



2020 Diversion and Disposal Report

A summary of solid waste management in the State of Vermont

Prepared by:

Waste Management & Prevention Division
Solid Waste Management Program

December 2021

Introduction

The Waste Management and Prevention Division's Solid Waste Management Program respectfully submits the Program's annual report describing how solid waste was managed in Vermont during the 2020 calendar year. This narrative report summarizes the sources of data used to determine the annual totals and briefly describes the significant changes and trends.

In the last decade, a few events have significantly changed Vermont's material management. The first of these was the Universal Recycling law of 2012, which focuses on increasing the convenience and choices available and the requirements for the proper management of recyclables and organics (leaf and yard debris, clean wood, and food scraps). The second was the 2014 adoption and subsequent 2019 updates to the State Material Management Plan (MMP), which established performance measures for the Agency and municipal partners. The last of these events was the passage of Vermont's Single Use Products law (Act 69 of 2019). Some of the changes implemented by these efforts include landfill bans on recyclables in July 2015, leaf and yard debris and clean wood in July 2016, mandatory collection of organics at solid waste facilities in 2017, a full statewide ban on food scraps in 2020, and regulations on the use of single-use plastic bags, straws and stirrers, and the sale and use of expanded polystyrene food and beverage containers in 2020. The solid waste management systems have generally adjusted accordingly, and this is reflected by some of the recent changes to the tonnages and types of solid waste managed within Vermont.

Beginning in 2020, the COVID-19 pandemic has impacted the global economy and service sectors, including solid waste management. Periods of economic downturn often correspond with decreases in waste generation. As the COVID-19 pandemic shuttered many businesses and institutions, waste, recycling, and organics from these commercial sectors dropped off and haulers reported an increase in the amount of these materials collected from the residential sector. The state-wide generation and movement of trash, recyclables, organics, and other waste materials in 2020 was impacted by the pandemic in ways that will not be easy to separate from other concurrent factors, such as the statewide landfill disposal ban on food scraps or the Single Use Products law.

The data and information presented within this summary are primarily based on reports that permitted solid waste facilities across the State are required to submit annually. All certified solid waste facilities (including landfills, transfer stations, material recovery facilities, and organics management facilities) are required to provide the Program with detailed information on the flow of solid waste under their management. As such, the data presented in this report is only as reliable as the data submitted. Though there is some quality control maintained over the submitted data, it remains likely that there are inaccuracies in the reporting. On a statewide basis, it is believed that these inaccuracies only have a minor influence on the data compilation. It is also necessary to utilize estimates, derived from existing waste composition studies, to complete our assessment of comprehensive solid waste management. When an estimate from another source is used within the report it is notated and cited.

| Report Sections | Page |
|---|------|
| Executive Summary and Method Approach | 4 |
| I. Disposal Activities | 5 |
| II. Diversion Activities | 8 |
| III. Total Municipal Solid Waste Generation Summary | 12 |
| IV. Other Materials Management | 15 |

| List of Tables and Figures: | Page |
|---|------|
| Table 1: Status of Vermont Landfills | 5 |
| Table 2: Materials Disposed in Vermont Landfills | 5 |
| Table 3: Solid Waste Sourced in Vermont, Disposed Out-of-State | 6 |
| Table 4: Landfill Beneficial Use of Solid Waste Materials | 7 |
| Table 5: Adjustment of MSW tonnages for C&D Component | 7 |
| Table 6: Summary of Diversion Activities | 10 |
| Table 7: Historic Perspective on Generation, Diversion and Disposal Totals | 13 |
| Table 8: Summary of Historic Hazardous Waste Collections and Participation | 14 |
| Table 9: Summary of Historic Mercury Collections | 14 |
| Table 10: Summary of Historic Electronics Collections | 15 |
| Table 11: Summary of Historic Battery Collections | 15 |
| Table 12: Summary of Historic Paint Collections | 16 |
| Figure 1: Destination of Municipal Solid Waste Generated in Vermont | 6 |
| Figure 2: Comparison of Materials Marketed Directly from a Vermont Solid Waste Facility | 11 |
| Figure 3: Projections of Waste Generation, Diversion and Disposal | 12 |
| Figure 4: Pounds of Waste Per Day Per Person Generated by Vermonters | 14 |
| Appendix A: Household Hazardous Waste Report | 17 |
| Appendix B: Vermont Biosolid Management Statistics | 20 |

References

- 2018, DSM Environmental Services, Inc., MSW Consultants, Castleton Polling Institute. 2018 Vermont Waste Characterization: Final Report. Prepared for Vermont Department of Environmental Conservation, Solid Waste Management Program.
- 2013, DSM Environmental Services, Inc., Tellus Institute and RLS. System Analysis of the Impact of Act 148 on Solid Waste Management in Vermont: Final Report. Prepared for Vermont Department of Environmental Conservation, Solid Waste Management Program.
- 2002, DSM Environmental Services, Inc., Vermont's Municipal Solid Waste Diversion Rate: 2001; Results of Recycling and Reuse Survey. Final Report. Prepared for Vermont Department of Environmental Conservation, Solid Waste Management Program.

Executive Summary

In 2020, Vermonters generated 624,862 tons of municipal solid waste (MSW). This is a decrease of 6.8% from the 670,348 tons generated in 2019. Of the solid waste generated, the Vermont materials management system diverted (recycled, reused, composted, etc.) 222,769 tons of material, a 1% decrease in diversion over the 225,122 tons diverted in 2019. Vermont disposed of 402,100 tons this past year, a 9.7% decrease in disposal over the 445,226 tons disposed in 2019. The resultant 36% diversion rate is similar to the 34% average diversion rate of the last 10 years. State-wide goals within the 2019 MMP are to reduce the disposal of municipal solid waste to 1,000 lbs./person/year and to increase the statewide diversion rate to 50% by 2024 (approximately four years after the food scrap landfill disposal ban went into effect per the Universal Recycling Law). In 2020, Vermonters disposed an average of 1,251 lbs./person/year, as compared to 1,427 lbs./person/year in 2019.

It is positive to see that, compared to 2019, rates of recycling/diversion held generally steady, while disposal and overall waste generation dropped. However, in looking at longer-term trends, Vermonters are clearly still generating and disposing of more waste than we once were. For instance, in the time since the Universal Recycling Law was passed in 2012, diversion has only increased marginally (the diversion rate in 2012 was 35%) and, in six of the eight years, overall waste generation has actually been higher than it was in 2012. This means that Vermont is still far from meeting the goals of the MMP, of 50% diversion rate per year and waste generation of 1,000 pounds per person per year. The 2020 decreases in disposal and waste generation were most likely related to COVID-19 Pandemic-induced changes to behavior and the economy.

Approach: Tracking the Flow of Vermont's Solid Waste

Within Vermont, public and private solid waste facilities are required to submit annual or quarterly reports to the Solid Waste Management Program ('Program') on the types, amounts, and management of solid waste materials handled by their facility. Facilities include, but are not limited to, transfer stations, material recovery facilities, compost facilities, anaerobic digesters, landfills, and recycling centers. In some cases, estimates from previous detailed analysis of the Vermont's material management system are also used. These alternative data sources are noted throughout the report when they are used. It is likely that this approach to tracking the flow of solid waste throughout the state underrepresents the total amount of solid waste managed within the state. This is particularly true for non-residential waste. Often significant quantities of commercial and industrial waste do not pass through a permitted Vermont facility, as they may be backhauled, recycled/reused/composted/digested/fed to animals out of state, or directly transferred to a market. The Program contracted with DSM Environmental Services, Inc. in 2018 to update the estimates used to represent this 'Direct to Broker' or 'economic recycling' of materials.

