



E-Cycle Wisconsin 2020 report

*Wisconsin DNR annual report to the Legislature and
governor under s. 287.17(10), Wis. Stats.*

November 2020

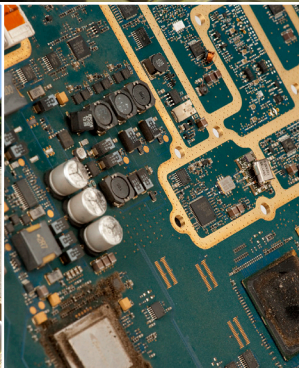
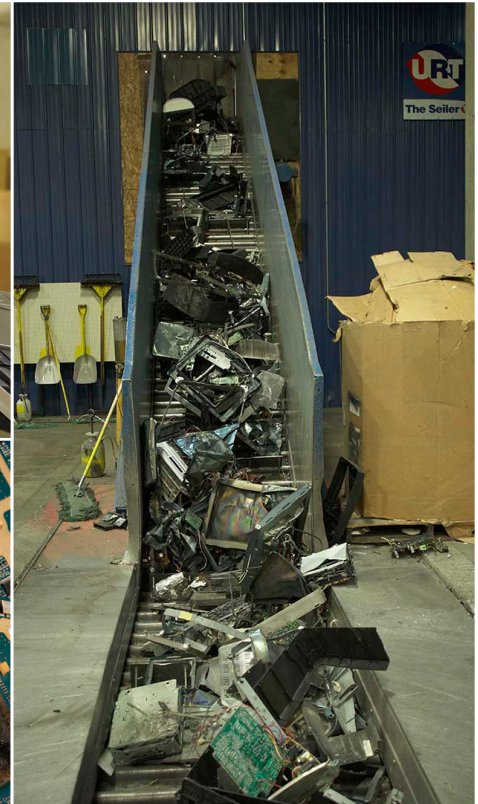


Table of contents		Ensuring a level playing field	9
Executive summary	2	Electronics recycling outside E-Cycle WI	11
Introduction	3	Disposal ban outreach and compliance	13
Program participation	4	Program challenges	13
Collection & recycling totals	5	Recommendations	17

Executive summary

Wisconsin's electronics recycling law has produced many successes since it took effect in 2010, recycling nearly 325 million pounds of electronics and expanding electronics recycling access for state residents. Most electronics collected under the manufacturer-funded E-Cycle Wisconsin program are processed in the state, contributing to capital investments and job growth at high-tech recycling facilities. Wisconsin has been a leader among state electronics recycling programs for the number of collection sites and weight collected per person, and stakeholders have praised the law's structure and its administration by the Department of Natural Resources (DNR).

Since 2010, however, both the nature of electronics being sold and the markets for materials electronics contain have changed dramatically. Due to the popularity of smaller and lighter devices and manufacturers' design improvements, the weight-based manufacturer recycling targets, set by a statutory formula, have declined by more than 8.3 million pounds (26%) since 2013. Dwindling markets for leaded glass in cathode ray tubes (CRTs) and plastics used in electronics, along with lower commodity values in newer devices, have increased recyclers' per-pound costs, but manufacturer payments have not always risen to match.

As a result, unless manufacturer recycling obligations are increased or restructured, the manufacturer-funded recycling system will continue to fall short of the electronics recycling demand of Wisconsin households and schools. Since 2013, the number of registered electronics collection sites has dropped by 30%, and consumers are paying more to recycle TVs and other devices. Several large cases of irresponsible recycling have created threats to the environment and human health and have been driven in part by higher costs for responsible recycling. These trends are increasing taxpayer costs to either collect electronics or clean up dumped devices.

In conversations with the DNR, E-Cycle Wisconsin participants have been positive about many aspects of the law, but noted several areas of growing concern, including the lack of affordable, convenient recycling for some state residents; a lack of consumer awareness about the need to responsibly recycle electronics; a need for more actions to deter bad actors; and economic and safety issues the changing material stream has brought to collectors and recyclers. This report provides more detail on these topics and includes suggestions stakeholders have made for possible actions to address the challenges.

Successes for program year 11 (July 2019 to June 2020)

- Registered collectors took in 21.3 million pounds of electronics, or 3.7 pounds per Wisconsin resident during the most recent program year.
- In total, between January 2010 and June 2020, Wisconsin households and schools have recycled nearly 325 million pounds of electronics through E-Cycle Wisconsin.
- Nearly all electronics collected under E-Cycle Wisconsin were processed initially in Wisconsin or other Midwest states, contributing to continued growth in the region's electronics recycling industry. Wisconsin recyclers accounted for 78% of the weight processed.
- Collectors and recyclers were able to maintain essential operations during the COVID-19 pandemic. While many collectors temporarily closed or restricted collection, and many spring collection events were canceled, the DNR did not receive any reports of problems moving electronics to and through recycling facilities.
- While the number of registered collection sites and counties served was down in program year 11 due to the pandemic, 98% of the state's population lived in a county with at least one collection site or event.
- Most manufacturers met or exceeded their recycling targets.
- Nearly all manufacturers, recyclers and collectors are complying with the law, and the DNR continues to work to ensure a level playing field for program participants.

Recommendations for potential legislative changes

The electronics recycling law directs the DNR to examine several aspects of the law within the annual report and make suggestions for possible changes. The following is a list for the Legislature's consideration, based on both formal and informal stakeholder input, of changes that could be made to improve the electronics recycling law and ensure its continued effectiveness.

- To better meet the electronics recycling needs of Wisconsin households and schools, the Legislature could consider changing or replacing the manufacturer target formula and method of encouraging collection in rural areas. The Legislature could also request a study of alternative approaches to setting manufacturer obligations.
- The Legislature could consider updating and clarifying device definitions to better fit the changing nature of electronics.
- To improve access to electronics collection in rural areas, the Legislature could consider authorizing the DNR to award small grants, using existing funds, to improve electronics recycling infrastructure in those areas.
- To better match the budget cycles of many manufacturers, recyclers and collectors, the Legislature could consider changing the E-Cycle Wisconsin program year to the calendar year (Jan. 1 to Dec. 31), rather than the state fiscal year, and adjusting reporting dates accordingly.
- The Legislature could consider assisting small businesses by reducing or eliminating registration fees very small electronics manufacturers pay to the state under s. 287.17(4)(b), Wis. Stats.
- The Legislature could consider modifying the definition of "school" under s. 287.17(1)(np), Wis. Stats., to allow all K-12 schools in Wisconsin to recycle electronics through E-Cycle Wisconsin.

In addition to these potential legislative changes, this report includes suggestions for collaborative efforts among stakeholders to improve consumers' awareness of and access to electronics recycling options, give consumers more value when they pay electronics recycling fees, and encourage development of new and expanded recycling markets for materials like plastics and CRT glass.

Introduction

Wisconsin's electronics recycling law establishes a statewide program to collect and recycle certain electronics. Under this product stewardship-based law, manufacturers of TVs, computers, monitors and desktop printers must register with the Department of Natural Resources (DNR) the brands they sell to Wisconsin households and schools. Those manufacturers also must recycle a target weight of electronics each year based on their sales. Manufacturers contract with state-registered recyclers and collectors to meet their targets. This manufacturer-funded recycling program is called E-Cycle Wisconsin. The law also bans landfill and incinerator disposal of many electronics.

This report fulfills the annual reporting obligation in s. 287.17(10), Wis. Stats., which specifies several metrics on which the DNR must report to the Legislature and governor. These include the weight of electronics collected and other information provided by program participants, an outline of electronics recycling outside of E-Cycle Wisconsin, a summary of compliance and enforcement actions related to the electronics disposal ban, and suggestions for changes needed.

To help evaluate the law and the DNR's administration of it, the DNR also examines whether the law is meeting these six general criteria:

- Keeping electronics out of landfills and the environment.
- Using a market-based approach to manage e-waste in the most efficient and cost-effective manner possible, with minimal government intervention.

- Reducing electronics recycling costs and improving recycling convenience for consumers.
- Reducing the financial and administrative burden on local and state governments of managing e-waste.
- Ensuring a level playing field for all participants in the electronics recycling program, including accountability for environmental and worker safety, along with other standards.
- Encouraging and supporting a strong electronics recycling industry in Wisconsin and the Midwest.

