted, this methodology makes it more likely that materials are underreported versus overreported. However, as the same methodology is used each year, it allows for a more accurate and informative comparison between reporting years.

Other limitations include DSM's reliance on the reporters to provide data in 'good faith', and while DSM believes most entities do so to their best of their ability, there continues to be irregularities in data reported. These irregularities may be due to the following:

- A change in the contact person who reports which can result in inconsistencies in materials accounting year-over-year;
- Incomplete survey data due to confidentiality agreements;
- Temporary changes in business activity or waste generation; and/or
- COVID-19 restrictions on business operations.

A change in an organization's contact person has been an ongoing challenge as rarely DSM or DNREC is notified of the change, and in some cases, the contact's e-mail address and phone number remains active after they leave the company. This was a larger challenge for CY 2020 when many companies had employees working from home and DSM could not identify if they remained the contact. In addition, individuals who report for an organization may follow a different process to account for annual recycling tonnages, reporting only materials taken into inventory instead of those sold during that CY, resulting in inconsistencies for materials reported year-to-year. DSM made every effort to address inconsistencies that were believed to be due to a changing methodology, but in many cases the report had to be accepted 'as is'.

Incomplete survey data continues to lead to irregularities in data submitted. Some reporters use or sell to more than one processor (or broker) but do not report (or carefully track) the quantity of material sold to each during the past CY. In the current recycling climate, this practice is more common with spot market conditions being more critical to moving material. Processing facilities or brokers may provide a list of who sent them material in a given year, but not specific materials or volumes received. This can result in the double counting of materials.

Temporary changes in business operations due to cleanouts of stored inventory or increased capacity to process backstock can lead to large one year increases in the amount of recyclables reported. In almost all cases these increases are not permanent, however, they lead to significant fluctuations on specific material tonnages for the CY in which they are reported.

For CY 2019 and CY 2020 reporting years, the COVID-19 pandemic and subsequent stay-at-home orders and business operation restrictions resulted in temporary changes for many businesses that provide data for this report. In many cases this led to a reduction in reported recycling volumes as outlined below.

Impact of the COVID-19 Pandemic on Recycling

On March 13th, 2020 Governor Carney declared a State of Emergency in Delaware to address the potential spread of COVID-19. Subsequent updates to the initial State of Emergency declaration included the closure of Delaware schools, non-essential businesses, commercial lodging, and short term rentals as well as a Stay-At-Home order for Delawareans. These restrictions were mirrored across the country, and many remained in place in some version going into 2021 as the vaccine was rolled out.

The restrictions in Delaware and nationally resulted in many commercial businesses and institutions temporary closing or significantly limiting access. Residents following Stay-At-Home orders relied more heavily on e-commerce to make purchases. And many people found themselves and their families working and participating in school from home.

These restrictions had an impact on both waste generation and recycling activity. In most regions, there was an increase in residential waste (and recyclables) generation and materials collected curbside from residential generators. However, there was a decrease in many of these same materials (paper and packaging) generated from commercial sectors.

One positive outcome was that the limited supply of paper and packaging led to an increased demand from international and domestic recycling markets which ultimately resulted in a 55% increase year over year of the value of a ton of curbside recyclables in the fourth quarter of 2020.[6]

[6] Paben, J. Feb. 2021. Resource Recycling. *The details on price spikes for recyclables in two regions.* https://resource-recycling.com/recycling/2021/02/23/the-details-on-price-spikes-for-recyclables-in-two-regions/

Survey Results

Summary

The results of the CY 2020 Recycling Survey are presented in Table 3 (below). Table 3 compares the CY 2020 results against the CY 2019 results.

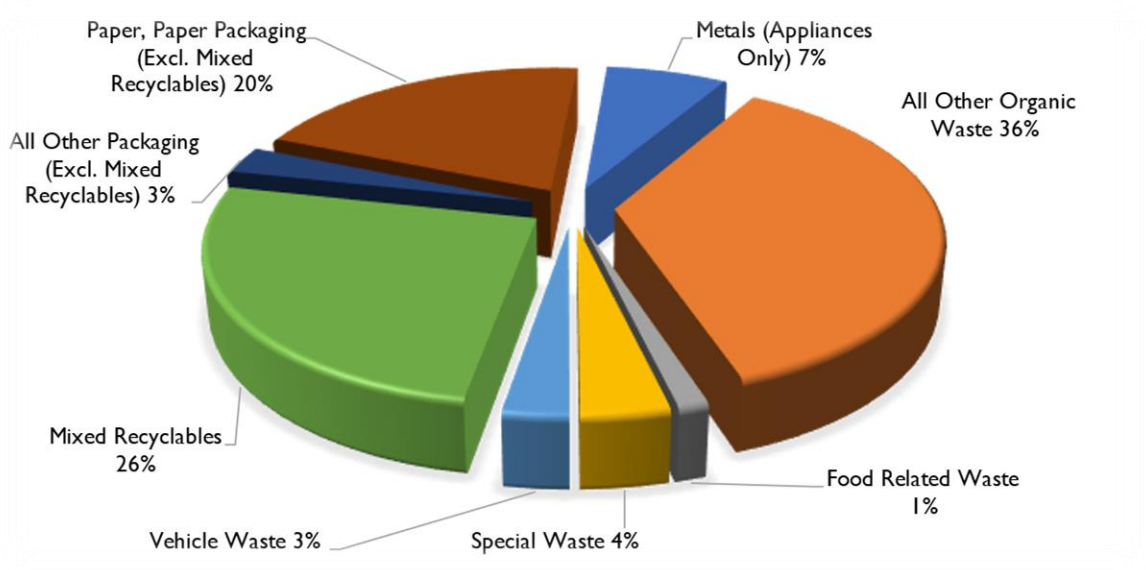
TABLE 3: COMPARISON OF MATERIAL RECYCLED, CY 2019 – 2020 (TONS BY GENERAL MATERIAL CATEGORY)

Material Category	2020 (Tons)	2019 (Tons)	Difference (Tons)	Percent Change 2020 - 2019 (%)
Paper, Paper Packaging	87,678	103,918	(16,240)	-16%
All Other Packaging	124,479	127,529	(3,050)	-2%
Net Packaging	**212,157**	**231,447**	**(19,290)**	**-8%**
Vehicle Waste	11,941	14,963	(3,022)	-20%
Special Waste	16,100	18,604	(2,505)	-13%
Organic Waste	164,328	180,167	(15,838)	-9%
Metals	31,037	27,292	3,744	14%
Other	313	412	(99)	-24%
TOTAL:	**435,875**	**472,885**	**(37,010)**	**-8%**

As illustrated in Table 3, CY 2020 results show a decrease of 37,000 tons (rounded) in the total of recyclable materials diverted between CY 2019 and CY 2020. This 8% decrease in recycling is primarily attributed to significant decreases in paper, paper packaging and organic waste tons.