The Program believes the data for the final management of the State's disposed materials are the most reliable of all the data. With only one landfill operating within the state and a limited number of transfer stations and material recovery facilities that sell directly to markets or reuse materials, the end-use management data aggregated by these types of facilities has the highest likelihood of being consistently and reliably tracked and reproduced from year to year. The ability to document the source and generation of solid waste is a much more challenging task. With a wider variety of types of facilities and collection points within Vermont, generation data is often incomplete and inaccurate. The Program recognizes that this is an area that can be improved; however, it is unlikely that generation data will be as reliable as the disposal and diversion data within the near future. For this reason, the generation value in this report is calculated based on the summation of the tonnages reported from the final management activities that occur at the statewide scale. In its most simplistic format:

$$\text{Disposal (tons) + Diversion (tons) = Generation (tons)}$$

I. Disposal Activities

Disposal at Vermont Facilities — In 2020 there was one permitted and operating solid waste landfill within Vermont, the New England Waste Services Vermont landfill in Coventry (Table 1). This landfill accepted 84% of the disposed municipal solid waste generated within Vermont (Table 2). The remaining 16% of Vermont’s disposed municipal solid waste was transported, either directly from the source or from a facility, to an out-of-state (OOS) facility (Figure 1, Table 3).

Table 1. Status of Vermont landfills that were permitted for waste acceptance in 2020

| Solid Waste Landfills | Location | Status | Permitted Fill Rate (tons/year) |
|--|----------|---|---------------------------------|
| New England Waste Services, Vermont (NEWSVT): Phase VI | Coventry | Operating | 600,000 |
| Northwest Solid Waste District – Sheldon: Cell 1 | Sheldon | Permitted, not operating, no current plans for construction | 20,000 |

Table 2. In-state and Out-of-State (OOS) materials disposed *within* Vermont landfills, as reported in 2020

| | Total Tons (as reported by disposal facilities) | OOS Tons | VT Tons (Total tons minus OOS tons) |
|-------------------|--|---------------|---|
| MSW | 378,307 | --- | 378,307 |
| C&D | 12,743 | 8,823 | 3,920 |
| Sludge (WWTP) | 38,304 | 24,701 | 13,602 |
| Asbestos | 7,710 | 6,961 | 749 |
| Ash | 4 | 0 | 4 |
| Contaminated Soil | 13,593 | 7,575 | 6,017 |
| Sewer Grit | 1,155 | 93 | 1,062 |
| Paper Sludge | 2,724 | --- | 2,724 |
| Medical Waste | 129 | --- | 129 |
| Other | 41,503 | 35,111 | 6,392 |
| TOTAL | 496,170 | 83,265 | 412,905 |

Disposal Occurring Out-of-State — Information about Vermont waste that is disposed out-of-state (OOS) is derived from two sources. Facilities report the quantity of materials that they have sent OOS for final management and some data comes from haulers that haul solid waste directly OOS without passing through a reporting Vermont facility. To help gather data and ensure compliance with the statewide collection of the franchise fee (the \$6 per ton fee on Vermont generated waste sent for disposal), an annual independent reviewer is contracted by the Program to collect data from OOS facilities and from haulers that manage Vermont solid waste. The reviewer reports these values annually to the Program and this information is combined with the Vermont facility reports to derive the OOS transport tonnage.

Table 3. Solid waste sourced in Vermont but sent for management at an Out-of-State facility in 2020

| | Massachusetts | New Hampshire | New York | Total |
|-----|---------------|---------------|----------|--------|
| MSW | --- | 29,601 | 44,398 | 73,999 |
| C&D | --- | 11,831 | 5,322 | 17,152 |

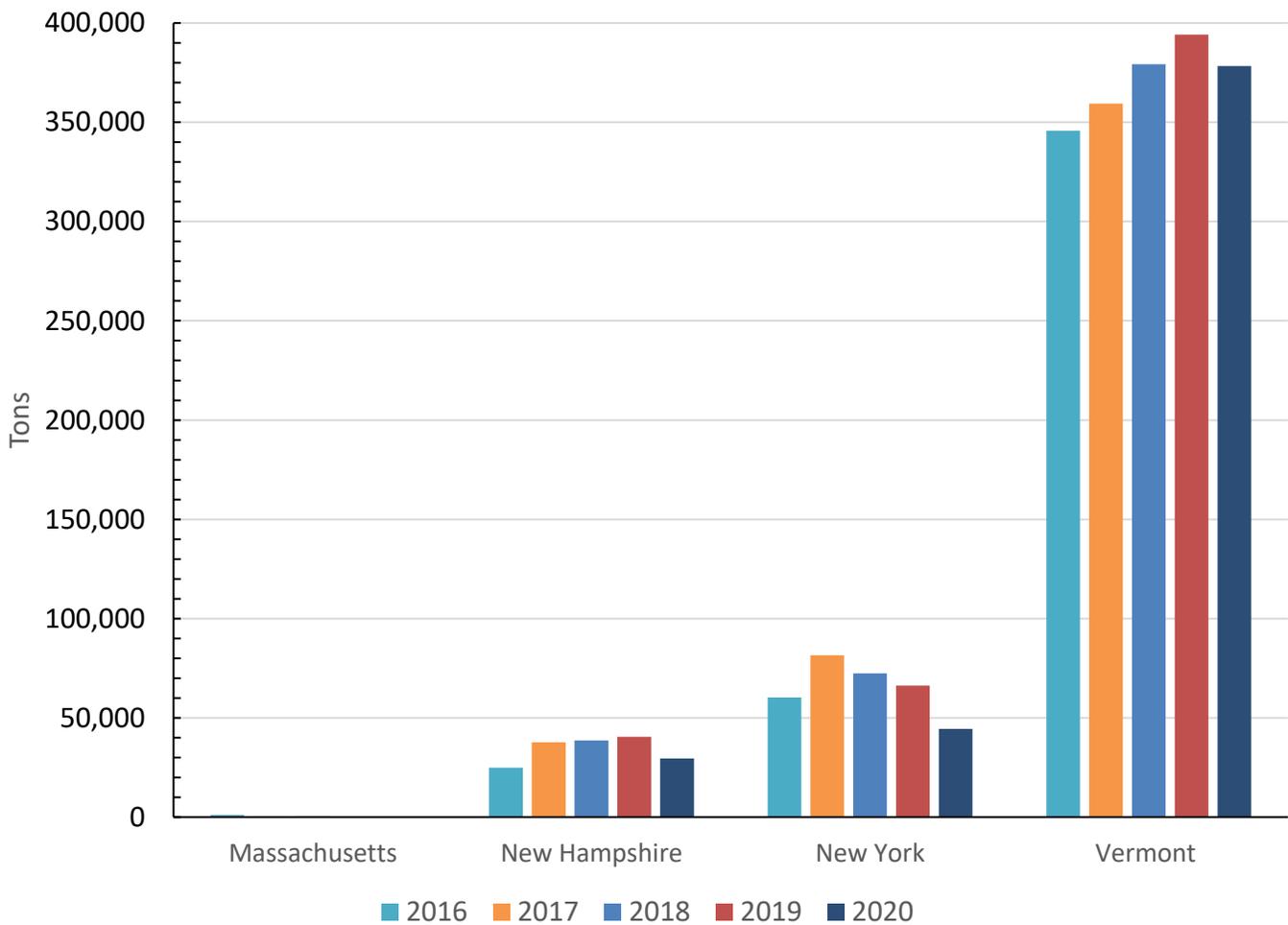


Figure 1: Destination of disposed MSW that was generated in Vermont in 2020, with recent years for comparison.