Wisconsin’s electronics recycling law has produced many successes. Over the last several program years, however, changing market conditions and other complications have made it more challenging for E-Cycle Wisconsin and the disposal ban to fulfill the first four of the above criteria. The biggest obstacles to meeting these goals have been the changing economics of electronics recycling and the changing nature of electronics being sold, which have combined to push more electronics recycling costs onto collectors and consumers, reduce electronics recycling options (particularly for large TVs), and increase the potential for e-waste mismanagement.

The DNR has continued to engage with program stakeholders and the public to get feedback on challenges facing E-Cycle Wisconsin and potential solutions. Input from stakeholders contributed to the sections of this

Table 1: Program year 11 registration and participation

Category	Registered	Active
Collectors	126	118 (94%)
Recyclers	18	16 (89%)
Manufacturers	159	n/a
Brands	240	n/a

“Active” means a collector that sent electronics to a registered recycler or a recycler that received electronics from registered collectors.

report concerning current challenges, opportunities for addressing the challenges through the DNR’s administration of the program, voluntary stakeholder actions and potential legislative changes.

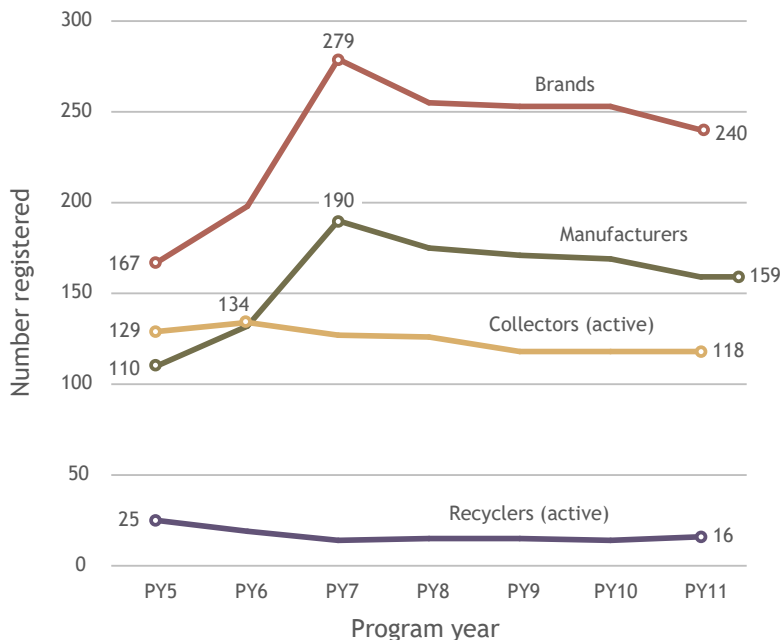
Program participation

Table 1 shows program year 11 registrations, and Figure 1 illustrates registration trends over the seven most recent program years.

In program year 11, the number of active registered collectors, which include local governments, electronics retailers, other for-profit businesses and non-profits, remained steady. The number of registered collection sites decreased, with 477 total permanent sites, one-day events and other

temporary sites, compared with 509 in program year 10. The decline from program year 10 to 11 was almost entirely due to a 50% reduction in one-day events, many of which are usually held in April and May. Due to the pandemic, many of these were canceled or postponed until late summer (after the end of program year 11). For-profit collectors registered the highest number of sites (165, or about one-third), though many of these - particularly one-day events - were at government-owned locations, as shown in Figure 3. There was a jump in the number of registered retailer sites, due to the addition of several dozen stores that were not drop-off sites open to

Figure 1: Summary of E-Cycle Wisconsin registrations



the general public but whose customer returns were recycled under E-Cycle Wisconsin.

Program year 11 recycler registrations increased from 16 to 18 (with 16 active instead of 14 in program year 10). Eight of the 18 recyclers (44%) were in Wisconsin. The number of registered recyclers has dropped from the high of 32 in program year 3, due to several companies going out of business or discontinuing their recycler registrations because of economic challenges.

The number of registered manufacturers and brands dropped slightly in program year 11, continuing a trend over the last few program years.

Collection and recycling totals and analysis

Marking 10 years of E-Cycle Wisconsin

Wisconsin households and schools have recycled nearly 325 million pounds of electronics through E-Cycle Wisconsin since 2010. This has reduced carbon dioxide emissions by about 123,000 metric tons—about the same amount as using 13.8 million fewer gallons of gasoline. It has also conserved an estimated 47 million pounds of steel, 16 million pounds of copper and 8 million pounds of aluminum, along with millions of pounds of glass, plastic and other metals.

Program year 11 totals

From July 2019 through June 2020 (program year 11), registered collectors took in 21.3 million pounds of electronics from Wisconsin households and schools (see Table 2), equivalent to 3.7 pounds per capita.

As shown in Figure 4, the weight of eligible electronics collected during program year 11 dropped by about 2.3 million pounds, or 10%, from program year 10. This was similar to the drop from program year 9 to 10. The drop between program years 10 and 11 in weight collected and then sent to a registered recycler

Figure 2: Program year 11 collection sites, by type

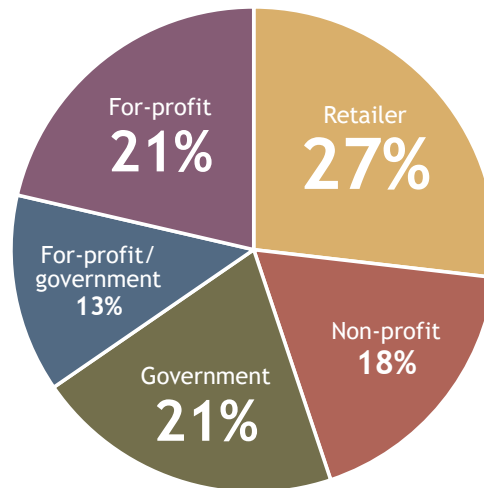
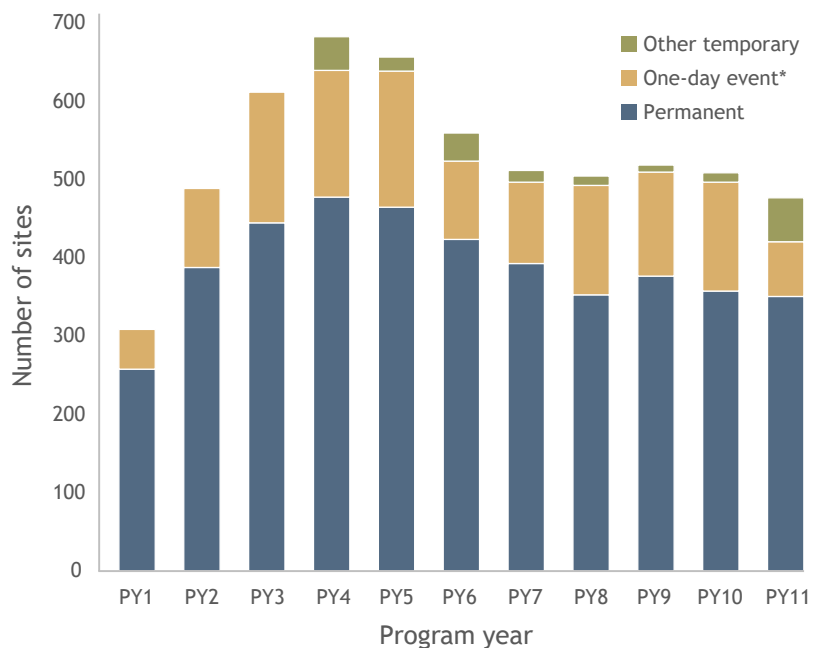
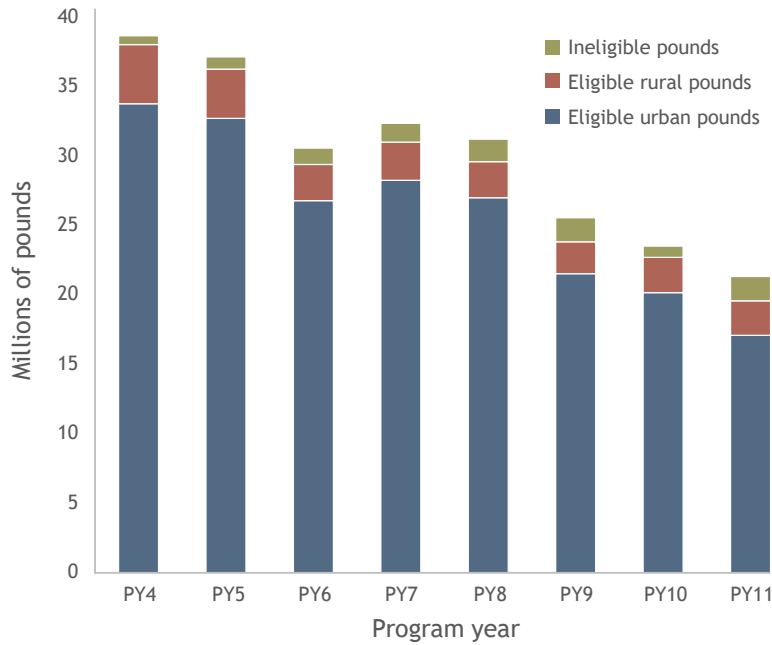


Figure 3: Registered collection sites over time



Sites were registered only as “Temporary” from program year 1 to 3.