Figure 1, (on the next page) illustrates the breakdown of the materials recycled, by material type in Delaware for CY 2020. As seen in Figure 1, 82% of total materials recycling is attributed to paper, paper packaging, mixed recyclables, and green waste diversion.

FIGURE 1: MATERIALS RECYCLING BY GENERAL MATERIAL CATEGORY INCLUDED IN EPA DEFINITION OF MSW RECYCLING (STATE OF DELAWARE, CY 2020)



A detailed breakdown of the CY 2020 survey results is presented in Table 4 (found on the next page). Table 4 also includes the results of the previous three reporting years (2019, 2018, and 2017).

As seen in Table 4, material categories that saw increases in recycled tons in CY 2020 include newspaper (ONP), plastic film/wrap, appliances, and trees and branches, whereas decreases in recycled tons are seen in categories including reported cardboard (OCC), leaf and yard waste, and mixed paper.

Note that Table 4 is heavily footnoted, and the Table notes can be found on the following page. Numbers shown in red were corrections made in this year's report to last year's data reported, due to new information provided by the reporter.

Table 4 is followed by a detailed discussion of the results by each of the major material categories.

TABLE 4: COMPARISON OF MSW MATERIALS RECYCLED IN DELAWARE, CY 2020, 2019, 2018 & 2017

Material Category	CY 2020 Total (Tons)	CY 2019 Total (Tons)	CY 2018 Total (Tons)	CY 2017 Total (Tons)	*Difference, 2020 - 2019* Total (Tons)	Difference (%)
Paper, Paper Packaging (1)						
Corrugated (OCC) (2)	62,184	76,261	72,796	94,520	(14,076)	*-18%*
Newspaper (ONP)	2,804	2,319	2,601	22,413	485	*21%*
Sorted Office Paper (3)	19,505	21,283	12,720	32,391	(1,778)	*-8%*
Mixed Paper	3,184	4,055	15,456	7,479	(871)	*-21%*
Subtotal:	***87,678***	***103,918***	***103,574***	***156,803***	(16,240)	*-16%*
All Other Packaging						
Glass		-	-	2	0	*0*
Plastic Film /Wrap (4)	3,787	1,911	2,066	2,428	1,876	*98%*
Retail Bags (4)	198	191	284	254	7	*4%*
Plastic Containers	878	951	1,772	2,957	(73)	*-8%*
Polystyrene Packaging	9	9	16	72	(0)	*-4%*
Aluminum Cans (5)	303	372	421	543	(69)	*-19%*
Pallets	7,303	8,213	3,980	4,136	(910)	*-11%*
Mixed Recyclables (6)	112,002	115,883	120,303	96,349	(3,880)	*-3%*
Subtotal:	***124,479***	***127,529***	***128,841***	***106,741***	(3,050)	*-2%*
Vehicle Waste						
Tires (7)	8,368	11,187	9,080	8,513	(2,820)	*-25%*
Lead Acid Batteries	3,104	3,371	2,011	3,286	(267)	*-8%*
Oil Filters (8)	469	404	364	240	65	*16%*
Subtotal:	***11,941***	***14,963***	***11,455***	***12,039***	(3,022)	*-20%*
Special Wastes						
Carpet	-	-	78	98	0	*0%*
Textiles (9)	14,499	16,501	15,709	13,631	(2,002)	*-12%*
Mattresses	73	*214*	180	201	(141)	*-66%*
Florescent Bulbs	26	45	24	36	(19)	*-42%*
Electronic Goods	1,427	1,763	1,709	1,679	(337)	*-19%*
Other Batteries	75	81	60	92	(6)	*-8%*
Subtotal:	***16,100***	***18,604***	***17,760***	***15,737***	(2,505)	*-13%*
Organic Wastes						
Fats, Oil, Grease	3,648	3,747	3,641	3,594	(99)	*-3%*
Food Waste (10)	1,899	1,878	1,550	1,735	21	*1%*
Leaf and Yard Waste (11)	112,095	141,805	104,903	107,721	(29,711)	*-21%*
Trees and Branches (11)	45,961	32,040	50,969	70,742	13,921	*43%*
Clean Wood	727	697	2,205	1,887	30	*4%*
Subtotal:	***164,328***	***180,167***	***163,267***	***185,679***	(15,838)	*-9%*
Metals						
White Goods (12)	31,037	27,292	28,256	34,941	3,744	*14%*
Subtotal:	***31,037***	***27,292***	***28,256***	***34,941***	3,744	*14%*
Other						
Mixed Plastics	313	412	440	341	(99)	-24%
Subtotal:	***313.03***	***412***	***440***	***341***	(99)	-24%
Total (13)	435,875	472,885	453,592	512,280	(37,010)	-8%

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 include different types of paper and paper packaging and therefore the totals for paper, paper packaging do not include this material.

2. Corrugated (OCC): Includes baled and loose OCC. Note that CY 2019 tons were adjusted up roughly 4,000 tons to reflect a reporter error made in CY 2019.

3. Sorted Office Paper (SOP): CY 2019 tons have been updated and adjusted up by roughly 7,000 tons to reflect a reporter error.

4. Plastic Film/Wrap and Retail Bags: Prior to 2014 plastic film/wrap and retail bags were reported under 'plastic film/wrap'. The majority of reporters still account for these materials as a total tonnage and provide DSM with an estimated breakdown of plastic film/wrap versus retail bags.

5. Aluminum Cans: Primarily reported by scrap metal recyclers.

6. Mixed Recyclables: Recyclables reported as single stream or co-mingled. This category is primarily collected by haulers from residential and commercial locations and includes paper, plastics, tin cans, aluminum, and glass materials collected from municipal recycling programs. As with previous years reports, total tons reported are incoming tonnages from Delaware collectors, therefore these tons do include residue. Additional discussion of the role of residue is in the following section entitled "Other Packaging Waste".

7. Tires: Tires reported do not include tires sent for tire derived fuel (TDF).

8. Oil Filters: Oil filters are reported primarily by recyclers and do not include any reported waste oil that is recycled.

9. Textiles: Textiles tons are primarily used clothing and shoes exported for recycling or reuse. Textile's exported do not have end use data as the end uses vary based on the textile quality and market conditions.

10. Food Waste: Includes seafood shells reported as recycled through non-profits to reinforce the Delaware shoreline.

11. Leaf and Yard Waste and Trees and Branches: Reported primarily by green waste companies. In most cases reporters operate drop off locations where third parties can bring material to be mulched or composted by the reporter. Due to this, and the frequent lack of a weigh scale, green waste reporters generally estimate the annual total tons and source of materials processed at their yard. For this reason, it is important to note that these two material categories reported tonnages do vary year-to-year.