Beneficial Use in Vermont Landfills — In addition to the disposal of materials within Vermont’s landfills, there are several material types that can be used for landfill operations (Table 4). These materials are used in place of virgin materials for daily cover and operations, and although their ultimate end use is within the airspace of the landfill, they are classified as beneficial use. Materials that are used beneficially in the landfill are not included in MSW disposal or diversion tonnages.

Table 4. Beneficial use of solid waste materials within Vermont landfill operations in 2020

| Material | Use | Tonnage |
|--------------------------|----------------------------------|----------------|
| Paper Sludge | Landfill Alternative Daily Cover | 333 |
| Contaminated Soils | Landfill Alternative Daily Cover | 6,125 |
| Sludge – cut with soil | Landfill Alternative Daily Cover | 2,078 |
| Sand Blast Grit | Landfill Alternative Daily Cover | 17 |
| Wood Waste | Landfill Road Base | 609 |
| Asphalt, Brick, Concrete | Landfill Road Base | 0 |
| Processed C&D | Landfill Road Base | 4,095 |
| Sawdust | Landfill Road Base | 992 |
| Total | | 14,249 |

Adjusting MSW for Construction & Demolition Debris — Some Construction and Demolition (C&D) materials are tracked separately from MSW, and are reported as being sent for disposal, beneficial use, or diversion. However, loads of disposal materials are often co-mingled at transfer facilities and reported solely as MSW, though the load may contain C&D. It is often difficult to separate these materials from the municipal solid waste (MSW) stream given the current materials management systems in the state.

For this reason, the results of the 2018 waste characterization study prepared for the State of Vermont by DSM Environmental are used to estimate the C&D and MSW percentages of all materials reported as disposed (Table 5). Manual and visual separation of MSW materials during the waste composition study indicated that 11.1% of MSW consisted of C&D waste (2018, DSM Environmental, et al.).

Table 5. Adjustment of MSW tonnage for estimated C&D component

| | Reported Tonnages | C&D tonnage (11.1% of reported MSW) | Remaining MSW Tonnage |
|-----------------------------------|--------------------------|--|------------------------------|
| Vermont MSW In-state Disposal | 378,307 | 41,992 | 336,315 |
| Vermont MSW Out-of-State Disposal | 73,999 | 7,876 | 65,785 |
| Total Vermont MSW Disposal | | | 402,100 |

II. Diversion Activities

Materials are diverted from the landfill through a variety of pathways in Vermont. While the Solid Waste Management Program has reliable reporting systems in place for some components of these diversion pathways, others are not directly reported and require approximation. Broadly, there are four principal avenues of material diversion which are accounted for by this report (Table 6):

Group A – From a Reporting Facility to a Market

As with the disposal data, most of the state's diversion data comes from facilities that self-report the flow of diverted materials. Within Vermont there are two large material recovery facilities (MRF's) that manage the majority of diverted recyclable materials. These facilities collect, sort, and process materials for distribution to recycling markets. As permitted solid waste facilities, they report quarterly to the Solid Waste Program. Additionally, some materials that are collected by transfer stations and recycling centers do not require further separation and can be sold directly by the collection facility to market. One hundred ten collection facilities reported selling some type of material directly to a market.

In 2020, there were twelve compost facilities within the State that were certified by the Program to process food scraps and/or leaf and yard debris and other organic materials.

Construction and demolition (C&D) materials are also tracked in Group A. Historically, C&D materials have been excluded from the materials tracked in the diversion tonnages. These materials are difficult to track due to the significant reuse of materials occurring outside of the Solid Waste system. However, in late 2013, the State's first dedicated C&D recycling facility opened, and several other solid waste facilities have since adopted more active separation programs to collect and market the valuable C&D materials. In July of 2014, the Vermont Legislature passed Act 175 which mandated the recycling of architectural waste, a subset of construction and demolition waste (i.e. scrap metal, asphalt shingles, clean wood, drywall, plywood, and oriented strand-board) for commercial and multi-unit residential building projects that produce over 40 cubic yards of architectural waste and are within 20 miles of a C&D recycling facility. Recycling markets for C&D materials have fluctuated significantly since 2014 and architectural waste facilities have adjusted to these fluctuations by altering the types and volumes of materials that they are capable of managing. In addition to variability in the amount of C&D generated, which is impacted by economy and local development patterns, changes in the reported tonnages by these architectural waste facilities reflect both changes to the market and changes in the operations, which can vary substantially year to year. Further, the difficulty of distinguishing C&D from other waste types in mixed loads may cause misreporting.

Group B – Estimate of Direct to Broker or Market (Economic Recycling)

In some cases, the recovery of materials occurs directly between business entities and brokers, thereby bypassing a reporting Vermont solid waste facility. For example, a supermarket may sell and ship large quantities of cardboard directly to a broker, instead of hiring a hauler, because it makes economic sense for a business of this scale to sell its recyclables directly. In the 2018 Vermont Waste Characterization Study (2018, DSM Environmental et al.), a survey of Vermont employers and manufacturing facilities identified and estimated the amount of recyclable materials that were either backhauled or sold directly to a broker by the business sector. On the basis of an extrapolated survey, this study estimated the tonnage of fibers, containers, and scrap metal delivered directly to a broker or market in 2018. Because economic recycling has been shown to be a significant contributor to the diversion of materials, estimates have been included in the annual Vermont Diversion and Disposal Report since the completion of the first estimate of economic recycling in a 2001 study (2001, DSM Environmental). This is the second Diversion and Disposal Report to use the updated economic recycling numbers from the 2018 study. The other category of material types sent directly to a broker without passing through a Vermont solid waste facility is the estimated 17,480 tons of beverage containers collected and processed through the Vermont Bottle Bill

for distribution to market (Table 40; 2013, DSM Environmental). As Vermont redemption centers are not considered solid waste facilities, they are not required to report annual tonnages on this important diversion activity.

Group C – *Reported Reuse Activities*

There are numerous reuse, resale, and repair businesses throughout Vermont; however, the diversity of material reused across the State makes estimates of this activity difficult, highly variable, and inaccurate. For that reason, this report is limited to listing reuse totals derived from facility reporting. In other words, only materials collected at permitted solid waste facilities for the purpose of local reuse are captured. As an example, the reuse listed here includes intact building materials, like cabinets, and used clothing. Reported reuse does not capture the vast amount of materials that are taken from the point of generation (residences, businesses, etc.) directly to a reuse or salvage store, or re-purposed at the point of generation.

Group D – *Estimated Household Composting*

Significant diversion of food waste and leaf and yard waste occurs at home without material being handled by a solid waste facility. Home composting of both food waste and leaf and yard waste is anticipated to significantly contribute to the state's long-term diversion goals. In 2018, DSM Environmental et al. characterized the amount of food waste diverted annually by each Vermont household through an analysis of a representative, statewide survey. They estimated that 58% of Vermont households compost an average of 367 pounds of food waste annually. A similar 2001 study evaluated Chittenden County household leaf and yard waste diversion through home composting (2002, DSM Environmental). This survey estimated that 250 pounds of yard waste was composted by 39% of the surveyed households. These estimates, derived from these survey results, are the current best estimates available for calculating a rough value of the tonnage diverted by home composting. With the advent of Universal Recycling within the State, home composting is likely to continue increasing as a diversion tool and these estimates will have to be revised as studies and data are available.