Figure 4: Pounds collected by registered collectors



“Ineligible pounds” means pounds that would have been eligible for manufacturer credit if sent to a registered recycler, but that collectors dismantled themselves or sent to a non-registered recycler.

Table 2: Pounds collected by registered collectors, program year 11

Type	Pounds
Eligible urban	17,121,582
Eligible rural	2,487,508
Dismantled by collector	1,413,171
Sent to non-registered recycler	345,009
Total collected	21,367,269

under many mature state recycling programs, some of the backlog of electronics stored in homes has been cleaned out, and also that lighter devices, such as flat-panel TVs, are entering the waste stream in greater numbers. It may also be due in part to the higher fees Wisconsin consumers are paying to recycle electronics under the program.

Much of the drop in collection during program year 11 is likely due in part to the COVID-19 pandemic. During March, April and the first part of May, many collectors shut down or scaled back hours for permanent collection sites and canceled electronics collection events. While recycling in general was considered an essential service under Gov. Evers’ Safer at Home order, many collectors lacked either staff or adequate safety procedures and personal protective equipment to operate safely during this time. In an informal survey DNR conducted among registered collectors in May, 24% reported one or more of their collection sites were still closed, and more than half said they had collection sites operating with restrictions on access, such as reduced hours, curbside drop-off or drop-off by appointment only. In the survey, nearly half of collectors that had sites open said they had seen a significant decrease in collections, though a few, mostly municipal-run sites had seen an increase. Many indoor collection sites, most notably retailers like Best Buy, remained closed to the public throughout much of the first half of 2020.

TVs continued to dominate the weight collected, accounting for 55% of the total in program year 11, though this was the lowest share since the program began (see Figure 5). Reasons for this likely include the gradual shift from heavier, tube-style TVs to flat panels in the waste stream, and also the high prices many collectors are charging consumers to recycle older TVs. The proportion of eligible electronic devices (EEDs) such as printers, increased during the program year.

was larger (3.2 million pounds). The weight collected but either dismantled by a registered collector or sent to a non-registered recycler doubled from program year 10 (707,000 pounds) to program year 11 (1.4 million pounds), likely due to collectors being able to make more money by refurbishing or dismantling more valuable items, like computers, than by sending them to a registered recycler. The weight collected in program year 11 was down about 46% from the peak collection total of 39.1 million pounds in program year 3.

The downward trend in weight collected mirrors many other states’ electronics recycling programs. This may indicate that,

With the rural credit (1.25 pounds counted toward manufacturer targets for each pound collected in a rural county) included and non-recycled pounds subtracted, Table 3 shows 20.2 million eligible pounds were available for purchase by manufacturers—to fund the recycling of the electronics—in program year 11. This was down about 4% from the weight available in program year 10.

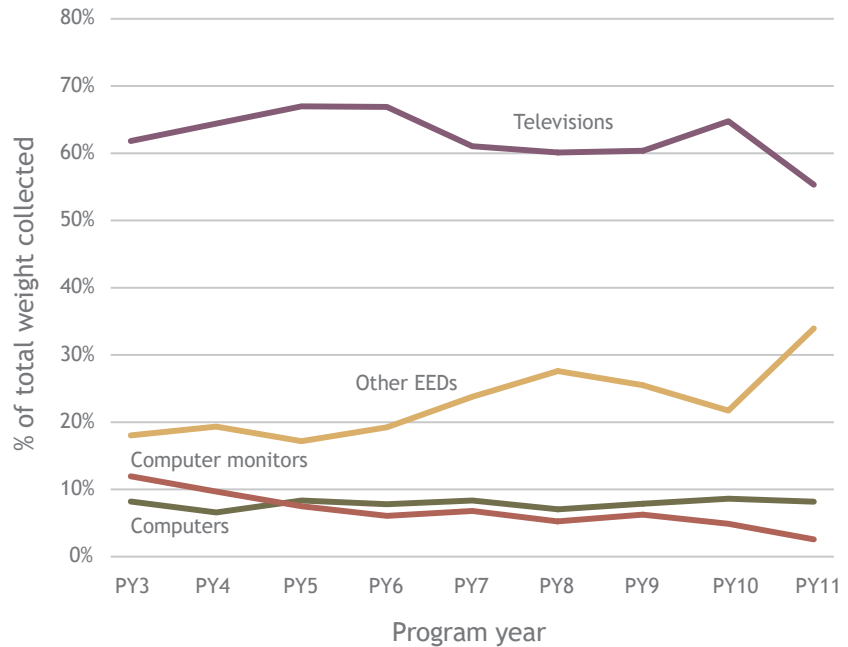
During program year 11, Wisconsin recyclers processed 78% of the total weight recycled, up from 62% in program year 7. Essentially all electronics collected under E-Cycle Wisconsin continue to be processed in the Midwest, as shown in Figure 6 (nearly all in the “Other” category were processed in Indiana and Ohio).

The overall manufacturer target, set by a statutory formula that uses manufacturer-reported sales of covered devices in Wisconsin, was 22.2 million pounds in program year 11, up slightly from 21.8 million pounds in program year 10. The manufacturer targets in recent years have been significantly lower than in the first few years of E-Cycle Wisconsin, due primarily to consumers buying lighter products, and manufacturers finding ways to reduce the weight of larger devices, such as TVs. However, the estimated manufacturer target for program year 12 is 23.7 million pounds, the first significant increase in several years.

Figure 7 shows manufacturer recycling targets and weight manufacturers purchased from recyclers by program year to meet their targets. It also illustrates the gap between pounds recycled and pounds paid for by manufacturers in the years before program year 11. Because of the lower weight collected during the first months of the pandemic, the weight recycled during program year 11 was less than the overall manufacturer target for the first time since program year 1. Nearly all of the weight recycled was sold to manufacturers during program year 11. As discussed below, manufacturers used credits earned during previous program years to make up most of the difference.

Based on DNR surveys of registered manufacturers and discussions with stakeholders, most manufacturers rely on recyclers to find and/or

Figure 5: E-Cycle Wisconsin collection, by product type



EEDs are eligible electronic devices. Other EEDs include printers, computer accessories, DVD players, VCRs and fax machines.

Table 3: Pounds of electronics reported by registered recyclers, program year 11

Type	Pounds
Urban received	17,121,582
Rural received	2,480,999
Rural credit	620,250
Non-eligible glass	0
Diverted for reuse	(5,252)
Available for manufacturers	20,217,578
Sold to manufacturers	(20,155,28)
Not sold to manufacturers	62,297

Rural credit is 1.25 pounds per pound collected. Urban and rural pounds differ slightly from Table 2 because some recyclers count all pounds as urban.

Non-eligible glass is CRT glass the recycler received but that was not recycled, under the definitions in s. 287.17, Wis. Stats.

Electronics diverted for reuse are not eligible for manufacturer recycling credit.

