2021 Diversion and Disposal Report

A summary of solid waste management in the State of Vermont

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Solid Waste Management Program

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VERMONT
AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation

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 2021 calendar year. This narrative report summarizes the sources of data used to determine the annual totals and briefly describes the notable changes and trends.

Vermont's solid waste disposal and diversion streams are impacted by several solid waste-related laws and policies. The Universal Recycling law of 2012 aims to increase recycling and composting tonnages and convenience by banning the disposal of mandated recyclables, leaf and yard debris, clean wood, and food scraps from the trash and requiring certain types of trash service providers to offer collection services for these materials. The 2019 Vermont Material Management Plan (MMP) supports these efforts by requiring outreach and education to businesses and schools about recycling, composting, and Vermont's landfill disposal bans. The Single Use Products law (Act 69 of 2019) prohibits or restricts the use of single-use plastic bags, straws, and stirrers, and the sale and use of expanded polystyrene food and beverage containers. Finally, Vermont's five (5) extended producer responsibility (EPR) programs (see Other Material Management Activities section) provide Vermonters with convenient ways to recycle and safely manage mercury light bulbs, mercury thermostats, paint, batteries, and electronics like TVs, computers, and printers.

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 are 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. Additionally, there is some management of materials, such as at-home or on-farm composting or the backhauling of recyclables directly from businesses, that takes place outside of certified solid waste facilities. Because these activities are not reported to the Program, this report relies upon estimates, derived from existing waste composition studies and systems analyses, 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

List of Tables and Figures:

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 2021, Vermonters generated 639,835 tons of municipal solid waste (MSW). This is an increase of 2.4% from the 624,869 tons generated in 2020. Of the solid waste generated, the Vermont materials management system diverted (recycled, reused, composted, etc.) 219,501 tons of material, a 1.5% decrease in diversion over the 222,769 tons diverted in 2020. Vermont disposed of 420,334 tons this past year, a 4.5% increase in disposal over the 402,100 tons disposed in 2020. The resultant 34% diversion rate is analogous 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 2021, Vermonters disposed an average of 1,302 lbs./person/year, as compared to 1,251 lbs./person/year in 2020.

It is positive to see that, while disposal and overall waste generation are higher than in 2020, they are still lower than in 2019. 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 remained relatively constant (the diversion rate in 2012 was 35%) but, in eight of the ten 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.

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. Most of the data in this report are compiled from these certified solid waste facilities. There is some material, however, that does not pass through certified solid waste facilities. In these cases, this report relies on estimates from previous detailed analyses of Vermont's material management system. 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 through 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 in this report. 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 throughout 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:

Disposal (tons) + Diversion (tons) = Generation (tons)

I. Disposal Activities

Disposal at Vermont Facilities — In 2021, 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 85% of the disposed municipal solid waste generated within Vermont (Table 2). The remaining 15% 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 2021.

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 2021.

	Total Tons (as reported by disposal facilities)	OOS Tons	VT Tons (Total tons minus OOS tons)
MSW	401,509	---	401,509
C&D	12,244	9,340	2,904
Sludge (WWTP)	38,689	22,955	15,735
Asbestos	529	179	351
Ash	15	0	15
Contaminated Soil	7,578	6,329	1,249
Sewer Grit	1,858	981	877
Paper Sludge	2,800	---	2,800
Medical Waste	118	---	118
MRF Residue	23,465	23,465	--
Other	6,785	642	6,143
TOTAL	**495,590**	**63,889**	**431,701**

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 2021.

	Massachusetts	New Hampshire	New York	Total
MSW	88	28,125	43,096	**71,308**
C&D	---	7,351	12,086	**19,437**

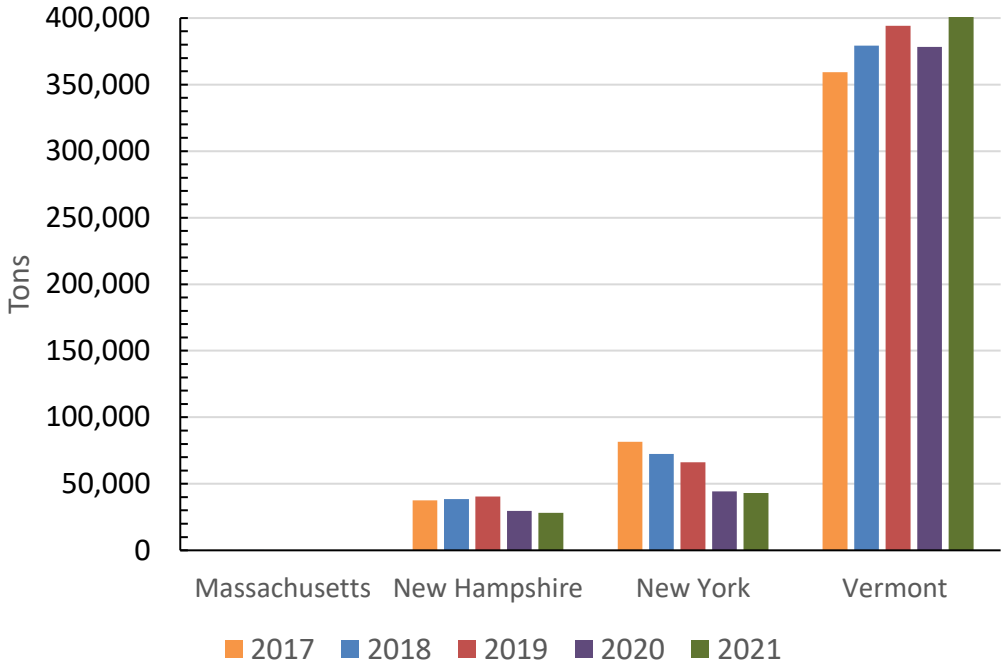


Figure 1: Destination of disposed MSW that was generated in Vermont in 2021, with recent years for comparison.