Table 6. Summary of Vermont’s 2020 diversion activities

| (in tons) | Fibers | Containers | Single Stream | C&D | Scrap Metal | Organics | Foodbank Food Rescue | Miscellaneous |
|--|--------------------------------|-------------------------------|---------------|--------------|--------------------|--|----------------------|--------------------|
| A- From Reporting Facility to Market | 65,651 | 19,575 | 1,474 | 3,724 | 13,810 | 12,787 | | 74 |
| B- Estimate of Direct to Broker or Market (Economic Recycling) | 20,707 [†] | 17,480* 2,686 [†] | | | 1,616 [†] | 2,552 [†] | | 1,159 [†] |
| C- Reported Reuse Activities | 444 | 182 | | 65 | | | 4,369 | 107 |
| D- Estimated Household Composting | | | | | | 17,061 [§] 37,246 [†] | | |
| TOTALS | 86,802 | 39,923 | 1,474 | 3,789 | 15,426 | 69,646 | 4,369 | 1,340 |
| | A + B + C + D = 222,769 | | | | | | | |

* Denotes an estimate derived from the System Analysis of the Impact of Act 148 on Solid Waste management in Vermont (2013, DSM Environmental Services, Inc.)

[†] Denotes a food waste diversion estimate derived from the 2018 Vermont Waste Characterization Report (2018, DSM Environmental). See above descriptions of the diversion groups for details.

[†] Denotes values determined from tonnages provided by the Vermont Foodbank.

[§] Denotes a leaf and yard waste diversion estimate derived from the Vermont’s Municipal Solid Waste Diversion Rate 2001 study (2002, DSM Environmental). See above descriptions of the diversion groups for details.

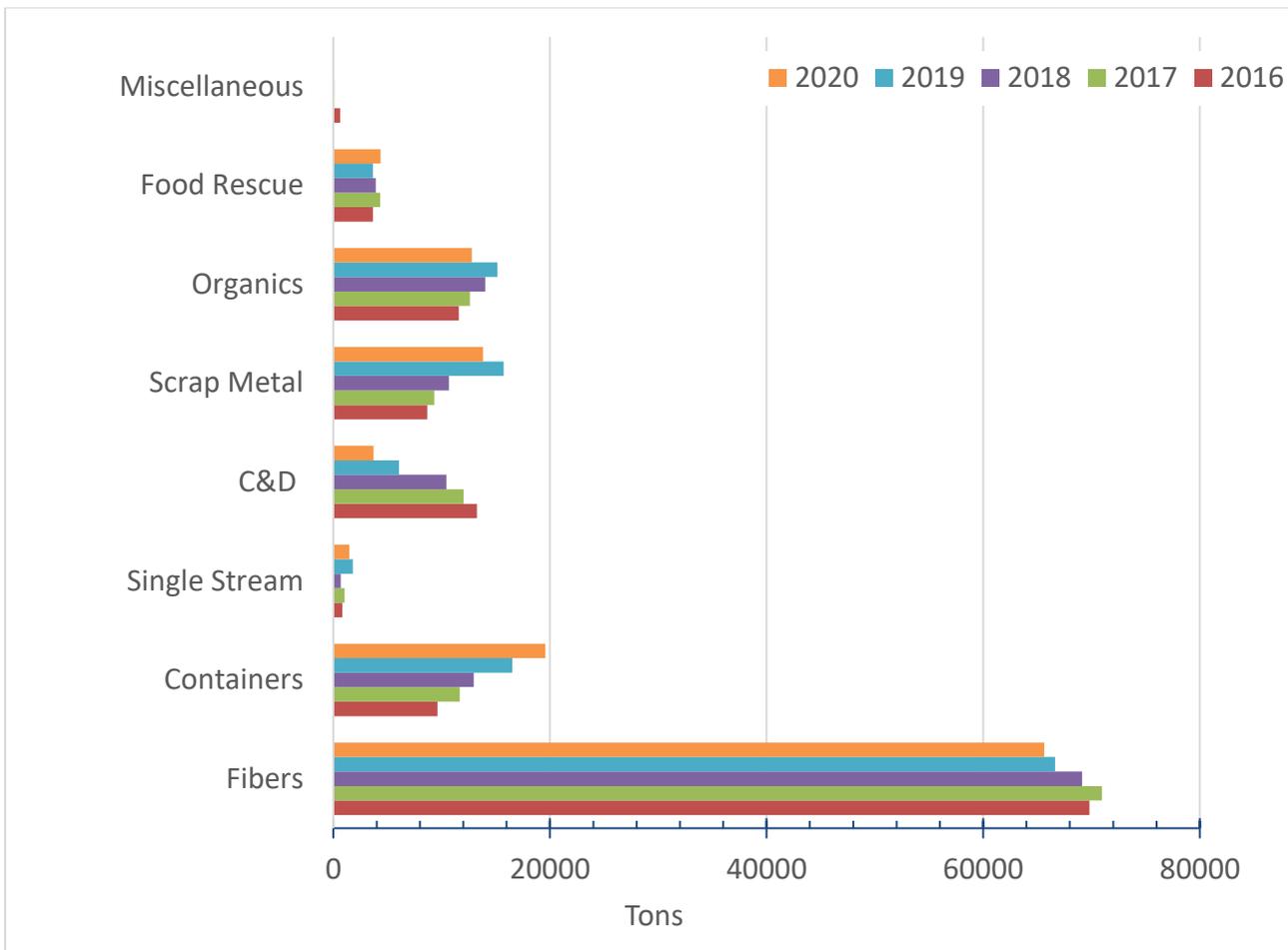


Figure 2: 2016-2020 comparison of materials marketed directly from Vermont solid waste facilities (Group A from Table 6 and Food Rescue).

Figure 2 displays the composition of diverted materials sold or donated to market year-to-year. Comparing diversion tonnages by material type helps the Program consider the impacts of market conditions on recycling/composting/donation activity in Vermont. Overall, the total tonnage of diverted material decreased from 2019 to 2020. It is also important to remember that the total tonnage of diverted materials changes each year as generation fluctuates. When considering the progress of recycling efforts in Vermont, the percent of materials diverted is a better metric than the total tonnage.

III. Total Municipal Solid Waste Generation and Summary

On the basis of the previously stated formula:

$$\text{Disposal} + \text{Diversion} = \text{Generation}$$

Vermont generated **624,869 tons** of municipal solid waste materials in 2020. Total MSW disposal (adjusted to remove C&D component) was 402,100 tons, a sizable decrease of 43,126 tons from 2019, while diversion decreased only modestly by 2,353 tons to 222,769 tons.

While this figure is an under-representation of the complete material management tonnages for the state, it does represent the components that the Solid Waste Program can accurately and consistently track year to year for meaningful comparisons. It should be noted, when reviewing per capita values within Table 7 below, that the 2020 United States Census

data resulted in a significant population increase, relative to the previous years' estimates. This, in addition to the decreased waste generation rates, results in notably lower per capita generation, disposal and diversion values.