Figure 6: Percent of pounds received by registered recyclers, by state

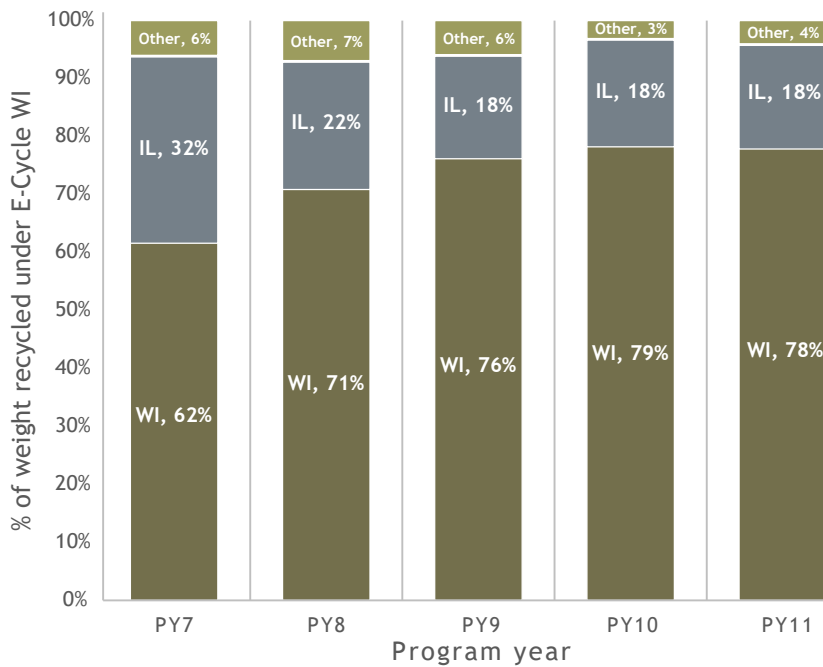
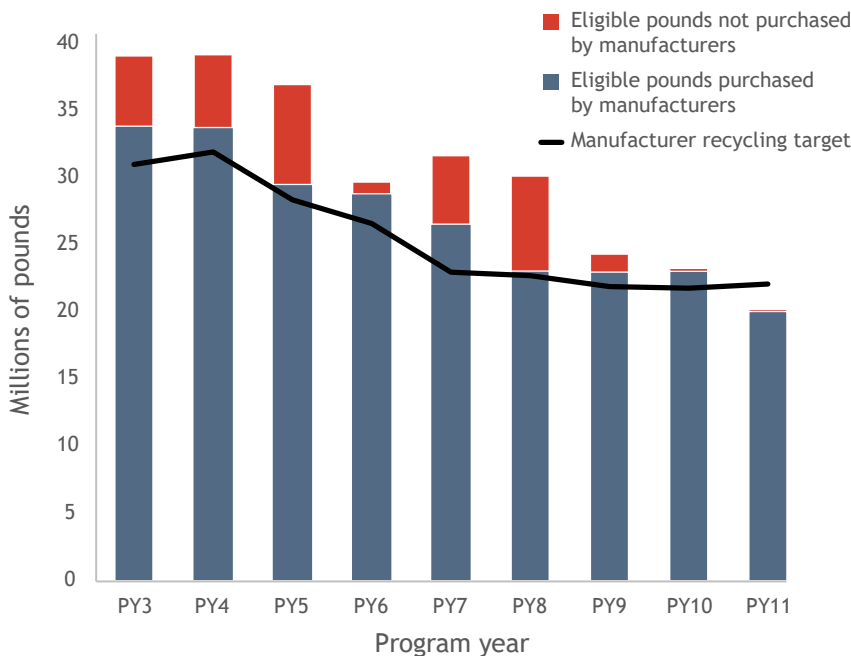


Figure 7: Comparison of weight recycled and manufacturer targets, by program year



credits were available to manufacturers for future use, the lowest since program year 1. Figure 8 summarizes credits applied or expired, credits earned, and total credits available from program years 4 to 11.

Each year, the DNR encourages manufacturers to purchase eligible recycled pounds rather than pay a shortfall fee, but several with very small targets have said it is more convenient to pay the fee than to go through the

set up collection networks. Prominent exceptions include the Dell Reconnect program, in which Dell works with several networks of Goodwill stores; Best Buy’s in-store collection program; a partnership between Hewlett Packard and Staples; and Apple’s recycling program for schools.

During program year 11, 40 registered manufacturers participated in collectives that contracted with recyclers for a large total sum of pounds and distributed the pounds among its members. The two collectives during program year 11 were MRM (23 manufacturers) and Reverse Logistics Group America (17). These collectives were responsible for about 32% of pounds purchased by manufacturers during program year 11, slightly lower than program year 10. Eleven other manufacturers worked through brokers to purchase weight from a recycler.

Most manufacturers continued to meet or exceed their sales weight-based recycling targets in program year 11. Five manufacturers recycled more than their targets and therefore earned a total of just under 179,700 credits that can be used during the next three program years (see Table 4). Seventeen manufacturers used 2.1 million credits from previous years to meet their targets, the most in any program year. At the end of program year 11, just over 550,000

process of contracting with a recycler. In addition, the tight supply of pounds in program year 11 made it more difficult for manufacturers to make last-minute weight purchases after the end of the program year. In total, 47 manufacturers paid or owed a shortfall fee as of November 2020. The amounts ranged from \$0.46 to \$3,744.

Table 5 summarizes registration and shortfall fees paid under E-Cycle Wisconsin.

Ensuring a level playing field within E-Cycle Wisconsin

Much of the DNR’s administration of the electronics recycling law focuses on maintaining a level playing field for E-Cycle Wisconsin participants and identifying problems at collectors or recyclers that might endanger human health or environmental quality. Many stakeholders have cited Wisconsin as a national leader in these efforts, particularly in online registration and reporting and careful accounting of collection and recycling transactions among program participants.

Manufacturer registration compliance

Manufacturers must comply with Wisconsin’s electronics recycling law by registering their covered electronics and paying applicable registration and shortfall fees. During program year 11, the DNR revoked 16 manufacturers’ registrations for failure to submit required forms or payments. Five returned to compliance during program year 11. The remaining manufacturers had either stopped selling covered electronics, the DNR could not find current contact information for them, or they remained out of compliance as of October 2020.

To ensure a level playing field among electronics manufacturers, the DNR continued its effort to bring manufacturers of unregistered brands into compliance. In addition to retailer compliance efforts described below, the DNR contacts manufacturers to inform them of their obligation to register, and communicates with other state programs about brand status. The DNR maintains lists of registered and unregistered brands on its website to help retailers and manufacturers stay up-to-date with registration status. As of October 2020, there were 165 unregistered brands tracked by the DNR, primarily from manufacturers selling a low volume of covered electronics through online retailers.

Electronics retailer compliance

Under Wisconsin’s electronics recycling law, retailers must sell only registered brands to Wisconsin households and schools, and must inform customers that electronics may not go into the trash and provide information about how to recycle electronics. These requirements apply to brick-and-mortar stores as well as online stores.

Figure 8: Manufacturer credit use, by program year

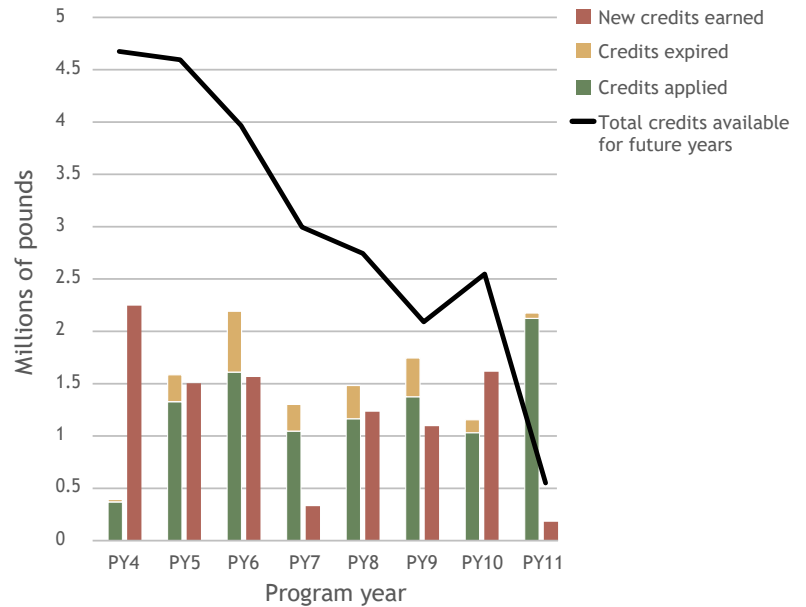


Table 4: Program year 11 manufacturer credit transactions

	Credits
Beginning balance	2,548,611
Credits applied	(2,125,798)
Credits expired	(51,458)
New credits earned	179,700
Total available for future use	551,055

Table 5: Manufacturer registration and shortfall fees

Program year	Registration fees	Shortfall fees
1	\$261,250	n/a
2	\$270,000	\$8,453
3	\$275,000	\$19,210
4	\$310,000	\$10,105
5	\$310,000	\$9,467
6	\$328,750	\$12,379
7	\$408,750	\$8,812
8	\$375,000	\$8,124
9	\$370,000	\$13,389
10	\$338,750	\$9,545
11	\$358,750	\$15,900

Shortfall fees for program year 10 as of November 2020. The law did not assess shortfall fees for program year 1.