12. White Goods: White goods are common household appliances that are recycled. Generally, this category is reported by scrap metal recyclers as well as some large retailers. In the case of scrap metal recyclers, appliances are typically a small portion of the total amount of scrap metal diverted for recycling. The remaining material is calculated every five years as part of the Total Solid Waste Diversion Rate.

13. Total: The total tons may not add due to rounding.

Paper Recycling

TABLE 5-1: PAPER AND PAPER PACKAGING

Material Category	2020 (Tons)	2019 (Tons)	Difference (Tons)	Percent Change 2019 - 2020 (%)
Paper, Paper Packaging				
Corrugated (OCC)	62,184	76,261	(14,076)	-18%
Newspaper (ONP)	2,804	2,319	485	21%
Sorted Office Paper (SOP)	19,505	21,283	(1,778)	-8%
Mixed Paper (MOP)	3,184	4,055	(871)	-21%
TOTAL:	**87,678**	**103,918**	**(16,240)**	**-16%**

(1) Numbers in red are corrections made to the figures reported last year based on new information received in CY 2020.

Paper and Paper Packaging reported as generated in Delaware and recycled decreased by 16% for CY 2020. This decrease is in contrast to the CY 2019 results where the total tons of Paper and Paper Packaging remained steady from totals for CY 2018. However, while overall aggregated tons of Paper and Paper Packaging decreased in Delaware, the American Forest and Paper Association reported that 65.7% of paper used in the U.S. was recycled in CY 2020, fairly consistent with the 66.2% paper recycling rate reported in CY 2019.[7]

As seen in Table 5-1, Corrugated (OCC) and Sorted Office Paper (SOP) represent the majority of the decrease in paper recycling in CY 2020.

- Corrugated (OCC) reported as recycled by Delaware generators decreased by roughly 14,100 tons of which roughly 13,800 tons were from the commercial sector. This decrease is attributed primarily to impacts from the COVID-19 pandemic on commercial business activity. These impacts include stay-at-home orders, changes in consumer behavior, and temporary closure or highly restricted business operations.
- Sorted Office Paper (SOP) also declined in CY 2020 by roughly 1,800 tons. All of this decline was attributed to the commercial sector. As of October 2020, 58% of Americans were working either completely remotely or a hybrid of remote and in person according to the most recent Gallop Poll.[8] Most SOP is generated in office buildings and financial institutions but with the majority of employees working from home for the bulk of CY 2020, less SOP was generated and when it was generated, it was likely recycled in residential curbside programs.

[7] American Forest & Paper Association. *Recycling During the Pandemic: 2020 Paper and Cardboard Recycling Rates Are In!* https://afandpa.org/media/blog/bloga/2021/05/13/recycling-during-the-pandemic-2020-paper-and-cardboard-recycling-rates-are-in!

[8] Brenan, M. Gallup. *COVID-19 and Remote Work: An Update*. https://news.gallup.com/poll/321800/covid-remote-work-update.aspx

While overall there was a 16% decrease in Paper and Paper Packaging recycling for Delaware in CY 2020, the total U.S. use of recovered paper fiber was at a 10-year high, a trend that is expected to continue as the global supply of OCC remains tight and global demand for OCC is high. Right at home, domestic paper mills are making investments to refurbish facilities to incorporate mixed paper as well as OCC into their products, which may eventually further increase the demand for and thus recycling of paper and paper packaging.[9]

All Other Packaging

TABLE 5-2: ALL OTHER PACKAGING

Material Category	2020 (Tons)	2019 (Tons)	Difference (Tons)	Percent Change 2019 - 2020 (%)
All Other Packaging				
Glass	-	-	-	-
Plastic Film/Wrap	3,787	1,911	1,876	98%
Retail Bags	198	191	7	4%
Plastic Containers	878	951	(73)	-8%
Polystrene Packaging	9	9	(0)	-4%
Aluminum Cans	303	372	(69)	-19%
Pallets	7,303	8,213	(910)	-11%
Mixed Recyclables	112,002	115,883	(3,880)	-3%
TOTAL:	**124,479**	**127,529**	**(3,050)**	**-2%**

The "All Other Packaging" category includes common recyclable materials generated by residential and commercial entities that are not fiber based. In CY 2020, the overall tons of All Other Packaging recycled decreased roughly 3,100 or 2% from CY 2019 and this decrease is primarily "Mixed Recyclables", more commonly called single stream or co-mingled recyclables.

The category "Mixed Recyclables" is the same as "Single Stream Recyclables". This category includes recyclables such as glass, plastic bottles, paper, cardboard, tin, and aluminum cans that are collected from household recycling programs in Delaware as part of the Single Stream recycling program. "Mixed Recyclables" or "Single Stream" tonnages are primarily reported by material recycling facilities (MRFs) and haulers and is either reported as tons collected or as an incoming stream (to a MRF). Note that no glass is reported separately for recycling in Table 5-2 as there are no longer separate glass recycling facilities in Delaware, instead all of the glass collected for recycling is included in the Mixed Recyclables category.

The reported tons of "Mixed Recyclables" include "Residue" which includes materials that could be recycled but are not due to process inefficiencies and contamination (materials that cannot be recycled). In The Recycling Partnership's *2020 State of Curbside Recycling Report*, it was estimated that the national average residue rate at MRFs for inbound curbside single stream is 17 percent.[10]

[9] NERC. *Domestic Recycled Paper Capacity Increases – Updated. https://nerc.org/documents/Summary%20of%20Announced%20Increased%20Capacity%20to%20use%20Recycled%20Paper%20May%202021.pdf*
[10] The Recycling Partnership. *2020 State of Curbside Recycling Report.* https://recyclingpartnership.org/stateofcurbside/

Residue is not subtracted from reported Mixed Recyclables (single stream materials) or from any other material category although "single stream" has the greatest potential for high residue rates compared to other materials reported. For this reason, when benchmarking Delaware against other regions, the issue of residue should be taken into consideration.

Potential explanations for the changes in reported CY 2020 figures for all other packaging waste include:

- The pandemic had an impact on the amount of recyclable material generated at home and at the workplace. Roughly 30% of Mixed Recyclables reported were generated from commercial entities, with the remaining 70% from residential customers. And while overall tons for Mixed Recyclables decreased, residentially generated Mixed Recyclables increased by roughly 4,500 tons over CY 2019 figures. However, the decrease in commercial Mixed Recyclables was even larger at roughly 8,000 tons, likely due to the decrease in commercial operations.

- Plastic Film/Wrap reported in CY 2020 increased by roughly 1,900 tons of which the majority was attributed to one reporter. Material that they used to process internally was sent out to a company that was able to both process the plastic film/wrap generated in CY 2020, but also all of their backstock. It is expected that in CY 2021 Plastic Film/Wrap will decrease back to the tonnages reported in the previous years.