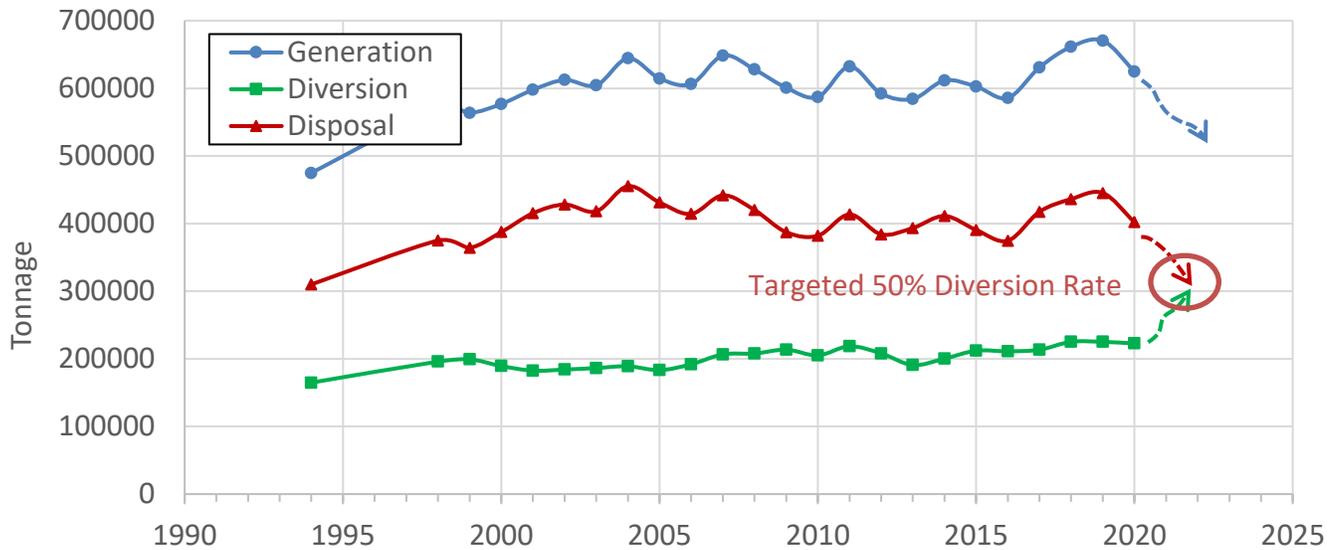


Figure 3: Projections of waste generation, diversion, and disposal with the implementation of Universal Recycling over the coming years.

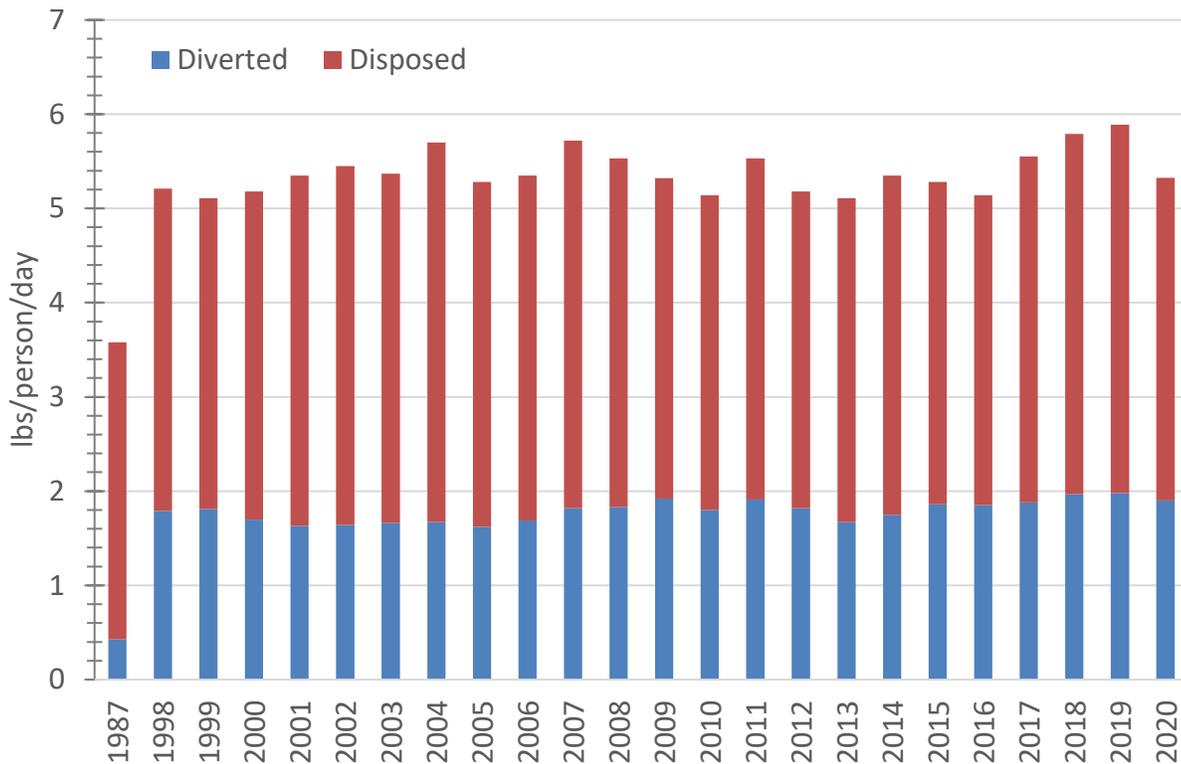


Figure 4: Pounds of waste generated per day per person (disposed + diverted) by Vermonters

Table 7. Vermont generation, diversion and disposal totals for municipal solid waste. Includes tonnages, per capita breakdowns and percentage rates.

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------------------|---------|---------|
| Generation | 579,689 | 571,446 | 613,517 | 592,981 | 566,042 | 552,297 | 597,254 | 557,302 | 584,235 | 611,472 | 602,617 | 585,789 | 630,851 | 661,385 *673,403 | 670,348 | 642,869 |
| Diversion | 148,459 | 157,173 | 171,818 | 173,024 | 178,796 | 170,326 | 183,737 | 173,258 | 190,797 | 200,272 | 212,065 | 211,152 | 213,449 | 225,219 *237,237 | 225,122 | 222,769 |
| Disposal | 431,230 | 414,273 | 441,699 | 419,957 | 387,246 | 381,971 | 413,517 | 384,044 | 393,438 | 411,200 | 390,552 | 374,637 | 417,402 | 436,166 | 445,226 | 402,100 |
| Population [1] | 619,736 | 620,778 | 621,254 | 621,270 | 621,750 | 625,741 | 626,592 | 625,953 | 626,630 | 626,562 | 626,042 | 624,594 | 623,657 | 626,299 | 623,989 | 643,077 |
| Per Capita MSW Generation (Tons/Year) | 0.94 | 0.92 | 0.99 | 0.95 | 0.91 | 0.88 | 0.95 | 0.89 | 0.93 | 1.0 | 0.96 | 0.94 | 1.01 | 1.08 | 1.08 | 0.97 |
| (Pounds/Day) | 5.13 | 5.04 | 5.41 | 5.23 | 4.99 | 4.84 | 5.22 | 4.88 | 5.11 | 5.35 | 5.27 | 5.14 | 5.54 | 5.89 | 5.88 | 5.30 |
| Per Capita MSW Diversion (Tons/Year) | 0.24 | 0.25 | 0.28 | 0.28 | 0.29 | 0.27 | 0.29 | 0.28 | 0.30 | 0.32 | 0.34 | 0.34 | 0.34 | 0.38 | 0.36 | 0.35 |
| (Pounds/Day) | 1.31 | 1.39 | 1.52 | 1.53 | 1.58 | 1.49 | 1.61 | 1.52 | 1.67 | 1.75 | 1.86 | 1.85 | 1.88 | 2.08 | 1.97 | 1.90 |
| Per Capita MSW Disposal (Tons/Year) | 0.70 | 0.67 | 0.71 | 0.68 | 0.62 | 0.61 | 0.66 | 0.61 | 0.63 | 0.66 | 0.62 | 0.60 | 0.67 | 0.70 | 0.71 | 0.62 |
| (Pounds/Day) | 3.81 | 3.66 | 3.90 | 3.70 | 3.41 | 3.34 | 3.62 | 3.36 | 3.44 | 3.60 | 3.41 | 3.29 | 3.67 | 3.82 | 3.91 | 3.40 |
| | | | | | | | | | | | | | | | | |
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| Generation | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Diversion | 26% | 28% | 28% | 29% | 32% | 31% | 31% | 31% | 33% | 33% | 35% | 36% | 34% | 34% | 34% | 36% |
| Disposal | 74% | 72% | 72% | 71% | 68% | 69% | 69% | 69% | 67% | 67% | 65% | 64% | 66% | 66% | 66% | 64% |

[1] Population Estimate, Vermont. US Census: <http://census.gov>

* There was an error in the 2018 diversion data. The corrected value is above.