The DNR reviews electronics retailer inventory online and in stores, and checks stores and websites for compliance with the customer education requirements.

In program year 11, the E-Cycle Wisconsin program lacked a second inspector until February 2020, but still conducted one round of online brand checks and one in-store inspection of a brick-and-mortar store. The DNR was not able to conduct in-store inspections after mid-March due to COVID-19 restrictions. Unregistered brands are most commonly found online, where inventory changes quickly, and there are several large, exclusively online retailers. The DNR notified retailers of the results of these checks, with a reminder about retailer requirements under the law. The DNR also continued to follow up with retailers regarding customer education requirements and suggested changes to ensure full compliance with Wisconsin’s law.

Registered recycler compliance

All electronics recyclers operating in Wisconsin must comply with solid and hazardous waste regulations. Registered E-Cycle Wisconsin recyclers must meet additional requirements, which apply whether the facility is located in-state or out-of-state. These requirements include main-

taining owner financial responsibility (OFR) to cover facility closure; at least \$1 million in pollution liability insurance; reporting to the DNR twice a year; and providing information on the weight of electronics recycled, sources of those electronics and which downstream vendors received the electronics and their components.

The DNR ensures compliance with program requirements through desktop record reviews for closure cost estimates, OFR and pollution liability insurance. In addition, DNR staff check in with recyclers if questions arise regarding downstream vendors, sources of materials received or changes to their recycling process. Typically, DNR staff conduct annual on-site inspections for in-state recyclers. Some out-of-state recyclers are also inspected on occasion; however, those occur much less frequently because of travel constraints.

During on-site inspections, the inspector reviews the facility’s safety plan and discusses training to ensure staff understand the procedures. The inspector also reviews closure plans and cost estimates to verify that the types of materials, amount of inventory and available storage space are accurately represented in the plan and the amount of OFR is adequate to properly close the facility. In addition, the inspector reviews shipping and downstream vendor records to determine whether electronics are flowing through the facility in a timely manner and ending up at a legitimate end market or are properly disposed of.

During program year 11, there were eight in-state recyclers and 10 out-of-state recyclers registered with E-Cycle Wisconsin. Since restriction on in-person facility inspections were put in place in March 2020 because of the COVID-19 pandemic, E-Cycle Wisconsin staff inspected only three in-state recyclers during program year 11. In lieu of face-to-face inspections, E-Cycle Wisconsin staff reached out to recyclers by phone and conducted online surveys to understand the impact COVID-19 was having on recyclers’ operations, and used these opportunities to provide technical assistance as needed. Fortunately, COVID-19 did not lead to significant problems for any registered recyclers in terms of maintaining essential operations and continuing to move materials in and out of their facilities.

Table 6 lists the number of collection site and recycler inspections the DNR has conducted each program year.

Registered collector compliance

The DNR assesses collector compliance through annual reports and inspections. Due to the large number of collection sites (averaging between 350 and 400 permanent sites for the last several years), E-Cycle Wisconsin staff are unable to inspect all sites on a routine basis, and therefore prioritize inspections on sites where they can have the most impact. E-Cycle Wisconsin staff typically inspect new sites to provide technical assistance during the start-up phase, collectors that receive large amounts of electronics either on their own site or by operating as a consolidation point, and collectors that also dismantle some electronics. In addition, if the DNR receives complaints about sites, they are addressed through an inspection or phone call. Occasionally, staff inspect non-registered collection sites to provide technical assistance or investigate complaints.

In program year 11, the E-Cycle Wisconsin program lacked a second inspector until February 2020, and the DNR suspended all in-person facility inspections from March until July 2020 due to COVID-19. As a result, staff inspected fewer collection sites than in previous years, conducting 13 in-person inspections at registered collection sites and two at non-registered sites due to complaints. To compensate for the loss of in-person inspections, E-Cycle Wisconsin staff conducted phone inspections with 11 registered collectors who operate 26 collection sites. Most of those sites are targeted for on-site inspections in program year 12. DNR staff also conducted online surveys of collectors to understand the impact COVID-19 was having on site operations and the amount of electronics being collected.

DNR staff help collectors understand how to effectively manage their sites by providing technical assistance during inspections, through emails, phone calls and collector workshops. In program year 11, the DNR held one workshop in Fond du Lac County, with almost 70 participants. A planned spring workshop was canceled due to COVID-19.

Electronics recycling separate from E-Cycle Wisconsin

Currently, collectors and recyclers that perform basic disassembly of electronics are currently considered to be exempt from most solid and hazardous waste requirements if the materials are handled appropriately. Consequently, only recyclers participating in E-Cycle Wisconsin are operating under DNR regulatory oversight. Monitoring recycling activities that occur outside of E-Cycle Wisconsin has been challenging. Often these activities only come to the DNR's attention when a problem occurs.

The cost for recycling electronics continues to rise, and it is likely the declining markets for metals, plastics and CRT glass have led to fewer people being interested in starting an electronics recycling company, so the number of inquiries from aspiring recyclers has declined in recent years. However, DNR staff continue to receive a few contacts each year from people interested in starting a new electronics recycling business. Staff explain the

Table 6: DNR inspections conducted, by program year

Time period	Recyclers	Collection sites
July 1, 2010, to June 30, 2011	8	20
July 1, 2011, to June 30, 2012	8	29
July 1, 2012, to June 30, 2013	10	65
July 1, 2013, to June 30, 2014	10	116
July 1, 2014, to June 30, 2015	18	28
July 1, 2015, to June 30, 2016	7	37
July 1, 2016, to June 30, 2017	8	73
July 1, 2017, to June 30, 2018	9	60
July 1, 2018, to June 30, 2019	8	64
July 1, 2019, to June 30, 2020	3	24*

** Includes 13 in-person inspections of collection sites and 11 phone inspections with collectors due to the COVID-19 pandemic.*

rules, provide guidance documents for managing electronics and encourage them to develop a business plan that will ensure they have legitimate outlets for all electronic components. Staff encourage others who may have contact with small-scale recyclers—such as local governments, other recyclers and collectors, and salvage yard operators—to help advise small recyclers about the proper way to manage electronics.

Illegal disposal and irresponsible electronics processing

In 2020, leaders of 5R Processors, a former registered recycler and collector based in Ladysmith, WI, entered guilty pleas for charges related to mismanagement of hazardous waste (leaded glass from cathode ray tubes). 5R was registered as a collector and recycler under E-cycle Wisconsin from 2010 until 2014, when questions began to arise about its handling of CRT glass. According to the charging documents filed in the case, 5R had accumulated and stored more than 7 million pounds of leaded CRT glass at a facility in Tennessee and 1.3 million pounds of leaded glass at sites in Wisconsin as of November 2016. The U.S. Department of Justice's criminal case against 5R continued to move through the federal court system as of October 2020.

As of October 2020, there were three other significant cases undergoing enforcement actions for alleged hazardous waste violations related to CRT storage and management. The total amount of CRT glass attributed to those sites is approximately 2 million pounds. Approximately 275,000 pounds of CRTs have been removed from one of the sites, but there are additional violations that still need to be resolved before that case is closed.

In February 2020, DNR staff received a complaint regarding storage lockers that were full of TVs, and the landlord alleged that they had been abandoned, because rent was more than six months overdue. The tenant was a former registered collector whose registration had been revoked in October 2018. Upon investigation, DNR staff discovered two larger units packed full of electronics, the majority of which were CRT TVs. Electronics were also found in the smaller unit, but there were far fewer. DNR staff began working with the landlord and the collector to develop a clean-up plan. In September 2020, DNR received confirmation from the landlord that the lockers were cleaned up. The collector provided recycling receipts to the DNR, and DNR staff received verification from the downstream recycler that it received 156,011 pounds of TVs from that collector between June and September.

In June 2020, DNR received another complaint about the same collector from a different storage locker company. That company alleged that six storage units had been abandoned, but only one unit was full of electronics. The landlord removed 11,920 pounds of electronics for recycling. The total cost of cleanup was \$9,664 for labor, transportation and recycling fees. The landlord has filed a lawsuit against the collector to recover costs.