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 2021.

Material	Use	Tonnage
Paper Sludge	Landfill Alternative Daily Cover	285
Contaminated Soils	Landfill Alternative Daily Cover	15,126
Sludge – cut with soil	Landfill Alternative Daily Cover	2,585
Sand Blast Grit	Landfill Alternative Daily Cover	13
Treated Wood Waste	Landfill Road Base	79
Asphalt, Brick, Concrete	Landfill Road Base	0
Processed C&D	Landfill Road Base	10,520
Sawdust	Landfill Road Base	991
Total		**29,520**

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	401,509	44,568	356,941
Vermont MSW Out-of-State Disposal	71,308	7,915	63,393
Total Vermont MSW Disposal			**420,334**

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 that are accounted for in 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 thirteen (113) collection facilities reported selling some type of material directly to a market.

In 2021, there were twelve (12) 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 difficultly 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. By extrapolating this survey, the 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). 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, re-purposed at the point of generation, or exchanged through yard sales, Front Porch Forum, Buy nothing groups, etc., as these activities are difficult to track or estimate.

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 (or feed animals) 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 implementation of Vermont's Universal Recycling law 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 2021 diversion activities.

(in tons)	Fibers	Containers	Single Stream	C&D	Scrap Metal	Organics	Foodbank Food Rescue	Miscellaneous
A- Reporting Facility to Market	69,456	16,846	364	2,126	12,764	15,018		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	484	354		13			3,521‡	20
D- Estimated Household Composting						16,418§ 35,843†		
TOTALS	**90,647**	**37,366**	**364**	**2,139**	**14,380**	**69,831**	**3,521**	**1,253**
	A + B + C + D = **219,501**							

* Denotes an estimate of Bottle Bill containers diverted as derived from the System Analysis of the Impact of Act 148 on Solid Waste Management in Vermont (2013, DSM Environmental Services, Inc.)
† Denotes a 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.

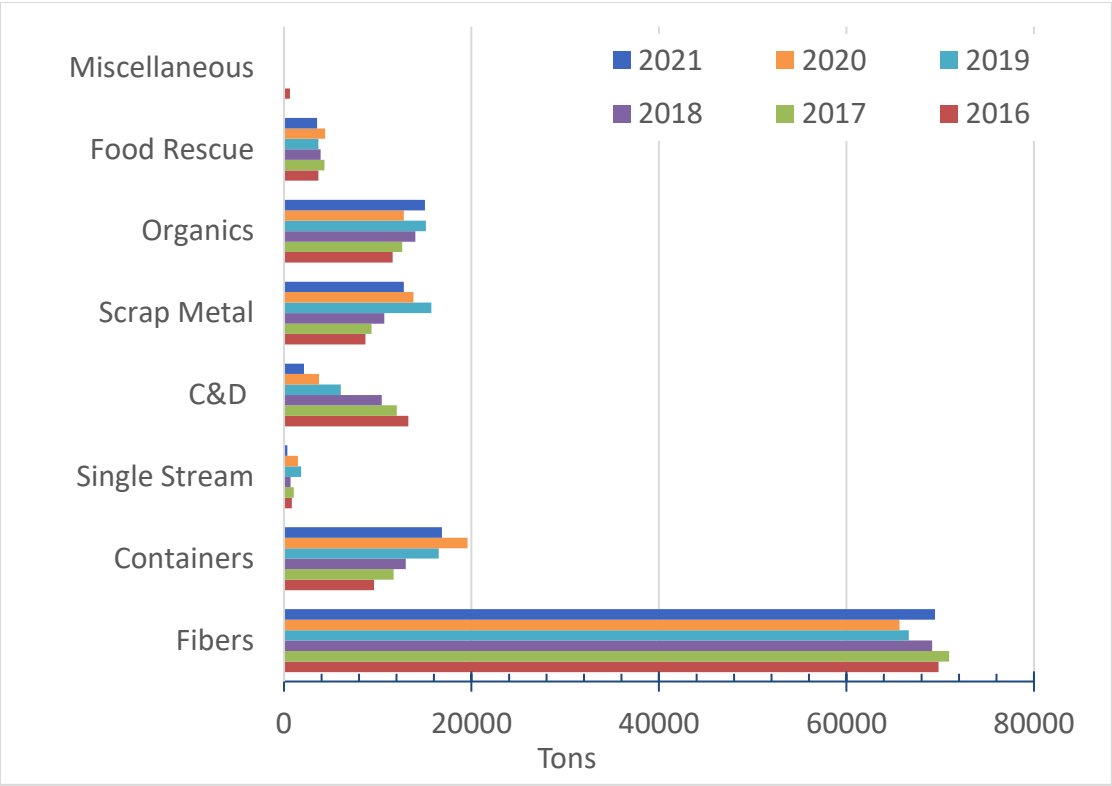


Figure 2: 2016-2021 comparison of materials marketed directly from Vermont solid waste facilities (Group A from Table 6 and Food Rescue).

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 programs, policies, and market conditions on recycling/composting/donation activity in Vermont. Overall, the total tonnage of diverted material decreased slightly from 2020 to 2021.