IV. Other Material Management Activities – Not included in disposal or diversion tonnages

Hazardous Waste

Household hazardous waste (HHW) and conditionally exempt generator (CEG) hazardous waste is collected and managed at several fixed full-time facilities in the state and at numerous collection events, 77 in 2020, hosted by municipalities throughout the year (fewer events were held than in a typical year, due to the COVID-19 pandemic). Information on the materials collected over the course of the year is reported through the ReTRAC™ online reporting system similar to the solid waste facility reporting, as described earlier. This data is summarized in an annual HHW Survey Results report (Appendix A). A total of 788 tons of combined HHW and CEG materials were collected in 2020, a decrease over the 935 tons collected in 2019 (Table 8). It is important to note that the values reported within the HHW Survey Results only reflect material collected at fixed HHW facilities and events. These numbers do not capture all the HHW that is collected through extended producer responsibility programs as reported upon below.

Table 8. Summary of historic hazardous waste collections and participation

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--|------|------|------|------|------|------|------|-------|------|------|------|------|
| Total HHW and CEG tons | 566 | 489 | 467 | 460 | 525 | 452 | 899 | 1,069 | 865 | 906 | 935 | 788 |
| % Participating VT Households | 8% | 6% | 7% | 9% | 7% | 7% | 6% | 8% | 10% | 9% | 11% | 7% |
| Pounds Collected per Household (avg.) | 45 | 46 | 47 | 34 | 62 | 102 | 131 | 86 | 60 | 60 | 55 | 80 |

Mercury Programs

In 2007, Act 149 banned the knowing disposal of products containing mercury within Vermont landfills. Extended Producer Responsibility (EPR) programs for collection and recycling of mercury were established for thermostats in 2008 and for some mercury-containing lamps in 2012.

Mercury-containing thermostats are collected and reported on by the Thermostat Recycling Corporation to the State of Vermont. This program collected 13.2 pounds of mercury in 2020 from 1,897 thermostats.

Mercury-containing lamps that are covered by the EPR program are collected, recycled, and reported on by the National Electrical Manufacturers Association (NEMA). During 2020, NEMA collected and recycled 1.39 pounds of mercury from 144,751 mercury-containing lamps and bulbs. Mercury-containing lamps that are not covered by the EPR program and lamps that are covered by the program and collected by municipalities are categorized as household hazardous waste in this report.

Table 9. Summary of historic mercury collections

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------------------|-------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| # Mercury Lamps | | | 125,361 | 154,157 | 205,155 | 233,820 | 191,060 | 158,079 | 209,400 | 186,652 | 144,751 |
| # Mercury Thermostats | 3,349 | 3,574 | 3,036 | 2,111 | 2,169 | 2,000 | 2,246 | 2,468 | 2,369 | 2,069 | 1,897 |

Vermont Electronic Recycling Program

The Vermont Electronic Recycling Program (E-cycles) was first implemented in July of 2011. This program provides no-cost electronic device recycling for covered entities and devices. During the 2020 collection period, 1,514 tons of e-waste were collected.

Table 10. Summary of historic electronics collections

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Lbs Electronics | 4,819,602 | 4,865,266 | 4,888,400 | 4,897,778 | 4,814,188 | 4,312,381 | 3,685,448 | 3,460,051 | 3,028,996 |

Batteries

In 2014, Vermont became the first state to require manufacturers to fund recycling of single-use batteries, with the passage of the Vermont Primary Battery Stewardship Law. The law requires producers of primary batteries (non-rechargeable batteries) sold in Vermont to register with Vermont Department of Environmental Conservation (DEC) and provide a stewardship plan to manage the proper recycling and/or disposal of primary batteries sold in Vermont. A Primary Battery is a non-rechargeable battery weighing two kilograms or less, including alkaline, carbon-zinc, and lithium metal batteries. Producers may choose to submit an individual stewardship plan or participate in a shared stewardship plan. Currently, most producers who sell in Vermont are under a shared stewardship plan which is implemented by the stewardship organization Call2Recycle.

Call2Recycle implements both the primary (non-rechargeable) battery stewardship program mandated by Vermont law and the manufacturer-led voluntary rechargeable battery collection program. This allows for both types of batteries to be collected at no cost to consumers in Vermont in convenient locations throughout the state. There are over 100 collection sites available in Vermont for battery recycling which offers 98% of Vermont residents and businesses access to a collection site within 10 miles of their home or business. The stewardship program is funded by battery producers who pay fees based upon their Vermont sales.

During the 2020 collection year, Call2Recycle collected 146,397 pounds of batteries (101,275 lbs primary and 45,122 lbs rechargeable), 12% less than Call2Recycle collected in 2019.

Table 11. Summary of historic battery collections

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------------------------|--------|--------|--------|--------|---------|---------|
| Lbs Primary Batteries | 3,350 | 64,366 | 81,381 | 94,424 | 113,451 | 101,275 |
| Lbs Rechargeable Batteries | 36,477 | 52,617 | 52,238 | 51,677 | 53,426 | 45,122 |

PaintCare

In May of 2013, the Vermont Legislature passed paint product stewardship legislation (Act 58) that establishes free paint collection sites at retailers and permitted solid waste facilities across the State, funded by a small fee appended to paint

sales in Vermont. This program is implemented by a stewardship organization called PaintCare, who worked with the Solid Waste Program in 2013 to develop the final Vermont Paint Stewardship Program Plan. The program officially launched on May 1, 2014. An annual report is due to the Program by October of each year, with a reporting period of July 1-June 30th. During this fourth collection period, July 1, 2019 to June 30, 2020, 99,838 gallons were collected. While this is a 13% decrease from the previous year, it is still a significant increase over the average annual collection of 60,000 gallons that occurred in years prior to implementation of the PaintCare program. 73% of the paint collected that year was latex paint, and 24% of the latex paint was unusable and sent to landfill. The rest of the paint collected was recycled, reused, or used as fuel.

Table 12. Summary of historic paint collections

| | 2013-2014 | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 | 2019-2020 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Gallons of Paint | 60,000 | 116,691 | 108,466 | 96,109 | 110,567 | 115,142 | 99,838 |