Oftentimes, municipalities are instrumental in helping to resolve cases, especially for cases that involve smaller amounts of materials. For example, one case that began in June 2019 involved a scrapper who was breaking CRT glass to recover the metals, which is a common issue that DNR addresses. The defendant left behind 3 Gaylords of crushed CRT glass. In addition to mismanaging CRTs, he was cutting freon lines on refrigerators. A DNR warden issued citations for the release of refrigerants and worked with Outagamie County Court, who agreed to dismiss the charges if the defendant cleaned up the CRT glass. The defendant provided documentation that the CRT glass was properly managed, and the court case was closed in November 2020.

DNR staff investigated about 10 other electronics-related complaints during 2019-20. Complaints included burning electronics, stockpiling, illegal dumping and other mismanagement of electronics and their components. The DNR addresses cases through letters, phone calls and/or visits by staff.

These types of cases show the need for DNR to continue outreach to ensure the public and municipalities

understand the issues regarding electronics mismanagement. Because of the cost of recycling electronics responsibly, collectors and individuals may turn to irresponsible, unregistered recyclers. DNR staff continue to reach out to collectors, governments and businesses to educate them about the importance of working with responsible recyclers and the potential consequences if their electronics are mismanaged.

Disposal ban outreach and compliance

In addition to the cases of irresponsible recycling discussed above, the DNR continues to receive reports of electronics being dumped on public lands, in ditches and in vacant lots, along with reports of electronics put in the trash. Often, these are cases of an individual dumping one or two items, most commonly TVs, and are difficult to track in a systematic way.

In fall 2020, the DNR is conducting a statewide waste characterization study to estimate the types and amounts of recyclable materials, including electronics, that are being sent to state landfills for disposal. Results from this study, expected in spring 2021, will help the DNR better evaluate compliance with the electronics disposal ban.

Public awareness efforts

The electronics recycling law requires the DNR to promote public participation in electronics recycling and facilitate communication among local governments and electronics collectors, recyclers and manufacturers. The DNR meets this requirement through advertising and social media, news releases, participation in outreach events, and providing outreach materials for local governments and E-Cycle Wisconsin participants to distribute. These efforts help ensure state residents are aware of the electronics disposal ban, and that manufacturers can meet their recycling targets.

The DNR's 2018 household survey estimated Wisconsin households had approximately 1.8 million TVs, 2.4 million computers and 5.1 million cellphones ready for disposal. The survey also found the top reasons residents were unable to recycle electronics were not knowing where or how, cost, lack of convenient location, and concern about data security. To help address these barriers, the DNR continues to promote electronics recycling through digital advertising, social media, sponsorship messages on Wisconsin Public Radio, and ads on Spanish-language radio stations to direct Wisconsin residents to consult the DNR's list of registered collection sites and mail-back programs.

Program challenges

In evaluating whether changes are needed to make the electronics recycling law function better, the DNR has gathered input through surveys and conversations with program participants, other stakeholders and the public. In particular, stakeholder meetings, collector workshops, surveys of registered E-Cycle Wisconsin participants, and statewide household surveys have provided valuable input.

Wisconsin's law is designed to operate on free-market principles, with collectors, recyclers and manufacturers conducting private negotiations to set recycling prices. However, declines in manufacturer targets, combined with increased recycling costs, have distorted the market. In recent years, the program has seen consumers having to pay an increasing share of the costs of recycling, decreased consumer access to recycling, decreased economic benefit for recyclers, and more illegal disposal and dumping.

Declining access and rising costs for consumers

As shown in Figure 3, the number of collection sites registered with E-Cycle Wisconsin increased through program year 4, then declined steeply, and has now stabilized. In program year 11, there were 351 permanent

sites, 70 one-day collection events and 56 other temporary sites registered with E-Cycle Wisconsin, for a total of 477 (down 30% from the program year 4 high of 681).

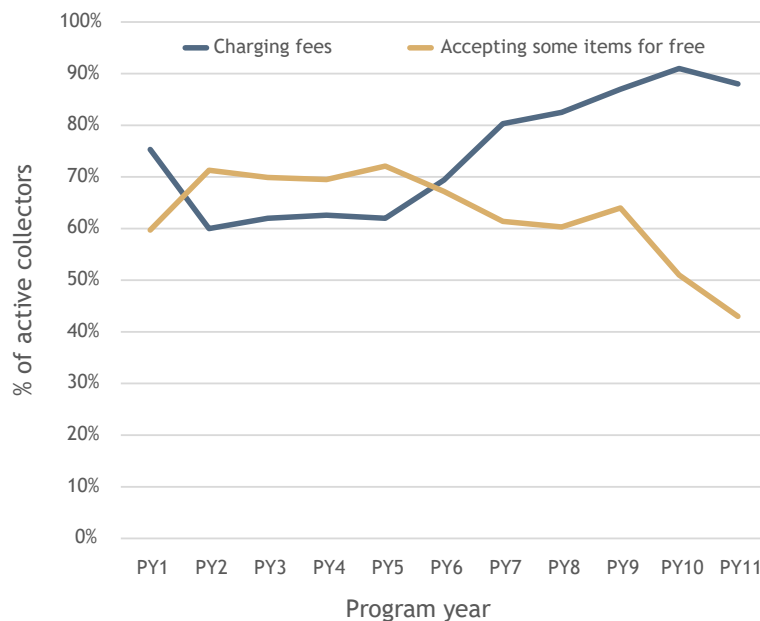
While all Wisconsin counties have had at least one registered collection site or event since 2010, the reduction in collection opportunities has affected residents in both rural and urban areas. During program year 11, there were E-Cycle Wisconsin collection sites in 63 of Wisconsin’s 72 counties, covering 97.8% of the state’s population. This was lower than the 69 counties with collection sites in program year 10, reflecting the fact that many rural counties rely solely on one-day collection events, many of which were canceled in 2020 due to the pandemic.

While this means that only a small portion of residents lived in counties without registered collection sites, there are parts of the state where residents would have to drive a significant distance to properly recycle electronics, increasing the likelihood of illegal dumping or disposal. And while urban areas generally had sites available, they were sometimes limited to residents of specific municipalities, leaving residents outside of those municipalities without convenient recycling options.

The map in Appendix B shows permanent and temporary collection sites registered during program year 11. Each site is surrounded by shading in a radius of 10 miles in the northeastern and southeastern parts of the state, and 15 miles in the northern, western and south-central areas, reflecting the median distance respondents reported they were willing to drive to recycle electronics on the 2018 DNR statewide household survey. These illustrate the mostly rural portions of the state that lack convenient access to collection sites.

As shown in Figure 9, there has been a substantial increase in the percentage of collectors charging consumers fees for electronics. In program year 11, 88% of active E-Cycle Wisconsin collectors charged consumers a collection fee of some sort, compared with 62% in program year 5. The percentage of active collectors taking at least some items for free fell from 72% in program year 5 to 43% in program year 11. Most collectors charged a per-item fee, with a smaller portion charging a per-pound fee or using a combination of fee types. Nearly all sites that charged a fee did so for TVs, and some limited the size or type of TVs accepted, or did not accept TVs at all.

Figure 12: Percent of registered collectors charging fees and accepting some items for free



that charged a fee did so for TVs, and some limited the size or type of TVs accepted, or did not accept TVs at all.

These fees reflect charges recyclers pass on to collectors. In the last few years, nearly all E-Cycle Wisconsin collectors have been paying for packaging, transportation and/or recycling of eligible electronics under the program. The most common charges were for recycling TVs and monitors (both CRTs and flat panels).

Getting electronics to registered recyclers

As shown in Figure 3, there has

been a significant amount of electronics collected by registered collectors but sent to non-registered recyclers over the last several years. In many cases, the material is still managed properly, but because the law doesn't require registered collectors or facilities not participating in E-Cycle Wisconsin to meet the same standards as registered recyclers, there is greater potential for these facilities to stockpile material and/or send it to non-legitimate downstream vendors, which can lead to costly cleanups. Diversion of more valuable devices also affects costs for registered recyclers and manufacturers. When the bulk of material sent to registered recyclers is CRTs, flat-panel displays and low-grade electronics, recycling costs for program-eligible materials are higher than if the true mix of collected electronics were reaching registered recyclers.