III. Total Municipal Solid Waste Generation and Summary

On the basis of the previously stated formula:

Disposal + Diversion = Generation

Vermont generated **639,835 tons** of municipal solid waste materials in 2021. Total MSW disposal (adjusted to remove C&D component) was 420,334 tons, an increase of 18,234 tons from 2020, while diversion decreased by 3,268 tons to 219,501 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 compared to 2019, results in notably lower per capita generation, disposal and diversion values.

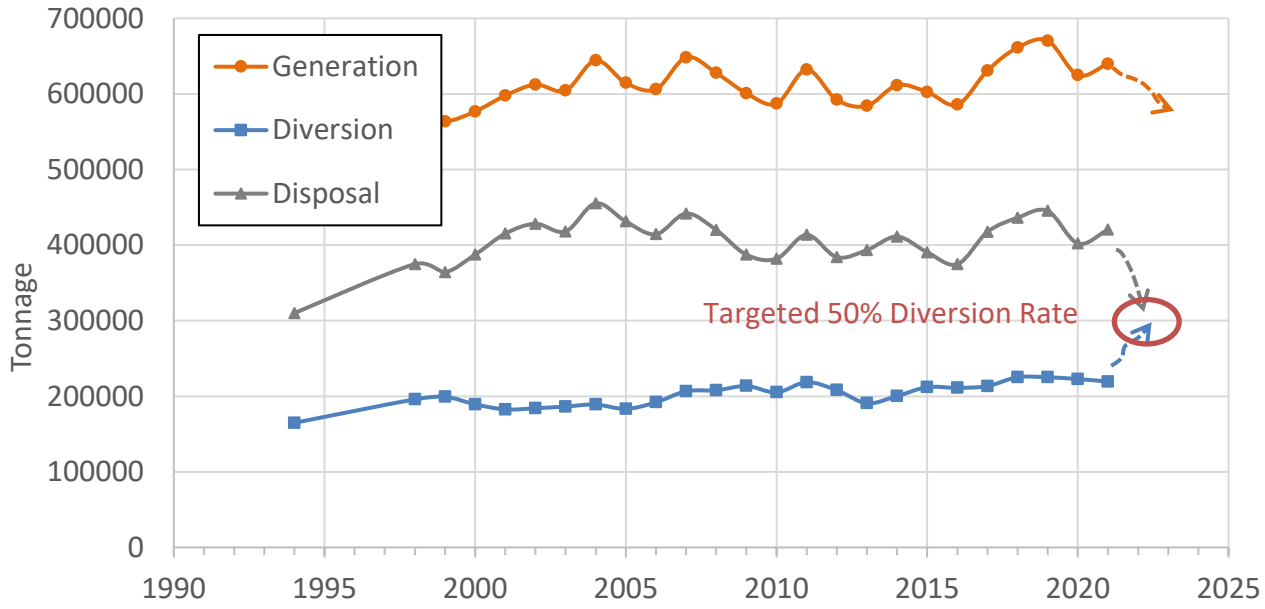


Figure 3: Projections of waste generation, diversion, and disposal with the targeted diversion rate goal of 50% from the state's 2019 Vermont Materials Management Plan.

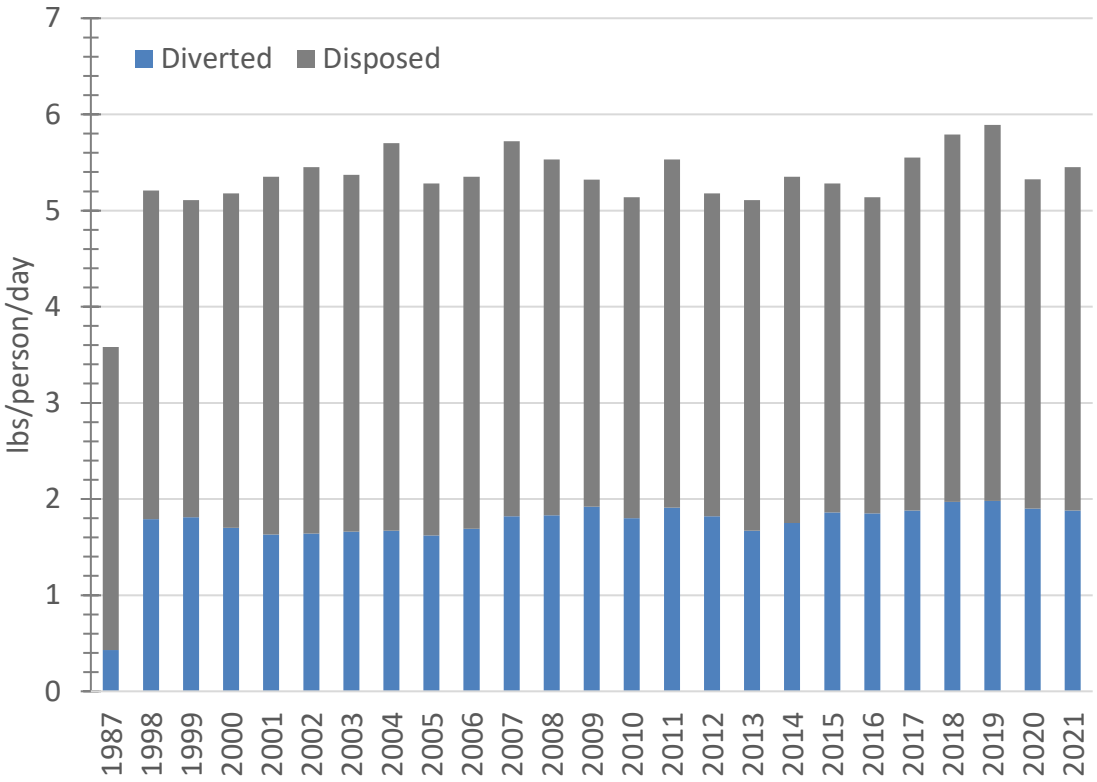


Figure 4: Pounds of waste generated per day per person (disposed + diverted) by Vermonters.