Appendix A: Household Hazardous Waste Report

SUMMARY OF 2020 VERMONT HHW/CEG WASTE PROGRAMS

All Solid Waste Districts and Alliances, in alphabetical order

| HHW/CEG Material Collected (all materials in tons) [†] | | All Solid Waste Districts and Alliances, in alphabetical order | | | | | | | | | | | | | | |
|--|-----------------------------|--|--|----------------------|----------------|---------------|-------------------|---------------|-------------------|-----------------------|----------------|--------------------------------------|----------------------|-----------------------|-------------|----------------------|
| | | Addison SWMD | Bennington County Solid Waste Alliance | Central Vermont SWMD | Chittenden SWD | Lamoille SWMD | Londonderry Group | Mad River RMA | Mountain Alliance | Northeast Kingdom WMD | Northwest SWMD | Rutland County SWD (includes Starks) | Solid Waste Alliance | Southern W/V Counties | Windham SWD | White River Alliance |
| 1 | Acids | 0.62 | 0.32 | 0.68 | 2.41 | 0.45 | 0.18 | 0.21 | 0.05 | 0.20 | 0.23 | 0.22 | 0.03 | 0.31 | 0.16 | 0.14 |
| 2 | Aerocoles | 1.14 | 1.32 | 1.55 | 10.08 | 1.99 | 0.38 | 0.37 | 0.60 | 0.48 | 0.23 | 1.76 | 0.37 | 2.15 | 0.44 | 0.63 |
| 3 | Bases | 0.84 | 0.35 | 0.81 | 3.15 | 0.57 | 0.18 | 0.21 | 0.10 | 0.41 | 0.50 | - | - | 0.27 | 0.17 | 0.27 |
| 4 | Fire Extinguishers | - | 0.18 | 0.94 | - | 0.01 | - | - | - | 0.15 | - | - | - | 0.10 | - | - |
| 5 | Flammables & Solvents | 13.20 | 3.16 | - | 33.27 | 5.53 | 1.11 | 0.69 | 0.80 | 10.21 | 1.37 | 2.53 | 0.96 | 4.18 | 3.63 | 1.88 |
| 6 | Glycols (Antifreeze) | 2.42 | - | - | 5.90 | - | - | - | - | 1.04 | 0.40 | 1.01 | - | - | 0.15 | - |
| 7 | Oxidizers | 0.18 | 0.45 | 0.18 | 0.62 | 0.13 | 0.01 | 0.21 | 0.05 | 0.14 | - | 0.02 | 1.43 | 0.05 | - | 0.02 |
| 8 | Lead Paint Chips & Debris | 0.54 | - | 0.01 | 0.29 | - | - | - | - | - | - | - | - | 0.11 | - | - |
| 9 | Paints - Latex | 33.45 | 7.91 | 7.41 | 111.58 | - | - | - | - | 12.55 | 20.31 | 6.55 | 0.81 | - | 0.35 | - |
| 10 | Paints - Oil | 13.71 | 3.78 | 2.85 | 33.01 | - | - | 1.46 | - | 4.06 | 10.63 | 0.31 | 0.53 | - | - | - |
| 11 | Paints - Oil + Latex, Mixed | - | - | - | - | 0.48 | - | 5.17 | - | - | - | 11.75 | 2.65 | - | - | - |
| 12 | Paints - Non-process Resins | 6.51 | 4.06 | 10.61 | 17.19 | 2.95 | 1.64 | 0.37 | 1.00 | 5.17 | 0.46 | 1.91 | 0.74 | 6.64 | - | 1.11 |
| 13 | Pesticides | 3.06 | 3.39 | - | 10.64 | 2.24 | 0.60 | 0.33 | 1.00 | 0.81 | 0.72 | 0.64 | 0.60 | 1.29 | - | 1.46 |
| 14 | Propane Tanks | 2.74 | 0.41 | - | - | 0.02 | - | 0.04 | - | 28.26 | - | 6.34 | 0.08 | - | - | - |
| 15 | Reactives | 0.18 | - | 0.04 | 0.00 | - | - | - | - | - | - | - | - | 0.01 | - | - |
| 16 | Toxics | 0.23 | 0.38 | - | 0.30 | - | - | 0.04 | - | - | - | - | - | 0.01 | 1.06 | - |
| 17 | Photo Chemicals | - | - | - | 0.23 | - | - | - | - | 0.02 | - | - | - | - | - | - |
| 18 | Waste Oil - Uncontaminated | 13.01 | - | 0.48 | 14.75 | 0.21 | - | 2.28 | - | 8.14 | 0.80 | 4.25 | 0.09 | 0.21 | - | - |
| 19 | Waste Oil - Contaminated | - | - | - | - | - | - | - | - | - | - | - | - | 1.04 | - | - |
| 20 | Waste Oil - City Debris | 1.92 | - | 0.16 | 3.99 | 0.63 | 0.03 | - | - | 0.21 | 0.07 | 0.44 | - | 0.52 | - | - |
| 21 | Waste Oil - Oil Filters | 2.58 | - | - | 1.25 | - | - | - | - | 1.41 | - | - | - | - | - | - |
| 22 | City Water | 1.76 | - | 3.65 | 2.47 | 0.63 | 0.42 | - | - | - | 1.52 | - | - | - | - | - |
| 23 | Mercury - Fluorescent Tubes | 5.83 | 0.06 | - | 14.78 | - | - | 0.10 | - | 0.88 | 0.99 | 2.45 | - | - | - | 0.10 |
| 24 | Mercury - Other Lamps | - | 0.10 | - | - | - | - | - | - | 0.59 | - | 1.53 | 0.06 | - | - | 0.11 |
| 25 | Mercury - Added Products | - | 0.02 | 0.00 | 0.33 | - | 0.01 | 0.02 | - | - | - | 0.03 | - | 0.01 | - | - |
| 26 | Mercury - Elemental | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 27 | Mercury - Compounds | - | - | 0.00 | - | 1.11 | - | - | - | - | 0.01 | - | 0.00 | - | - | - |
| 28 | Primary Batteries | 3.91 | 0.35 | - | 16.79 | - | - | 0.11 | - | 4.71 | 0.22 | 0.45 | 0.04 | - | - | 0.02 |
| 29 | Rechargeable Batteries | 13.18 | - | - | - | - | - | 0.02 | - | 1.12 | 0.14 | - | - | - | - | - |
| 30 | Lead-Acid Batteries | 3.44 | 0.10 | - | 2.34 | - | - | 0.21 | - | 12.18 | 0.23 | 3.09 | - | - | - | 0.21 |
| 31 | Other misc. products | 0.36 | 0.15 | 3.70 | 13.68 | 0.06 | 0.05 | 0.04 | 0.10 | - | 0.68 | 4.19 | 1.53 | 0.55 | - | - |
| Demographics | | | | | | | | | | | | | | | | |
| Occupied Households in Area ^{††} | | 13,798 | 14,549 | 22,664 | 61,815 | 10,906 | 1,478 | 5,044 | 5,092 | 19,751 | 19,824 | 19,953 | 5,786 | 13,656 | 15,381 | 3,971 |
| Program Profiles | | | | | | | | | | | | | | | | |
| Number of Events Held | | 0 | 2 | 5 | 0 | 2 | 2 | 1 | 1 | 8 | 3 | 32 | 3 | 2 | 2 | 2 |
| # of households served | | 2821 | 487 | 684 | 6905 | 471 | 253 | 354 | 85 | 578 | 1500 | 971 | 184 | 530 | 230 | 182 |
| # of businesses served | | 84 | 0 | 4 | 518 | 8 | 2 | 21 | 0 | 2 | 58 | 58 | 11 | 0 | 3 | 0 |
| % household participation | | 20% | 3% | 3% | 11% | 4% | 17% | 7% | 2% | 3% | 8% | 5% | 3% | 4% | 1% | 5% |
| Total HHW/CEG (tons) | | 124.80 | 28.47 | 33.08 | 299.04 | 16.41 | 4.58 | 11.85 | 3.70 | 92.71 | 38.54 | 49.48 | 9.82 | 17.44 | 5.95 | 5.84 |
| Total CEG Collected (tons) | | 6.01 | - | 2.00 | 108.43 | 0.98 | 0.13 | 0.84 | - | 0.83 | 0.14 | - | 2.88 | - | 0.21 | - |
| Total HHW Collected (tons) | | 118.79 | 28.47 | 31.08 | 190.80 | 15.43 | 4.47 | 11.22 | 3.70 | 91.88 | 38.40 | 49.48 | 7.03 | 17.44 | 5.74 | 5.84 |
| Avg. HHW/per household (tons) | | 0.04 | 0.05 | 0.05 | 0.03 | 0.03 | 0.02 | 0.03 | 0.04 | 0.16 | 0.03 | 0.05 | 0.04 | 0.03 | 0.02 | 0.03 |
| Avg. CEG/per business (tons) | | 0.07 | - | 0.50 | 0.21 | 0.18 | 0.06 | 0.03 | - | 0.42 | 0.003 | - | 0.28 | - | 0.07 | - |

SEE
VERMONT
TOTALS
FOR EACH
MATERIAL
ON PAGE 2

[†] All reported materials are converted to tons using VT Solid Waste Program Combined HHW Conversion Factors. See cover page for details.
^{††} Household estimates were derived from the US Census Bureau: Population, Housing Units, Area and Density: 2010.