These issues point to the need to improve the economics of E-Cycle Wisconsin to ensure registered recyclers are the first choice for registered collectors and consumers, along with the need for more uniform regulations for all facilities in Wisconsin that dismantle electronics.

Economic challenges for electronics recycling

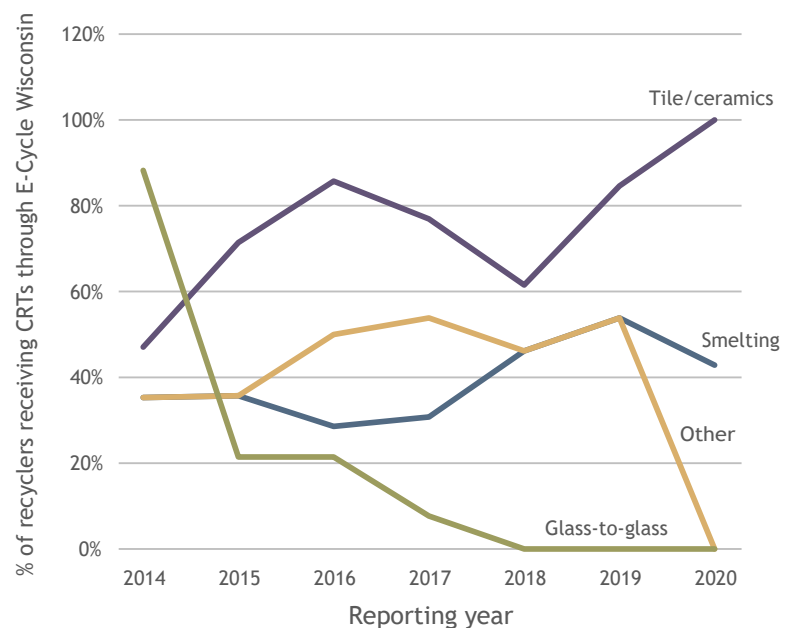
Changes in markets for commodities derived from electronics are a major cause of higher costs—along with increased labor costs due to a tight employment market—and manufacturer payments have not necessarily kept pace with these market shifts.

Cathode ray tubes

CRT-containing devices (TVs and monitors) make up the majority of weight collected under E-Cycle Wisconsin (see Figure 5). They are some of the most difficult and expensive devices to recycle, and several recyclers—including some involved in E-Cycle Wisconsin—have mismanaged or abandoned stockpiles of glass. The DNR has spent considerable time following up on these cases and making sure mismanaged glass is not counted for manufacturer credit under E-Cycle Wisconsin.

Figure 10 shows CRT end markets under E-Cycle Wisconsin since 2014. Historically, primary options for recycling the glass were the manufacture of new CRTs (called glass-to-glass) or smelting. In 2015, the lone remaining glass-to-glass furnace in the world stopped accepting more glass. Many recyclers began sending glass overseas for use in tile and other ceramics. Use of this option dropped during 2017-2018, especially when Spain stopped accepting CRT glass for tile in fall 2018, but rebounded due to expanding markets in Brazil and other countries, with all registered recyclers using ceramics as at least one of their CRT glass end markets. Smelting has remained a limited but steady

Figure 13: End-market destinations for E-Cycle Wisconsin CRT glass, 2014-2019



Many recyclers have multiple downstream vendors, so percentages do not add up to 100. Downstreams are based on what recyclers report during an annual fall survey.

end market for CRTs from E-Cycle Wisconsin. In 2020, unlike previous years, no glass was going to other end markets, such as non-lead CRT glass used in applications such as road base aggregate.

Flat-panel displays

Liquid crystal display (LCD) monitors and TVs, sold primarily between 2001 and 2014, have up to 20 thin, mercury-containing fluorescent tubes and represent another problematic portion of the waste stream. Manual disassembly of the displays is time-consuming (and thus expensive). One recycler in Wisconsin uses automated processing technology to reduce costs, but the value of commodities in flat panels is less than the cost of processing and handling the mercury.

Low-grade electronics and plastics import bans

Recyclers have relied on non-hazardous and more valuable materials in electronics—including steel, aluminum, precious metals and plastics—to offset costs for recycling materials like CRT glass. However, the value of commodities recovered from newer devices has dropped as manufacturers make products lighter and use fewer precious metals, and many commodity markets have decreased sharply in recent years. This means there is less commodity value in electronics to offset recycling costs.

Over the last three years, many countries have stopped accepting or placed restrictions on imports of plastics derived from electronics. As a result, electronics recyclers have had trouble marketing plastics, and prices in remaining markets are lower than in recent years. More countries are expected to add or increase restrictions on plastic imports going into 2021, as new provisions concerning plastics take effect in the international Basel Convention on the Control of Transboundary Movements of Hazardous Wastes. Several recyclers have implemented new procedures and installed equipment to improve the marketability of plastics, and a handful of electronics manufacturers incorporate recycled plastics into new products. However, the market volatility, overall price drop and lack of funding for capital investments have put new economic pressures on recyclers that will likely lead to higher costs for collectors, consumers and manufacturers.

Safe handling of lithium batteries

Lithium ion batteries—used in many portable electronics—can retain a considerable charge even after a consumer has discarded a device, and can spark and cause fires if damaged. Lithium batteries from devices thrown in the trash or curbside recycling bins, and even those properly brought to electronics drop-off sites, have caused several fires throughout the country, including in Wisconsin. Recyclers are spending additional money to train workers, revise procedures and invest in fire-suppression systems. The challenge will grow worse as more electronics containing these batteries enter the waste stream.

Manufacturer share of recycling costs

According to feedback from recyclers, consistent oversupply of eligible pounds, rising manufacturer compliance costs across programs in all states and competition among recyclers has led many manufacturers to push for lower per-pound payments. This means more of the recycling cost is passed on to collectors and, ultimately, consumers. Manufacturers could help improve the economics of E-Cycle Wisconsin by increasing the amount per pound they pay recyclers to cover the full cost of transportation and responsible recycling.

Recommendations for potential legislative changes

Based on the first 10 years of implementation and positive feedback from stakeholders, most of the fundamental elements of Wisconsin's electronics recycling law are sound. The changing nature of electronics and recycling markets, however, are producing the challenges discussed above and risk further erosion in consumer access to responsible and affordable electronics recycling. These ideas for the Legislature's consideration, submitted under s. 287.17(10), Wis. Stats., are based on extensive conversations with stakeholders over the last several years, in addition to analysis of program data.

The following previously recommended changes were included in companion state Senate and Assembly bills during the 2019-20 legislative session. The DNR continues to support these changes.

- Change the program year to a calendar year (Jan. 1 to Dec. 31), with reporting deadlines adjusted accordingly. To accomplish the transition, program year 12 would run from July 1, 2020, through Dec. 31, 2021, with reporting manufacturer targets adjusted accordingly.
- Modify the definition of "school" under s. 287.17(1)(np) to allow all K-12 schools in Wisconsin to recycle electronics through E-Cycle Wisconsin.

The bills also reduced annual registration fees paid to the DNR by smaller manufacturers by adjusting fee levels in s. 287.17(4)(b), Wis. Stats. The DNR continues to view this as a way of making this administrative cost more equitable, but recommends the following updated fee categories:¹

- \$5,500 if the manufacturer sold 550 or more covered electronic devices in this state during the last program year.
- \$2,500 if the manufacturer sold 250 to 549 covered electronic devices.
- \$0 if the manufacturer sold fewer than 250 covered electronic devices.

Consider updating or replacing the manufacturer target formula to ensure consistent and affordable consumer access to electronics recycling

To better balance the supply of electronics that need to be recycled with manufacturer obligations, the Legislature could consider adjusting the manufacturer target formula. For example, the multiplier in the formula could be increased from 0.8 to 0.9, or weight received for recycling under the program could be allocated among manufacturers by market share. In addition, the current rural incentive could be replaced with an alternative method to ensure that, regardless of the overall manufacturer target, manufacturers and recyclers would provide more opportunities for recycling in rural areas.

At the 2018 E-Cycle Wisconsin stakeholder meeting, many participants suggested an alternative approach, moving to a system where manufacturers assess a recycling fee when new electronics are purchased and use the resulting funds to pay for recycling. Other options stakeholders have suggested include moving to a "convenience model," where manufacturers work together to provide collection at sites throughout the state, and incentivizing manufacturers to incorporate recycled content (especially plastics) into their products by reducing recycling targets for those that have invested time and money to use recycled content in new products. The Legislature could request a study of the feasibility and implementation steps for these and other alternative methods of funding electronics recycling in Wisconsin.