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

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Generation	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	624,869	639,835
Diversion	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	219,501
Disposal	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	420,334
Population [1]	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	645,570
Per Capita MSW Generation (Tons/Year)	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	0.99
(Pounds/Day)	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	5.43
Per Capita MSW Diversion (Tons/Year)	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	0.34
(Pounds/Day)	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	1.86
Per Capita MSW Disposal (Tons/Year)	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	0.65
(Pounds/Day)	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	3.57
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Generation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Diversion	28%	28%	29%	32%	31%	31%	31%	33%	33%	35%	36%	34%	34%	34%	36%	34%
Disposal	72%	72%	71%	68%	69%	69%	69%	67%	67%	65%	64%	66%	66%	66%	64%	66%

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

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

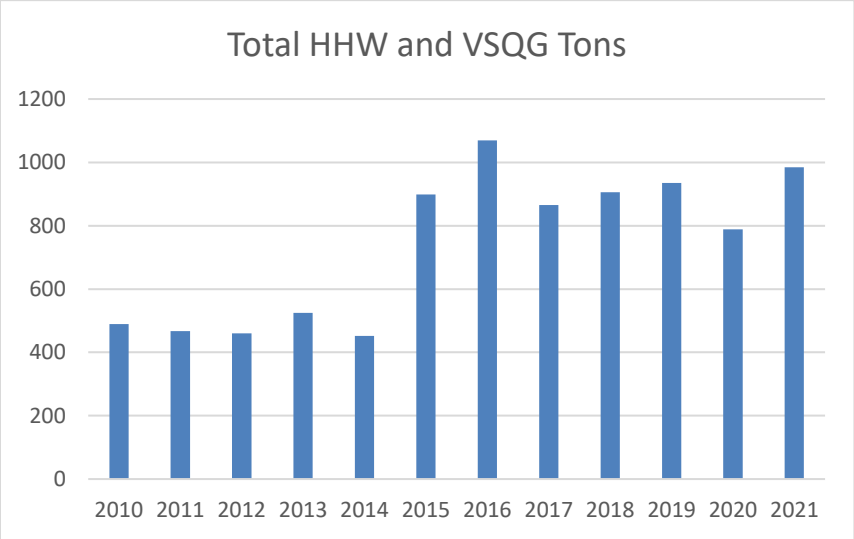
IV. Other Material Management Activities – Not included in disposal or diversion tonnages

Hazardous Waste

Household hazardous waste (HHW) and very small quantity generator (VSQG; formerly "conditionally exempt generator (CEG)") hazardous waste is collected and managed at several full-time facilities in the state and at numerous one-day collection events (93 in 2021) hosted by municipalities throughout the year. 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. These data are summarized in an annual HHW Survey Results report (Appendix A). A total of 984 tons of combined HHW and VSQG materials were collected in 2021, a notable increase over the 788 tons collected in 2020 (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

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total HHW and VSQG tons	489	467	460	525	452	899	1,069	865	906	935	788	984
% Participating VT Households	6%	7%	9%	7%	7%	6%	8%	10%	9%	11%	7%	8%
Pounds Collected per Household (avg.)	46	47	34	62	102	131	86	60	60	55	80	88



Figures 5. Trends in HHW and VSQG hazardous waste collected.

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 (after a successful pilot program in 2007), and for most general-use mercury-containing bulbs in 2012. Mercury-containing thermostats are collected and reported on by the Thermostat Recycling

Corporation to the State of Vermont. This program collected 13.4 pounds of mercury in 2021 from 1,846 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 2021, NEMA collected and recycled 1.57 pounds of mercury from 159,750 mercury-containing bulbs. In addition, mercury-containing bulbs that are not covered by the program are collected by HHW events and facilities and are accounted for in HHW tonnage.

Table 9. Summary of historic mercury collections.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
# Mercury Bulbs	125,361	154,157	205,155	233,820	191,060	158,079	209,400	186,652	144,751	159,750
# Mercury Thermostats	3,036	2,111	2,169	2,000	2,246	2,468	2,369	2,069	1,897	1,846

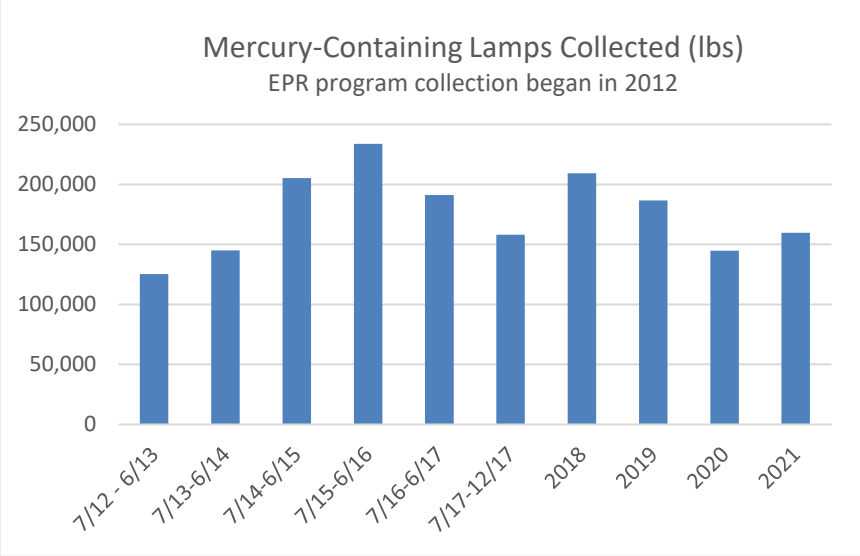


Figure 7. Trends in lamp collections.