- Retail Bags increased by roughly 7 tons over CY 2019 to a total of 198 tons. The majority was reported by retailers that collect or take back recycling on-site. It is important to note that most retail bags reported are an estimated percent of total shrink wrap/film reported as these materials are consolidated together and not tracked separately by grocers or retailers. A recent white paper published by the Recycling Partnership estimates that an average household brought back 1.6 pounds of retail bags each year, which in Delaware would amount to roughly 290 tons of retail bags.[11] It was reported to DSM that while Delaware's Plastic Bag Ban did not go into effect until January 1, 2021, many customers had already switched to using reusable bags.

[11] The Recycling Partnership. *Addressing the Challenge of Film and Flexible Packaging Data for The Recycling Partnerships Film and Flexibles Coalition*. https://recyclingpartnership.org/wp-content/uploads/dlm_uploads/2021/04/FF_Whitepaper_final.pdf

Vehicle Waste

TABLE 5-3: VEHICLE WASTE

Material Category	2020 (Tons)	2019 (Tons)	Difference (Tons)	Percent Change 2019 - 2020 (%)
Vehicle Waste				
Tires	8,368	11,187	(2,820)	-25%
Lead Acid Batteries	3,104	3,371	(267)	-8%
Oil Filters	469	404	65	16%
TOTAL:	**11,941**	**14,963**	**(3,022)**	**-20%**

In CY 2020, roughly 11,900 tons of vehicle waste was reported as recycled from Delaware generators, a decrease of 20% from the CY 2019 reported vehicle waste tonnages.

Scrap tire recycling in Delaware decreased by roughly 2,800 tons or 25% over CY 2019. Scrap tires classified as recycled exclude tires sent for use as tire derived fuel (TDF). Utilizing data presented in the *2019 U.S. Scrap Tire Management Summary*, DSM estimates that in CY 2020 Delaware generated roughly 8,400 tons of scrap tires for non-TDF use[12]. This estimate indicates DSM has identified and collected data from nearly all tire recyclers handling DE tires and, that they follow DSM's request to exclude tires sent for TDF use in their annual report.

Additional vehicle waste categories are lead acid batteries and oil filters. Reported recycled lead acid batteries decreased by roughly 270 tons in CY 2020 whereas oil filter recycling increased by 65 tons. DSM believes that both lead acid battery and oil filter recycling remain underreported despite DSM's best efforts to identify and contact recyclers. For example, scrap yards would not necessarily know how much metal they accepted that were drained oil filters.

In general, it would be expected that Delaware would see a decline in vehicle related waste during the pandemic due to the reduction in vehicle use.

[12] U.S. Tire Manufacturing Association. *2019 U.S. Scrap Tire Management Summary* https://www.ustires.org/system/files/2019%20USTMA%20Scrap%20Tire%20Management%20Summary%20Report.pdf

Special Wastes

TABLE 5-4: SPECIAL WASTES

Material Category	2020 (Tons)	2019 (Tons)	Difference (Tons)	Percent Change 2019 - 2020 (%)
Special Waste				
Carpet	-	-	-	-
Textiles	14,499	16,501	(2,002)	-12%
Mattresses	73	214	(141)	-66%
Florescent Bulbs	26	45	(19)	-42%
Electronic Goods	1,427	1,763	(337)	-19%
Other Batteries	75	81	(6)	-8%
TOTAL:	**16,100**	**18,604**	**(2,505)**	**-13%**

Special waste recycling decreased in CY 2020 by 2,505 tons or 13%. Decreases in reported tons recycled were seen across all categories.

Decreases in textile recycling were reported by all of the textile recyclers that report to DSM. In part this was due to removal of drop-off textile recycling bins due to COVID-19 and changes in consumer behaver. Additionally, textile recyclers struggled to find markets as lockdowns occurred and warehouses stockpiled material. Prices dropped as exporters also struggled to find end markets for textiles.[13]

The most recent *Waste Characterization Study* (FY 2016) in Delaware found that textiles represented roughly 5% of all waste going into Delaware landfills.[14] As clothing companies continue to make 'fast fashion' clothing of lesser quality, it is likely that textile waste generation per capita will continue to increase, which may lead to a growth in textile recycling initiatives.

Florescent Bulbs and Electronic Goods also saw decreases in the tons reported as recycled. These decreases are likely due to the switch to remote work and school for much of the Delaware population, reducing the use of florescent bulbs and access to in-office electronic waste recycling.[15]

[13] Dowsett, S., Obulutsa, G. Reuters. *Height of Fashion? Clothes mountains build up as recycling breaks down. https://www.reuters.com/article/us-health-coronavirus-textiles-recycling-idUSKBN26L0QQ*
[14] EPA reports textiles as 5.8% of generation in 2018.
[15] Cunningham, K. Waste Today. *How Sunnking is adjusting its electronics recycling operations during the COVID-19 pandemic. https://www.wastetodaymagazine.com/article/e-waste-covid-19-recycling-e-scrap/*

Organic Wastes: Food Waste

TABLE 5-5: FOOD WASTE

Material Category	2020 (Tons)	2019 (Tons)	Difference (Tons)	Percent Change 2019 - 2020 (%)
Food Waste				
Fats, Oils, Grease	3,648	3,747	(99)	-3%
Food Waste	1,899	1,878	21	1%
Food Donations	80	1,104	(1,024)	-93%
TOTAL:	**5,626**	**6,729**	**(1,102)**	**-16%**

Food waste diversion decreased in CY 2020 by 16% over 2019, or roughly 1,100 tons. The decrease was primarily attributed to a large decrease in food donations during the pandemic. Food donations are primarily reported by grocers who faced significant supply chain problems as well as contended with panic buying this past year. It is expected that food donations will return to pre-pandemic levels in the coming years.

Food donations, while listed, are not part of the EPA's definition of MSW or counted toward Delaware's recycling rate. However, they continue to be tracked in Delaware as they provide data on food waste diversion activity in Delaware.

Fat, Oils, Grease (FOG) decreased slightly in CY 2020 as primarily generators of FOG are restaurants. It is likely that the decreased seen in CY 2020 are attributed to restrictions put in place due to COVID-19.

Food waste recycling increased by roughly 20 tons in CY 2020 and is primarily reported by retailers and grocers who contract with private haulers to collect and deliver food waste to compost facilities located outside of Delaware. It is expected that a steady increase in food waste recycling will continue year-over-year as it becomes more a viable option for businesses.

Organic Waste: Green Waste

TABLE 5-6: GREEN WASTE

Material Category	2020 (Tons)	2019 (Tons)	Difference (Tons)	Percent Change 2019 - 2020 (%)
Green Waste				
Leaf and Yard Waste	112,095	141,805	(29,711)	-21%
Trees and Branches	45,961	32,040	13,921	43%
Clean Wood	727	697	30	4%
TOTAL:	**158,782**	**174,543**	**(15,760)**	**-9%**

In CY 2020 there was an 9%, or roughly 15,800 ton decrease in green waste reported. While leaf and yard waste decreased by roughly 29,700 tons, tree and branches increased by roughly 14,000 tons.