SUMMARY OF 2020 VERMONT HHW/CEG WASTE PROGRAMS

All Independent Towns, Shared HHW Events

| HHW/CEG Material Collected (all materials in tons)† | All Independent Towns, Shared HHW Events | | | | | | | | VERMONT TOTALS |
|--|--|--------------------------------------|---------|------------------------------------|--|------------|---------|---------|----------------|
| | Canaan shared with Lemington | Cowenry, Loweral and Newport City | Fairfax | St. Johnsbury shared with Burke | Greater Upper Valley SWD shared with Hartford | Whitingham | Winmail | | |
| 1 Acids | 0.02 | 0.40 | 0.08 | 0.02 | 0.56 | - | 0.08 | 7.4 | |
| 2 Aerosols | 0.12 | - | 0.90 | 0.37 | 1.18 | 0.08 | 0.28 | 25.8 | |
| 3 Bases | 0.06 | - | 0.18 | 0.02 | - | 0.08 | 0.20 | 8.4 | |
| 4 Fire Extinguishers | - | - | - | - | - | - | - | 1.4 | |
| 5 Flammables & Solvents | - | - | 3.60 | 0.99 | 13.82 | 0.22 | 0.44 | 101.6 | |
| 6 Glycols (Antifreeze) | - | - | - | - | - | - | - | 10.9 | |
| 7 Oxidizers | 0.02 | 0.10 | 0.10 | 0.12 | 0.02 | 0.02 | 0.14 | 4.0 | |
| 8 Lead Paint Chips & Debris | - | - | - | - | - | - | - | 1.0 | |
| 9 Paints - Latex | - | - | - | - | - | - | - | 200.9 | |
| 10 Paints - Oil | - | - | - | - | - | - | - | 70.3 | |
| 11 Paints - Oil + Latex, Mixed | - | - | - | 1.13 | - | - | - | 21.2 | |
| 12 Paints - Non-process Resins | 0.22 | - | 3.50 | 0.37 | 4.06 | - | 0.74 | 69.2 | |
| 13 Pesticides | 0.06 | 0.30 | 1.15 | 0.60 | 3.06 | - | 0.44 | 32.4 | |
| 14 Propane Tanks | - | - | - | - | - | - | 0.02 | 37.9 | |
| 15 Reactives | - | - | - | - | 0.10 | - | - | 0.3 | |
| 16 Toxics | - | - | - | - | - | - | - | 2.0 | |
| 17 Photo Chemicals | - | - | - | - | - | - | - | 0.2 | |
| 18 Waste Oil - Uncontaminated | 0.28 | - | - | 0.63 | 0.16 | - | - | 45.3 | |
| 19 Waste Oil - Contaminated | - | - | - | - | 0.13 | - | - | 1.2 | |
| 20 Waste Oil - Oily Debris | - | - | - | - | 0.21 | - | - | 8.2 | |
| 21 Waste Oil - Oil Filters | - | - | - | - | - | - | - | 5.2 | |
| 22 Oily Water | - | - | - | - | - | - | - | 10.4 | |
| 23 Mercury - Fluorescent Tubes | - | 0.05 | 0.25 | 0.03 | - | - | 0.05 | 25.6 | |
| 24 Mercury - Other Lamps | - | 0.03 | 0.10 | - | - | - | - | 2.5 | |
| 25 Mercury - Added Products | - | 0.01 | - | 0.02 | - | - | - | 0.5 | |
| 26 Mercury - Elemental | - | - | - | - | - | - | - | - | |
| 27 Mercury - Compounds | - | - | - | 0.02 | - | - | - | 1.1 | |
| 28 Primary Batteries | - | 0.03 | 0.20 | 0.07 | - | - | - | 28.9 | |
| 29 Rechargeable Batteries | - | - | - | 0.02 | - | - | 0.01 | 14.5 | |
| 30 Lead-Acid Batteries | - | - | 2.50 | 0.16 | - | - | 0.00 | 24.4 | |
| 31 Other misc. products | 0.04 | 0.30 | 0.05 | 0.02 | 1.16 | 0.10 | 0.22 | 27.0 | |
| Demographics | | | | | | | | | |
| Occupied Households in Area†† | 480 | 3,818 | 1,591 | 3,888 | 12,211 | 574 | 343 | 256,582 | |
| Program Profiles | | | | | | | | | |
| Number of Events Held | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 77 | |
| # of households served | 200 | 130 | 318 | 155 | 522 | 17 | 40 | 17,605 | |
| # of businesses served | - | 1 | - | 3 | 3 | - | 1 | 774 | |
| % households served | 41% | 3% | 20% | 4% | 4% | 3% | 12% | 7% | |
| Total HHW/CEG (tons) | 0.82 | 1.21 | 12.60 | 4.58 | 24.48 | 0.50 | 2.82 | 788 | |
| Total CEG Collected (tons) | - | - | - | 0.03 | 0.50 | - | - | 123 | |
| Total HHW Collected (tons) | 0.82 | 1.21 | 12.60 | 4.58 | 23.98 | 0.50 | 2.82 | 665 | |
| Avg. HHW/per household (tons) | 0.00 | 0.01 | 0.04 | 0.03 | 0.05 | 0.03 | 0.07 | 0.04 | |
| Avg. CEG/per business (tons) | - | - | - | 0.01 | 0.17 | - | - | 0.18 | |

† All reported materials are converted to tons using VT Solid Waste Program Combined HHW Conversion Factors.

†† Household estimates were derived from the US Census Bureau: Population, Housing Units, Area and Density: 2010.

Appendix B: Vermont Biosolids Management Statistics for 2020

| 2020 Vermont Sludge & Biosolids Management Statistics* | | | |
|---|-----------------|---------------------|---------------|
| Management Option | In-State | Out-of-State | Totals |
| Volume (Dry Tons) | | | |
| Beneficial Reuse* | 4,607 | 3,225 | 7,832 |
| Landfill Disposal | 3,080 | 651 | 3,732 |
| Total | 7,688 | 3,876 | 11,564 |
| Percentages | | | |
| Beneficial Reuse | 39.8 | 27.9 | 67.7 |
| Landfill Disposal | 26.6 | 5.6 | 32.3 |
| Total | 66.5 | 33.5 | 100.0 |

*Note: 450 dry tons (11.9%) land applied in VT as Class B Biosolids.

| 2020 Vermont Septage Management Statistics | | | |
|---|-------------------|---------------------|-------------------|
| Management Option | In-State | Out-of-State | Totals |
| Volume (Gallons) | | | |
| Land Application | 746,986 | 90,250 | 837,236 |
| Wastewater Treatment Facility Disposal | 41,965,473 | 2,870,537 | 44,836,010 |
| Total | 42,712,459 | 2,960,787 | 45,673,246 |
| Percentages | | | |
| Land Application | 1.6 | 0.2 | 1.8 |
| Wastewater Treatment Facility Disposal | 91.9 | 6.3 | 98.2 |
| Total | 93.5 | 6.5 | 100.0 |

*This table was updated on 2-28-22 to reflect corrected values.