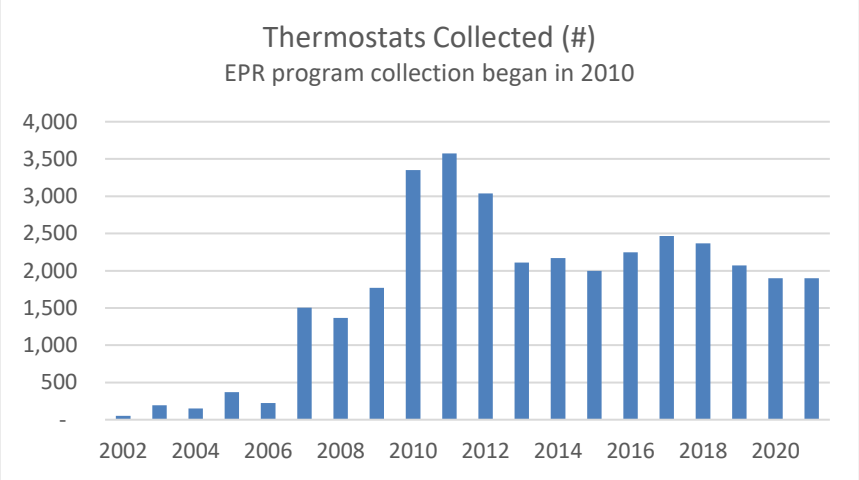


Figure 8. Trends in thermostat collections.

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 2021 collection period, 2,955,501 lbs of e-waste were collected. The decrease in tonnage over time is due, in part, to the fact than many types of covered electronics are now typically lighter than comparable items once were (flat-screen monitor versus cathode-ray tube monitor, for example).

Table 10. Summary of historic electronics collections.

	2013	2014	2015	2016	2017	2018	2019	2020	2021
Lbs Electronics	4,865,266	4,888,400	4,897,778	4,814,188	4,312,381	3,685,448	3,460,051	3,028,996	2,955,501

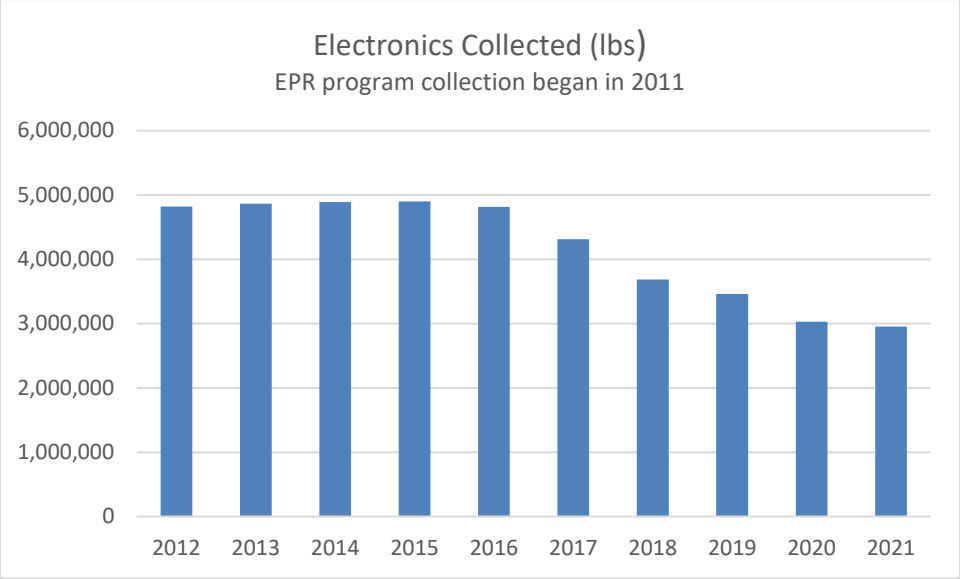


Figure 9. Trends in electronics collections.

Batteries

In 2014, Vermont became the first state to require manufacturers to fund collection and recycling of single-use batteries, with the passage of the Vermont Primary Battery Stewardship Law. The law requires producers of primary 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 that sell in Vermont are under a shared stewardship plan 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 at 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 battery sales.

During the 2021 collection year, Call2Recycle collected 216,764 pounds of batteries (148,340 lbs primary and 68,424 lbs rechargeable), 48% more than Call2Recycle collected in 2020; this is the highest collection amount to date.

Table 11. Summary of historic battery collections.