Many reporters of green waste estimate annual tons handled because they do not have scales, and because of this, totals may be off by a larger percentage that those for other materials. In addition, processors do not typically track incoming material by yard waste versus trees and branches, but instead estimate. Finally, green waste reporters accept materials from landscapers, residents, contractors, and others but do not request information as to the source location of the materials, making it impossible to allocate this material to residential or commercial sources. In an effort to provide consistency to this data, DSM utilizes an estimate of the percent of yard waste and trees and branches that are typically residential (vs. commercial) based on survey data obtained from DE landscapers and mulchers in 2004 and updated in 2015 (See Table 1 in this report).

The decrease in leaf and yard waste of roughly 29,700 tons was attributed to a number of factors. They include:

- In CY 2019 one reporter noted a large increase in business at their site that did not continue into CY 2020;
- A large hauler noted they had to limit their curbside yard waste collection due to COVID-19; and,
- One large reporter no longer accepted any green waste in CY 2020; however, it is unclear where that material may have gone instead.

Trees and Branches increased roughly 14,000 tons however DSM believes that some of this material may be miscategorized leaf and yard waste. But in August of 2020 Delaware was hit by Tropical Storm Isaias which produced a strong tornado causing significant tree damage and therefore generating trees and branches that must be moved off roadways and cleared from powerlines.

Finally, clean wood increased by roughly 30 tons or 4%. There are few options for clean wood recycling in Delaware and the surrounding areas. For this reason, it is unlikely that clean wood recycling will increase significantly in the coming years.

Scrap Metal

TABLE 5-7: SCRAP METAL

Material Category	2020 (Tons)	2019 (Tons)	Difference (Tons)	Percent Change 2019 - 2020 (%)
Metals				
White Goods	31,037	27,292	3,744	14%
TOTAL:	**31,037**	**27,292**	**3,744**	**14%**

White goods (appliances) reported as recycled in CY 2020 increased by 3,744 tons. Appliance recycling is primarily reported by scrap metal recyclers who do not always track them as a separate material but rather provide DSM with estimates each year. It is likely that the increase in appliance recycling is due to widespread home renovations that took place during CY 2020 and therefore households recycling their old appliances but DSM has no evidence that this is the main driver.

Estimating Residential vs. Commercial Recycling Activity

Since the EPA does not track or estimate residential and commercial recycling separately, generally acceptable guidelines for the allocation of recyclables to the residential versus the commercial sectors are not available. DSM relied on survey results to make these estimates for many materials but for some materials, more accurate estimates were necessary.

To address this, DSM worked with RPAC's Methods and Methodology Subcommittee (now called the Measurement and Reporting Subcommittee) in the early years of reporting to develop acceptable allocations of materials recycling to the commercial and the residential sectors. As materials such as retail bags were added, RPAC agreed to accepted allocations. Table 1 at the beginning of this report shows the allocations used to estimate residential versus commercial recycling activity for specific material types that have standard allocations.

For green waste (leaf and yard waste, and trees and branches), more detailed survey data was used with an extensive survey performed in 2004 updated by a survey in 2015.

Materials not included in the list of standard allocations found in Table 1 are allocated each year based on data provided by reporters.

Table 6-1 (next page) uses the data provided by reporters and the Allocations Table (for the materials listed in Table 1), to provide the estimate of residential and commercial recycling activity for CY 2020.

TABLE 6-1: ESTIMATE OF RESIDENTIAL VS. COMMERCIAL MSW RECYCLING ACTIVITY (CY2020)

Material Category	*Residential* (tons)	*Commercial* (tons)	Total MSW (tons)
Paper			
Corrugated (OCC)	92	62,093	62,184
Newspaper (ONP)	0	2,804	2,804
Sorted Office Paper	0	19,505	19,505
Mixed Paper	7	3,177	3,184
Subtotal:	98	87,579	87,678
Packaging			
Glass	0	0	0
Plastic Film / Shrink Wrap	0	3,787	3,787
Retail Bags	198	0	198
Plastic Containers	0	878	878
Polystyrene Packaging	6	3	9
Aluminum Cans	272	30	303
Mixed Recyclables	79,060	32,942	112,002
Mulched Pallets	0	7,303	7,303
Subtotal:	79,535	44,944	124,479
Green Waste			
Leaf and Yard Waste	100,885	11,209	112,095
Trees and Branches	22,981	22,981	45,961
Clean Wood	0	727	727
Subtotal:	123,866	34,917	158,782
Food Related Wastes			
Food Waste	0	1,899	1,899
Fats, Oil, Grease	0	3,648	3,648
Subtotal:	0	5,546	5,546
Vehicle Waste			
Tires	6,694	1,674	8,368
Lead Acid Batteries	2,483	621	3,104
Oil Filters	375	94	469
Subtotal:	9,553	2,388	11,941
Special Wastes			
Textiles	14,080	418	14,499
Electronics	1,067	360	1,427
Mattresses	73	0	73
Carpet	0	0	0
Florescent Bulbs	0	26	26
Other Batteries	67	7	75
Subtotal:	15,288	812	16,100
Metals			
White Goods	27,933	3,104	31,037
Subtotal:	27,933	3,104	31,037
Other			
Mixed Plastics	0	313	313
Subtotal:	0	313	313
Total:	256,273	179,602	435,875

Table 6-2 provides a comparison between CY 2019 and CY 2020 for the residential and commercial paper and packaging recycling in Delaware. As shown in Table 6-2, residential paper and packaging recycling was up 6% while the commercial sector lost 15% of material compared to last year. This data highlights the impacts of COVID-19 restrictions and behavior changes on the recycling stream.

It should be recognized that most residential paper and all glass is included in Mixed Recyclables.