	2015	2016	2017	2018	2019	2020	2021
Lbs Primary Batteries	3,350	64,366	81,381	94,424	113,451	101,275	148,340
Lbs Rechargeable Batteries	36,477	52,617	52,238	51,677	53,426	45,122	68,424

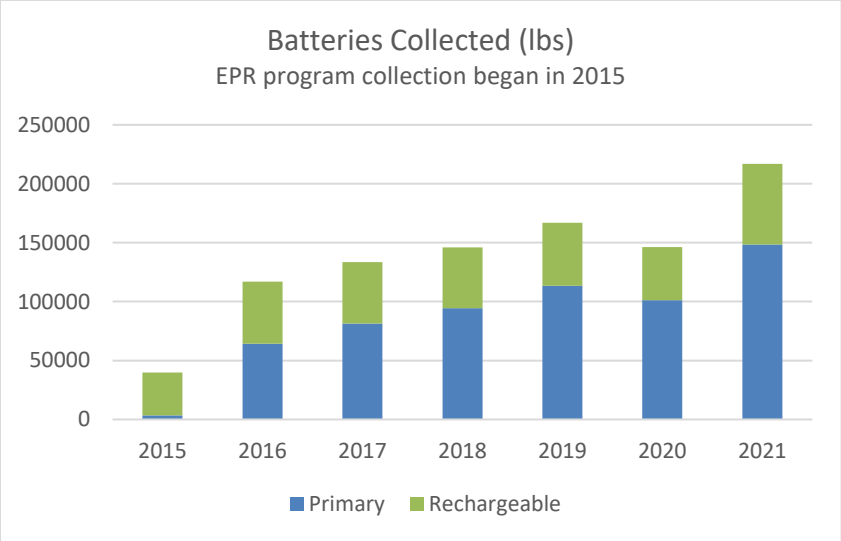


Figure 10. Trends in battery collections.

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. This program is funded by a fee consumers pay on each container of paint sold in Vermont. This program is implemented by the PaintCare stewardship organization, which 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, 2020 to June 30, 2021, 111,847 gallons were collected. This is a 12% increase from the previous year, and a significant increase over the average annual collection of 60,000 gallons that occurred in years prior to implementation of the PaintCare program. 76% of the paint collected that year was latex paint, and 23% 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	2020-2021
Gallons of Paint	60,000	116,691	108,466	96,109	110,567	115,142	99,838	111,847

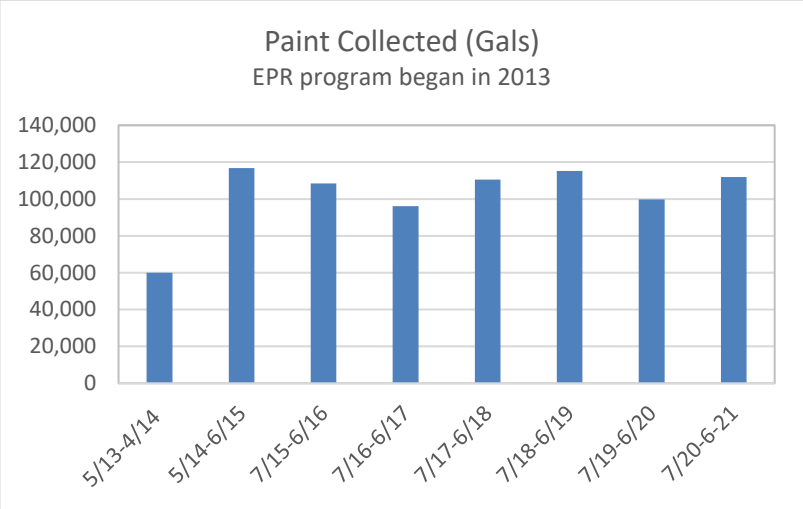


Figure 11. Trends in paint collections.

Tires

Stockpiling tires is illegal in Vermont and tires have been banned from the landfill since 1992. Currently, there is no state law requiring a tire collection program funded by producers or consumer fees. Most tires that are collected in Vermont are brought out-of-state for processing, primarily as tire-derived-fuel for paper mills and cement kilns. Vermont facilities collected 3,712 tons of tires in 2021, which is similar to the amount collected in recent years. Tires have not been historically included in the Diversion & Disposal report, although permitted tire collection facilities are required to report the tonnage of tires that pass through their facilities.

Table 13. Summary of recent tire collections.

	2016	2017	2018	2019	2020	2021
Tons Tires	4,315	2,733	4,274	3,878	3,551	3,712

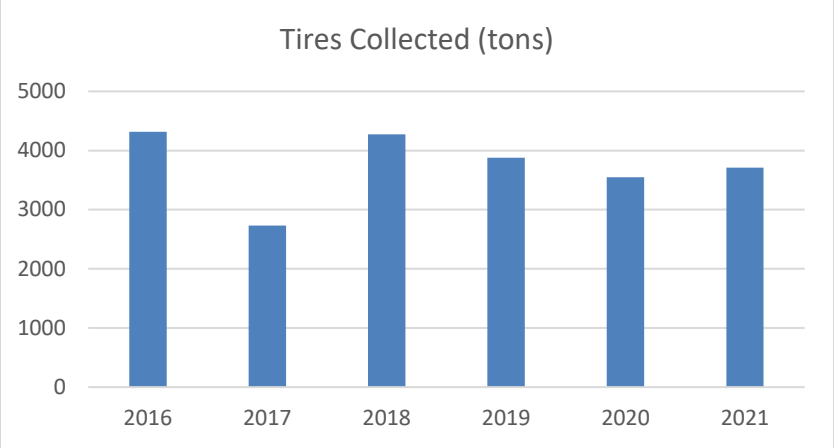


Figure 12. Trends in recent tire collections.

Appendix A: Household Hazardous Waste Report
SUMMARY OF 2021 VERMONT HHW/VSQG WASTE PROGRAMS

All Solid Waste Districts and Alliances, in alphabetical order

	HHW/VSQG Material Collected (all materials in tons)†	Addison SWMD	Bennington County Solid Waste Alliance	Central Vermont SWMD	Chittenden SWD	Lamoille RSWMD	Londonderry Group	Mad River RMA	Mountain Alliance	Northeast Kingdom WMD	Northwest SWMD	Rutland County SWD (excludes SWAC)	Solid Waste Alliance	Southern W/W Counties	Windham SWD	White River Alliance
1	Acids	0.64	2.00	0.68	2.29	0.16	0.16	0.21	0.20	0.68	0.22	0.22	0.33	0.20	0.23	0.42
2	Aerosols	1.10	2.05	2.31	11.54	1.48	0.50	0.37	0.60	0.41	0.43	12.14	0.87	1.68	0.68	1.04
3	Bases	1.18	1.31	1.12	3.50	0.39	0.26	0.21	0.25	0.41	0.21	0.16	-	0.34	0.34	0.83
4	Fire Extinguishers	-	0.26	-	-	0.02	-	-	-	0.12	-	0.02	-	-	-	-
5	Flammables & Solvents	16.28	4.00	8.61	39.15	10.50	2.20	3.48	0.88	22.09	2.71	9.44	0.77	4.87	2.78	3.33
6	Glycols (Antifreeze)	2.74	-	-	9.46	-	-	-	-	0.63	1.40	0.23	-	-	1.79	-
7	Oxidizers	0.23	0.45	0.10	0.65	0.23	0.05	0.21	-	0.14	0.08	0.15	0.14	0.49	-	-
8	Lead Paint Chips & Debris	0.68	-	0.04	-	-	-	-	-	-	-	-	-	-	0.02	-
9	Paints – Latex	30.55	60.36	7.46	100.11	-	3.82	-	-	18.45	24.43	-	-	-	-	-
10	Paints – Oil	12.16	19.45	4.95	24.13	-	1.99	-	-	7.75	5.88	-	-	-	-	-
11	Paints – Oil + Latex, Mixed	-	-	-	-	-	-	3.00	-	-	-	79.63	1.76	-	13.54	-
12	Paints – Non-process Resins	6.09	4.80	8.65	24.72	3.09	1.75	0.74	1.10	10.33	3.32	3.11	1.11	4.68	-	1.85
13	Pesticides	2.45	2.07	2.74	11.73	1.78	-	0.34	0.85	1.49	1.25	2.17	0.35	1.73	-	1.46
14	Propane Tanks	2.25	1.20	-	-	-	-	-	0.07	7.78	-	6.12	-	-	-	-
15	Reactives	0.21	0.01	0.03	0.01	0.01	-	-	-	-	0.06	-	0.02	-	0.02	-
16	Toxics	0.28	-	-	0.55	-	-	-	-	-	0.00	-	-	-	0.86	-
17	Photo Chemicals	-	-	-	-	-	-	-	-	-	0.02	-	-	-	-	-
18	Waste Oil – Uncontaminated	12.89	-	-	12.28	-	-	1.28	-	6.25	3.60	6.80	-	-	-	-
19	Waste Oil – Contaminated	-	-	-	-	-	-	-	-	-	0.39	0.22	-	-	1.49	-
20	Waste Oil – Oily Debris	1.33	0.21	0.67	3.89	0.74	0.10	-	-	-	-	0.32	-	0.42	-	-
21	Waste Oil – Oil Filters	2.87	-	-	1.38	-	-	-	-	1.13	-	-	-	-	-	-
22	Oily Water	2.86	-	0.88	1.00	2.50	-	-	-	-	0.40	-	-	-	-	-
23	Mercury – Fluorescent Tubes	7.57	0.16	-	14.05	-	-	0.12	0.01	-	1.31	2.64	-	-	-	1.10
24	Mercury – Other Lamps	0.06	0.15	-	-	-	-	0.04	-	-	0.08	0.59	-	-	-	0.56
25	Mercury – Added Products	-	0.02	0.03	0.31	-	-	0.02	0.00	-	0.00	-	-	0.02	-	0.02
26	Mercury – Elemental	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	Mercury – Compounds	-	-	-	-	0.01	0.00	-	-	-	0.01	-	0.02	0.01	-	-
28	Primary Batteries	3.95	0.25	-	24.60	-	-	0.11	-	6.56	0.70	2.18	-	-	-	-
29	Rechargeable Batteries	3.50	0.01	-	-	-	-	0.07	-	-	0.66	0.51	-	-	-	0.02
30	Lead-Acid Batteries	9.74	-	-	2.21	-	-	-	-	-	0.85	3.03	-	-	-	-
31	Other misc. products	2.97	0.90	0.27	15.10	0.13	0.60	0.00	0.20	-	1.26	5.77	0.22	0.75	-	0.21
	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	3	5	3	3	2	1	2	9	6	36	3	2	0	2
	# of households served	2725	666	665	8259	772	207	359	80	618	1696	1187	127	575	326	276
	# of businesses served	96	0	3	565	4	1	13	0	1	565	60	0	3	15	0
	% household participation	20%	5%	3%	13%	7%	14%	7%	2%	3%	9%	6%	2%	4%	2%	7%
	Total HHW/VSQG (tons)	124.56	99.66	38.51	302.66	21.03	11.41	10.19	4.16	84.21	49.25	135.46	5.59	15.19	21.75	10.84
	Total VSQG Collected (tons)	8.85	-	0.34	96.59	0.79	0.55	-	-	0.84	0.48	8.85	-	0.10	0.24	-
	Total HHW Collected (tons)	115.71	99.66	38.17	206.08	20.24	10.86	10.19	4.16	83.37	48.77	126.61	5.59	15.09	21.51	10.84
	Avg. HHW/per household (tons)	0.04	0.15	0.06	0.02	0.03	0.05	0.03	0.05	0.13	0.03	0.11	0.04	0.03	0.07	0.04
	Avg. VSQG/per business (tons)	0.09	-	0.11	0.17	0.20	0.55	-	-	0.84	0.001	0.15	#DIV/0!	-	0.02	-

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*.