TABLE 6-2: RESIDENTIAL VS. COMMERCIAL PAPER AND PACKAGING RECYCLING ACTIVITY CY 2020 VS. CY 2019

Material Category	*Residential*				*Commercial*			
	CY 2020 (Tons)	*CY 2019* (Tons)	*Difference 2020 - 2019* (Tons)	(%)	*CY 2020* (Tons)	*CY 2019* (Tons)	*Difference 2020 - 2019* (Tons)	(%)
Paper								
Corrugated (OCC)	92	384	-292	-76%	62,093	75,877	-13,784	-18%
Newspaper (ONP)	0	0	0	-	2,804	2,319	485	21%
Sorted Office Paper	0	0	0	-	19,505	21,283	-1,778	-8%
Mixed Paper	7	21	-14	-67%	3,177	4,034	-857	-21%
Subtotal:	98	405	-306	-76%	87,579	103,513	-15,934	-15%
Packaging	0	0	0	-	0	0	0	-
Glass	0	0	0	-	0	0	0	-
Plastic Film / Shrink Wrap	0	0	0	-	3,787	1,911	1,876	98%
Retail Bags	198	191	7	4%	0	0	0	-
Plastic Containers	0	0	0	-	878	951	-73	-8%
Polystyrene Packaging	6	6	0	-	3	3	0	-6%
Aluminum Cans	272	335	-62	-19%	30	37	-7	-19%
Mixed Recyclables	79,060	74,527	4,533	6%	32,942	41,356	-8,413	-20%
Mulched Pallets	0	0	0	-	7,303	8,213	-910	-11%
Subtotal:	79,535	75,058	4,477	6%	44,944	52,471	-7,527	-14%
Paper and Packaging Total:	79,634	75,463	4,171	6%	132,523	155,984	-23,461	-15%

Calculating the Recycling Rate for Delaware

Calculating the Denominator

Delaware, unlike many states, has instituted flow control for all MSW generated in the state. This allows the State to more easily track and maintain accurate data on annual MSW generation and disposal. An additional benefit is having one entity, DSWA, consistently track incoming waste deliveries by having scales at every facility and maintaining a uniform approach to track and keep detailed scale records on the vehicle type, waste type, and load weight of all deliveries.

This allows DSWA to provide the contractor, DSM, with accurate scale data on deliveries of all Delaware waste to the three landfills and the three transfer stations during CY 2020. Using these data DSM followed a standardized methodology (as used in previous years) to disaggregate construction and demolition (C&D) waste delivered to DSWA facilities in order to make an accurate estimate on the total MSW disposal in Delaware, as well as to allocate municipal solid waste (MSW) disposed as either residential or commercial.

The methodology follows these steps:

First, DSWA provided DSM with CY 2020 data on solid waste deliveries made to each of their six facilities. The data provided classified waste deliveries as MSW, C&D, or special wastes to each 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 scale house survey data on the typical source of waste coming into each facility by vehicle type, DSM allocated the annual waste tonnages reported for 2020 for each vehicle type to either residential, commercial, C&D, or self-haul generator categories.[16]

For example, all cars are allocated to self-haul as they are only allowed in the self-haul area of the facility. And the allocations applied for rear end loaders is different at each facility based on the surveys performed.

Third, DSM totaled residential, commercial, C&D, and self-haul waste quantities for each facility calculated by the vehicle type allocations and weights delivered by those vehicles, to calculate the total tons of residential, commercial, C&D, and self-haul waste delivered statewide for 2020.

Finally, the self-haul waste totals were then allocated equally between residential, commercial, and C&D sources consistent with past surveys of facility self-haul areas. Table 7-1 and 7-2 illustrate these steps.

[16] In CY 2020 DSM with the input of DSWA adjusted the waste allocation and therefore annual waste tonnages for front end loaders from what was used previously to account for the changes seen in waste collection with the growing use of front-end loaders for residential waste in some regions. This adjustment also helped to account for the understood impact of COVID-19 on commercial and residential waste generation.

TABLE 7-1: SELF-HAUL, RESIDENTIAL, COMMERCIAL, AND C&D WASTE DELIVERIES TO DSWA FACILITIES[17] BASED ON VEHICLE TYPE (2020)

	Waste, By Generator Type, CY 2020				
DSWA Facility	Self Haul *(tons)*	Residential *(tons)*	Commercial *(tons)*	C&D *(tons)*	Total
NSWMC	23,098	187,698	154,027	50,929	415,752
CSWMC	8,302	42,990	65,166	17,852	134,309
SSWMC	13,588	44,062	44,916	99,414	201,981
PTCTS	5,706	43,196	30,562	6,377	85,841
MTS	3,870	18,070	15,250	1,517	38,706
RT5TS	6,456	47,213	40,084	10,019	103,772
TOTAL:	61,021	383,229	350,004	186,107	980,361

TABLE 7-2: REALLOCATION OF SELF-HAUL WASTE TO RESIDENTIAL, COMMERCIAL, AND C&D SECTOR TO ESTIMATE TOTAL RESIDENTIAL AND COMMERCIAL WASTE DELIVERIES TO DSWA FACILITIES (CY 2020)

SECTOR	Total, from Table 7-1 *2020 (tons)*	Reallocation of Self-haul Deliveries *2020 (tons)*	Minus Tires and Yard Waste Diverted *2020 (tons)*	TOTAL MSW Disposal *2020 (tons)*
Residential	383,229	20,340	-9,180	394,389
Commercial	350,004	20,340	-1,840	368,505
C&D	186,107	20,340	-3,900	
Self Haul	61,021			
TOTAL:	**980,361**	**61,021**	**-14,920**	**762,893**

By taking the steps outlined, total MSW disposal for CY 2020 is estimated to be 762,893 tons.

Calculating the Recycling Rate

Using totals from Table 6-1 for residential and commercial recycling activity in the numerator and the results of Tables 7-1 and 7-2 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 8 (next page).

[17] *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 8: CALCULATION OF RESIDENTIAL AND COMMERCIAL RECYCLING RATE, AND THE TOTAL MSW RECYCLING RATE (CY 2020)

Sector	(A) Recycling *(tons)*	(B) Disposal *(tons)*	(A) + (B) Total Generation *(tons)*	A / (A + B) Recycling Rate *(%)*
Residential	256,273	394,389	650,662	**39%**
Commercial	179,602	368,505	548,107	**33%**
TOTAL:	**435,875**	**762,893**	**1,198,769**	**36%**

Appendix A

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

TABLE A. SCOPE OF MATERIALS INCLUDED IN THE STANDARD MSW RECYCLING RATE

MATERIAL[1]	WHAT IS MSW	WHAT IS NOT MSW[2]
Food Scraps	Uneaten food and food preparation wastes from residences and commercial establishments (restaurants, supermarkets, and produce stands), institutional sources (school cafeterias), and industrial sources (employee lunchrooms).	Food processing waste from agricultural and industrial operations.
Glass Containers	Containers; packaging; and glass found in appliances, furniture, and consumer electronics.	Glass from transportation equipment (automobiles) and construction and demolition (C&D) debris (windows).
Lead-Acid Batteries	Batteries from automobiles, trucks, and motorcycles.	Batteries from aircraft, military vehicles, boats, and heavy-duty trucks and tractors.
Tin/Steel Cans and Other Ferrous Metals	Tin-coated steel cans; strapping; and ferrous metals from appliances (refrigerators), consumer electronics, and furniture.	Ferrous metals from C&D debris and transportation equipment.
Aluminum Cans and Other Nonferrous Metals	Aluminum cans; nonferrous metals from appliances, furniture, and consumer electronics; and other aluminum items (foil and lids from bimetal cans).	Nonferrous metals from industrial applications and C&D debris (aluminum siding, wiring, and piping).
Paper	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.	Paper manufacturing waste (mill broke) and converting scrap not recovered for recycling.
Plastic	Containers; packaging; bags and wraps; and plastics found in appliances, furniture, and sporting and recreational equipment.	Plastics from transportation equipment.
Textiles	Fiber from apparel, furniture, linens (sheets and towels), carpets[3] and rugs, and footwear.	Textile waste generated during manufacturing processes (mill scrap) and C&D projects.
Tires	Tires from automobiles and trucks.	Tires from motorcycles[4], buses, and heavy farm and construction equipment.
Wood	Pallets; crates; barrels; and wood found in furniture and consumer electronics.	Wood from C&D debris (lumber and tree stumps[5]) and industrial process waste (shavings and sawdust).
Yard Trimmings	Grass, leaves, brush and branches, and tree stumps.[5]	Yard trimmings from C&D debris.
Other	Household hazardous waste (HHW)[6], oil filters, fluorescent tubes[7], mattresses, and consumer electronics.	Abatement debris, agricultural waste, combustion ash, C&D debris, industrial process waste, medical waste, mining waste, municipal sewage and industrial sludges, natural disaster debris[8], used motor oil, oil and gas waste, and preconsumer waste.

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 tornados. Heavy storms are not considered natural disasters.

TABLE B. SCOPE OF ACTIVITIES INCLUDED IN THE STANDARD MSW RECYCLING RATE

RECYCLABLE MATERIAL	WHAT COUNTS AS RECYCLING	WHAT DOES NOT COUNT AS RECYCLING[1]
Food Scraps	Composting of food scraps from grocery stores, restaurants, cafeterias, lunchrooms, and private residences, and the use of food scraps to feed farm animals.	Backyard (onsite) composting of food scraps, and the use of food items for human consumption (food banks).
Glass	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).	Recycling of glass found in transportation equipment and construction and demolition (C&D) debris, recycling of preconsumer glass or glass from industrial processes, and reuse of refillable glass bottles.
Lead-Acid Batteries	Recycling of lead-acid batteries found in cars, trucks, or motorcycles into new plastic and lead products.	Recycling of lead-acid batteries used in large equipment, aircraft, military vehicles, boats, heavy-duty trucks and tractors, and industrial applications.
Metals	Recycling of aluminum and tin/steel cans, and recycling of metals found in appliances and packaging into new metal products.	Reuse of metal containers, packaging, furniture, or consumer electronics, and recycling of metals found in transportation equipment (autobodies) and C&D debris.
Paper	Recycling of paper products (old newspapers and office papers) into new paper products (tissue, paperboard, hydromulch, animal bedding, or insulation materials).	Reuse of paper products, recycling of preconsumer or manufacturing waste (trimmings, mill broke, print overruns, and overissue publications), and combustion of paper for energy recovery.
Plastic	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).	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.
Textiles	Recycling of textiles into wiper rags, and recycling of apparel and carpet fiber[2] into new products such as linen paper or carpet padding.	Reuse of apparel.
Tires	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.	Recycling of tires from motorcycles, buses, and heavy farm and construction equipment, retreading of tires, and combustion of tire chips for energy recovery.
Wood	Recycling of wood products (pallets and crates) into mulch, compost, or similar uses.	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&D debris.
Yard Trimmings	Offsite recycling of grass, leaves, brush or branches[3], and tree stumps[4] into compost, mulch, or similar uses; and landspreading of leaves[5].	Mulching of tree stumps[4] from C&D debris, backyard (onsite) composting, grasscycling, landspreading of leaves[5], and combustion of yard trimmings for energy recovery.
Other	Household hazardous waste (HHW)[6], oil filters, fluorescent tubes[7], mattresses, circuit boards, and consumer electronics[8].	Recycling of used oil, C&D debris (asphalt, concrete, and natural disaster debris), transportation equipment (autobodies), municipal sewage sludge, and agricultural, industrial, mining, and food processing waste.

TABLE B. NOTES

[1] 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 *Characterization of Municipal Solid Waste in the United States*, (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.

[2] Carpeting is categorized as Textiles when discarded in MSW and is included in the rate calculation. When carpets are discarded in C&D debris, they are excluded from the rate calculation.

[3] Includes woody material such as branches, brush, and whole trees such as Christmas trees.

[4] 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 excluded from the rate calculation.

[5] 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.

[6] 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 cleansers, and bug sprays. Used motor oil is excluded.

[7] 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&D debris, they are excluded from the rate calculation.

[8] 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.

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 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 are collecting 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 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 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 addresses 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 2020)

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF WASTE AND HAZARDOUS SUBSTANCES
RICHARDSON & ROBBINS BUILDING
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

DIRECTOR'S OFFICE

PHONE
(302) 739-9400

January 1, 2021

Subject: **Required Recycling Report Due February 15, 2021**

Dear Sir/Madam:

This letter serves as a reminder that your organization's calendar year 2020 recycling activity data is due February 15, 2021. The Delaware Solid Waste Recycling Law (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 and the location and name of facilities where these recyclables are sent in order to ensure material reported is not double counted. The CY 2020 reporting form is attached to this letter along with more detailed information about how to correctly complete the reporting form.

Please remember that this mandatory reporting is on-going: each year on February 15th the information 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.

DSM Environmental Services, Inc. (DSM) worked with Delaware's Recycling Public Advisory Council (RPAC) to design the survey reporting form and collect 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 aggregates the survey data in an annual report to the RPAC to assure that individual company data are not reported. DSM also analyzes 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: http://www.dnrec.delaware.gov/dwhs/Recycling/Documents/19th-Annual-RPAC-Report.pdf

To view the DSM Report of MSW recycling activity in CY 2019 please visit: http://www.dnrec.delaware.gov/dwhs/Recycling/Documents/2019-delaware-recycling-report-dsm-environmental-services.pdf

Attached to this letter you will find DSM's letter with more information on how to report along with the 2020 reporting form (**due February 15, 2021**). If you have any questions regarding completion of the reporting form please call 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. I thank you in advance for your cooperation and we commend you for your ongoing recycling efforts.

Sincerely,

Timothy Ratsep
Director

Cc Julie Miro Wenger, Acting Chair RPAC
Mike Parkowski, DSWA

Delaware Annual Recycling Activity Report Form

REPORT FORM FOR CALENDAR YEAR 2020

If you have any questions about this form, please e-mail Marissa Ambrosi at the third-party consulting firm, DSM Environmental, at marissa@dsmenvironmental.com. If you have questions about the reporting requirement, please contact DNREC's Compliance and Permitting Section at (302) 739-9403.