All Independent Towns, Shared HHW Events

	HHW/VSQG Material Collected (all materials in tons)†	Canaan shared with Lemington	Coventry, shared with Barton, Lowell and Newport City	Fairfax	St. Johnsbury shared with Burke	Greater Upper Valley SWD shared with Hartford	Whitingham	Winhall	VERMONT TOTALS
1	Acids	0.22	0.15	0.14	0.14	0.33	-	0.08	9.7
2	Aerosols	0.22	0.85	1.25	0.44	1.18	0.21	0.28	41.6
3	Bases	0.22	0.30	0.27	0.10	0.42		0.20	12.0
4	Fire Extinguishers	-	-	-	-	-	-	-	0.4
5	Flammables & Solvents	0.44	2.20	7.09	0.53	6.65	0.48	0.44	148.9
6	Glycols (Antifreeze)	-	-	-	-	0.42	0.44	-	17.1
7	Oxidizers	-	0.08	0.14	-	0.09		0.14	3.3
8	Lead Paint Chips & Debris	-	-	-	-	-	-	-	0.7
9	Paints – Latex	-	-	-	-	-	-	-	245.2
10	Paints – Oil	-	-	-	-	-	-	-	76.3
11	Paints – Oil + Latex, Mixed	-	-	-	-	2.50	-	-	100.4
12	Paints – Non-process Resins	0.81	3.10	1.04	-	2.21	-	0.74	83.2
13	Pesticides	-	0.85	2.08	0.36	0.79	0.06	0.44	35.0
14	Propane Tanks	-	-	0.30	0.01	-	-	0.02	17.7
15	Reactives	-	-	-	-	0.06	-	-	0.4
16	Toxics	-	-	-	-	-	-	-	1.7
17	Photo Chemicals	-	-	-	-	-	-	-	0.0
18	Waste Oil – Uncontaminated	-	-	-	-	-	-	-	43.1
19	Waste Oil – Contaminated	-	-	-	-	-	-	-	2.1
20	Waste Oil – Oily Debris	-	-	-	-	0.21	-	-	7.9
21	Waste Oil – Oil Filters	-	-	-	-	-	-	-	5.4
22	Oily Water	0.40	-	-	-	0.63	-	-	8.7
23	Mercury – Fluorescent Tubes	-	0.25	0.00	0.07	-	-	0.05	27.3
24	Mercury – Other Lamps	-	0.05	0.42	0.00	-	-	-	1.9
25	Mercury – Added Products	-	-	0.07	0.02	-	-	-	0.5
26	Mercury – Elemental	-	-	-	-	-	-	-	-
27	Mercury – Compounds	-	-	-	-	0.00	-	-	0.1
28	Primary Batteries	-	0.08	1.11	0.00	-	-	-	39.5
29	Rechargeable Batteries	-	-	-	0.00	-	-	0.01	4.8
30	Lead-Acid Batteries	-	0.13	-	-	-	-	0.00	16.0
31	Other misc. products	-	-	-	2.36	0.63	0.88	0.22	32.5
	Demographics								
	Occupied Households in Area††	489	3,818	1,591	3,888	12,211	574	343	256,582
	Program Profiles								
	Number of Events Held	2	2	2	3	3	2	2	93
	# of households served	46	285	225	121	402	45	40	19,702
	# of businesses served	5	2	-	-	2	1	1	1,337
	% households served	9%	7%	14%	3%	3%	8%	12%	8%
	Total HHW/VSQG (tons)	2.31	8.03	13.89	4.03	16.11	2.07	2.62	983.5
	Total VSQG Collected (tons)	-	1.00	-	-	-	-	-	118.6
	Total HHW Collected (tons)	2.31	7.03	13.89	4.03	16.11	2.07	2.62	865
	Avg. HHW/per household (tons)	0.05	0.02	0.06	0.03	0.04	0.05	0.07	0.04
	Avg. VSQG/per business (tons)	-	-	-	-	-	-	-	0.09

† 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 2021

2021 Vermont Sludge & Biosolids Management Statistics*			
Management Option	**In-State**	**Out-of-State**	**Totals**
Volume (Dry Tons)			
Beneficial Reuse*	3,561	4,734	8,294
Landfill Disposal	2,699	605	3,304
Total	6,260	5,339	11,598
Percentages			
Beneficial Reuse	30.7	40.8	71.5
Landfill Disposal	23.3	5.2	28.5
Total	54.0	46.0	100.0

*includes both Class B land application and EQ biosolids distribution

2021 Vermont Septage Management Statistics			
Management Option	**In-State**	**Out-of-State**	**Totals**
Volume (Gallons)			
Land Application	702,484	81,275	783,759
Wastewater Treatment Facility Disposal	39,908,558	3,329,358	43,237,916
Total	40,611,042	3,410,633	44,021,675
Percentages			
Land Application	1.6	0.2	1.8
Wastewater Treatment Facility Disposal	90.7	7.6	98.2
Total	92.3	7.7	100.0