COMPANY INFORMATION

Company Name _____ Subsidiary of _____

Mailing Address _____ Contact Name _____

City _____ State _____ Zip _____ Title _____

Physical Address _____ Phone _____

☐ Same as mailing _____ Email _____

City _____ State _____ Zip _____

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, 2020)*

Material Type [1]	Annual Tons Recycled 2020	Please list the company and location where each material is sent for Recycling, Processing or End Use [2]	*Percent Commercial*	*Percent Residential*	*Approx.* percent of material originating from Delaware ONLY[3]
			%	%	%
			%	%	%
			%	%	%
			%	%	%
			%	%	%
			%	%	%
			%	%	%
			%	%	%
			%	%	%
			%	%	%

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/Single Stream; White Goods/Appliances; Leaf and Yard Waste (including branches < 4"); Trees and Branches (but no landclearing debris); Clean Wood (but no construction debris);Tires; Lead Acid Batteries; Other Batteries; 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 is handled by another recycler that participates in our survey.**
3. If you handle recycling material 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 to us which 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 material recovered 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 material quantities 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. Note that participating company names and participation status may be provided to RPAC upon request.

E-mail completed form to: DSM@DSMEnvironmental.com

DSM Environmental Services, Inc.
P.O. Box 2 • Windsor, VT 05089
802.674.2840
www.dsmenvironmental.com

Appendix D

DSM Letter on 2020 Annual Recycling Reporting

DSM ENVIRONMENTAL SERVICES, INC.

Resource Economists
Environmental Scientists

January 1, 2021

Re: **Delaware Recycling Report for Calendar Year 2020**

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 2020. As indicated in the letter from DNREC, **annual reporting is mandatory and a report is due by Monday, February 15, 2021.**

The survey data will be compiled to become part of RPAC's 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/

As in previous years, DSM is 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; however, participating company names and participation status may be reported to RPAC if requested. Please refer to the Executive Summary section 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/19th-Annual-RPAC-Report.pdf.

Attached is the CY 2020 reporting form. Please list the weight of each 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 2020, 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 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.

Please email or mail back the completed form 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.**

The CY 2020 reporting form is also available for download on our website in both an electronic version and one that you can print and fill out. A direct link can be found at: http://www.dsmenvironmental.com/active-project-resources

Information about how to download and complete the reporting form are included with this letter. Also please refer to the list of materials to report on and the definitions for each material type.

DSM ENVIRONMENTAL SERVICES, INC.
Resource Economists
Environmental Scientists

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

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

Or mail the completed form 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 do not hesitate to contact Marissa Ambrosi by e-mail at marissa@DSMEnvironmental.com or call DSM at (802) 674-2840.

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

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

Sincerely,
DSM Environmental Services, Inc.

Marissa Ambrosi

Marissa Ambrosi

DSM ENVIRONMENTAL SERVICES, INC.
Resource Economists
Environmental Scientists

Completing the Recycling Survey Form:

Electronic Form
If you use the electronic form, 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@DSMEnvironmental.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.

Description of Information Requested on the Recycling Survey Form

Material Type – List each material you recycled in CY 2020. See Table 1 for a list of materials to report and definitions for each.

Company where material is sent for Recycling, Processing, or End Use – For each material, list the facility and location where the material has been sent for processing or end use. This information is critical to ensure that DSM does not double count material handled by another recycler that participates in the survey. **Your report will not be considered complete or in compliance with the reporting requirement if this information is excluded or if only a geographical location is listed. 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, including apartment dwellers and multi-family households. 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 only from recycled materials generated in Delaware.

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TABLE 1 – List of Materials to Report and Definitions

Material Category	Definition
PAPER AND PAPER PACKAGING	
OCC (old corrugated containers)	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 packing paper.
ONP (old newspapers)	All newspapers and glossy inserts, and all items made from newsprint, such as free advertising guides, election guides, plain news packing paper, stapled college schedules of classes, and tax instruction booklets.
Sorted Office Paper	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.
Mixed Paper	All other types of paper including magazines and catalogs, phone books and directories, junk mail, chipboard, and all other recyclable paper packaging.
NON-PAPER PACKAGING	
Mixed Glass (bottles and jars)	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.
Plastic Film / Shrink Wrap	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 wrapping, and stretch wraps used for shipping and containerizing pallets.
Plastic Retail Bags	Plastic retail and grocery sacks collected through retail collection sites.
Plastic Bottles and Containers (all Resins Except #6, Polystyrene)	Bottles, Jars, Containers and Tubs including clear or colored PETE (polyethylene terephthalate), natural and colored HDPE (high-density polyethylene) and all other plastic (3-7) 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.
Polystyrene Packaging	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.
Aluminum Cans and Food Containers	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.
Single Stream or Mixed Recyclables	Recyclables reported as collected as a single stream or mixture of different categories of recyclables.
Pallets, mulched and other	Unpainted wood pallets, crates, and packaging made of lumber/engineered wood and ground for mulch or use in composting. Do not include rebuilt pallets.
GREEN WASTE	
Leaf and Yard Waste	Plant material from public or private landscapes that is no bigger than 4 inches in diameter. Examples include leaves, grass clippings, seaweed, and plants, prunings, shrubs, and small branches with branch diameters that do
Tree Waste	Woody plant material, branches, and stumps that exceed four inches in diameter from any public or private landscape. DO NOT INCLUDE LAND CLEARING DEBRIS
Clean Wood	All untreated and unpainted wood, including clean lumber and natural wood that is used for mulch, compost, or other products

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FOOD AND RELATED WASTE	
Food Waste	Food material resulting from the processing, storage, preparation, cooking, handling, or consumption of food.
Fats, Oils, Grease	Liquid or solid, composed primarily of fat, oil, and grease from animal or vegetable source
VEHICLE WASTE	
Tires	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.
Lead Acid Batteries	Lead-acid batteries from passenger cars, trucks, and motorcycles and small equipment when reported separately.
Oil Filters	Oil filters from vehicles.
OTHER SPECIAL WASTES	
Textiles	Items made of thread, yarn, fabric, or cloth including clothes, fabric trimmings, draperies, and all natural and synthetic cloth fibers.
Electronics/Electronic Goods	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.
Mattresses	Mattresses and box springs processed for reclaiming the components including steel, foam, wood, and fibers.
Carpet	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.
Florescent Bulbs	Mercury containing bulbs and ballasts recycled.
Other Batteries	Consumer batteries of various sizes and types. Examples include flashlight, small appliance, watch, and hearing aid batteries.
METALS	
Aluminum Products	Any item made of aluminum other than cans or constriction waste including aluminum furniture, tools, and household items.
White Goods / Appliances	Metal appliances including refrigerators and air conditioners (with Freon removed), as well as stoves, water coolers, water heaters, and other small (mostly) metal appliances.
OTHER PLASTIC WASTE	
Mixed Plastics/Other Plastics	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.