Consider updating device definitions to address today's consumer electronics

As technology changes, it has been difficult for the DNR to determine whether devices are covered by the definitions in s. 287.17(1), Wis. Stats. Examples of these "gray area" products include smartphones, digital

¹ Current registration fee categories are: \$5,000 for 250 or more units sold, \$1,250 for 25 to 249 units sold and \$0 for fewer than 25 units sold.

picture frames, photo printers, portable DVD players and video game consoles. In addition, the increased use of lithium ion batteries in consumer electronics, along with the fact that the majority of these devices store personal data, make this a good time for the Legislature to take a fresh look at which devices are included in E-Cycle Wisconsin and are therefore banned from disposal in landfills or incinerators.

Device definitions and program requirements could be revamped to:

- Update the definition of consumer computer so that it is easier to determine whether new or updated products with video displays smaller than 7 inches, such as smartphones, are included, and add video game consoles to the list of covered electronics.
- Broaden the definition of video display device so that it includes items with screen sizes greater than 7 inches, such as portable DVD players, that are very similar to TVs and monitors but not currently included.
- Broaden the definition of “peripheral” to include items used with video display devices, not just computers. This would allow items such as coaxial cables and digital converter boxes to count toward a manufacturer’s recycling target, making the recycling program clearer for consumers and requiring less sorting by recyclers.
- Include more devices with lithium ion batteries in disposal bans and set standards for how battery-containing and data-containing devices must be managed under E-Cycle Wisconsin.

Consider creating a grant program to improve electronics recycling infrastructure

In addition to updating the manufacturer target formula and rural incentive, legislation could authorize the DNR to award small grants to create more electronics recycling opportunities in underserved areas of the state, using money already received from existing manufacturer fees. A similar program in Michigan is helping rural areas to set up viable permanent electronics collection sites or plan collection events.

Recommendations for non-legislative actions to improve electronics recycling in Wisconsin

Through conversations with stakeholders in recent years, the DNR has identified areas where collaboration or voluntary actions could improve consumer access to electronics recycling, reduce costs for consumers or collectors, or make consumers more willing to recycle electronics through E-Cycle Wisconsin. The suggestions below are in addition to the DNR’s efforts to enhance public outreach and improve compliance.

Collection site consolidation and collaboration

Registered recyclers have said being able to pick up full semi loads of sorted, well-packaged electronics reduces costs. There is a tradeoff, however, in ensuring convenient consumer access to collection sites. Especially in rural areas, collecting full semi loads at a municipal drop-off site is not feasible. Collectors (with support from recyclers and/or manufacturers) could explore forming voluntary partnerships and consolidating materials locally before sending them to a recycler.

Addressing underserved areas

Registered manufacturers could reach out to parts of the state that have had few collection sites or events and work with local governments, non-profits or businesses to organize collection events or permanent sites. In some cases, there may already be collection efforts outside of E-Cycle Wisconsin, and helping these join the program would ensure materials are sent to responsible recyclers and improve public awareness of these sites through the DNR’s online list of registered collection sites.

More value for consumers

On the DNR's 2018 household survey, concern about data security was one of the top barriers to recycling electronics, and many respondents were willing to pay more to recycle electronics with a guarantee of safe data destruction. Collectors can ensure their operations securely handle data-containing devices, and work with recyclers to provide information on how data are kept secure and destroyed. Collectors and recyclers could also explore options like hosting events with on-site hard drive shredding.

Other services/incentives survey respondents have said would make them willing to pay more to recycle electronics include receiving a gift card or coupon, or having electronics picked up from their homes. Collectors, recyclers, community organizations or manufacturers could consider sponsoring special incentives to encourage recycling, even if consumers are still paying some fees.

Improving consumer awareness

The DNR's 2018 household survey showed receiving recent information about electronics recycling was the biggest factor in whether respondents knew where to recycle electronics. Local governments and electronics retailers have statutory requirements to educate residents and customers on this topic. Manufacturers, recyclers and collectors could also add to consumer education efforts.

Recycling market development

A challenge for recyclers has been the lack of funding for research and development of new or more reliable end markets for materials derived from electronics, such as CRT glass and plastics. More private funding in this area, including investment to help offset capital costs for installing or upgrading processing equipment, could help address some of these market challenges.



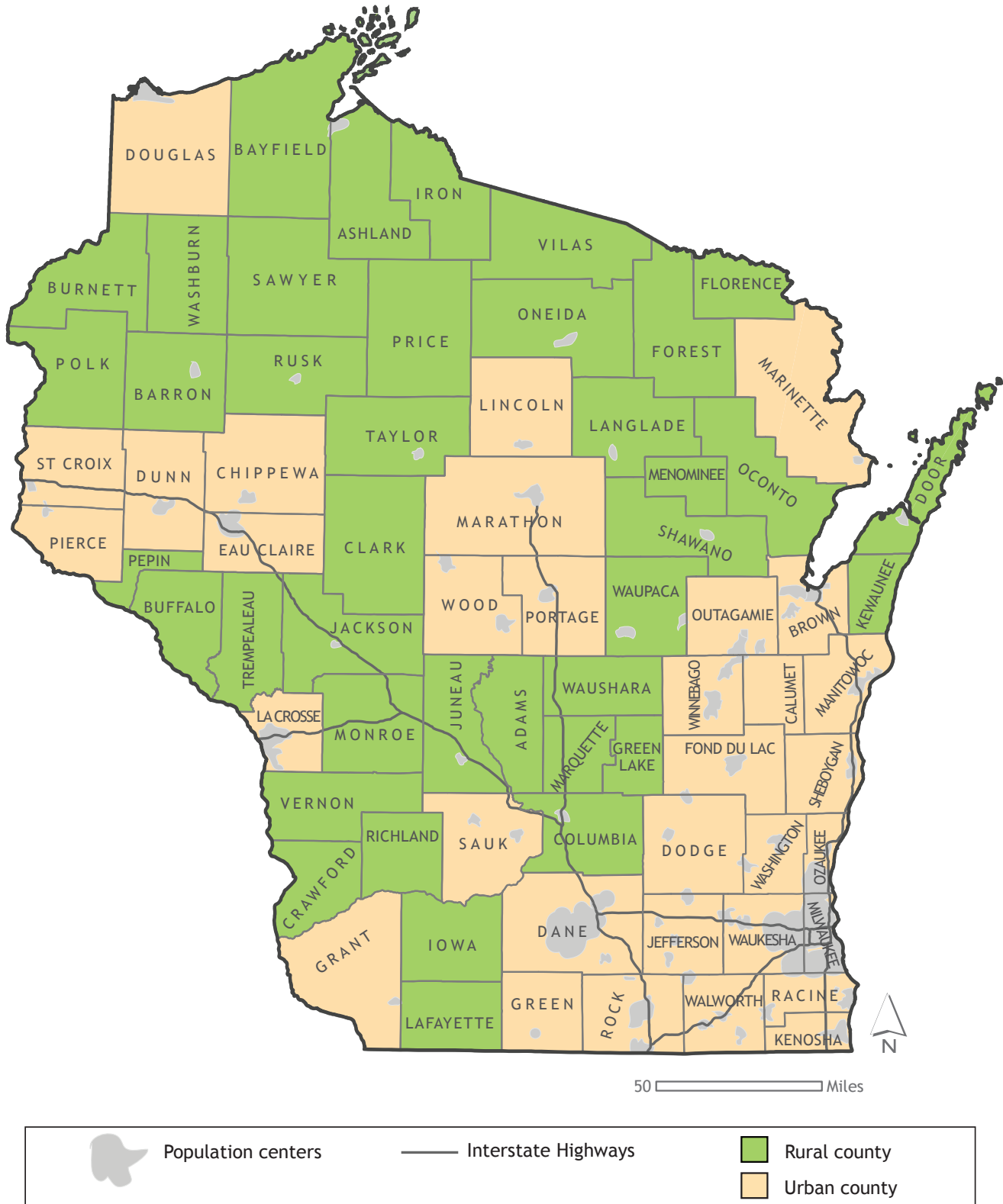
PUB-WA-1911 2020

Wisconsin Department of Natural Resources
Bureau of Waste and Materials Management
P.O. Box 7921, Madison, WI 53707 | DNRWle-cycling@wisconsin.gov

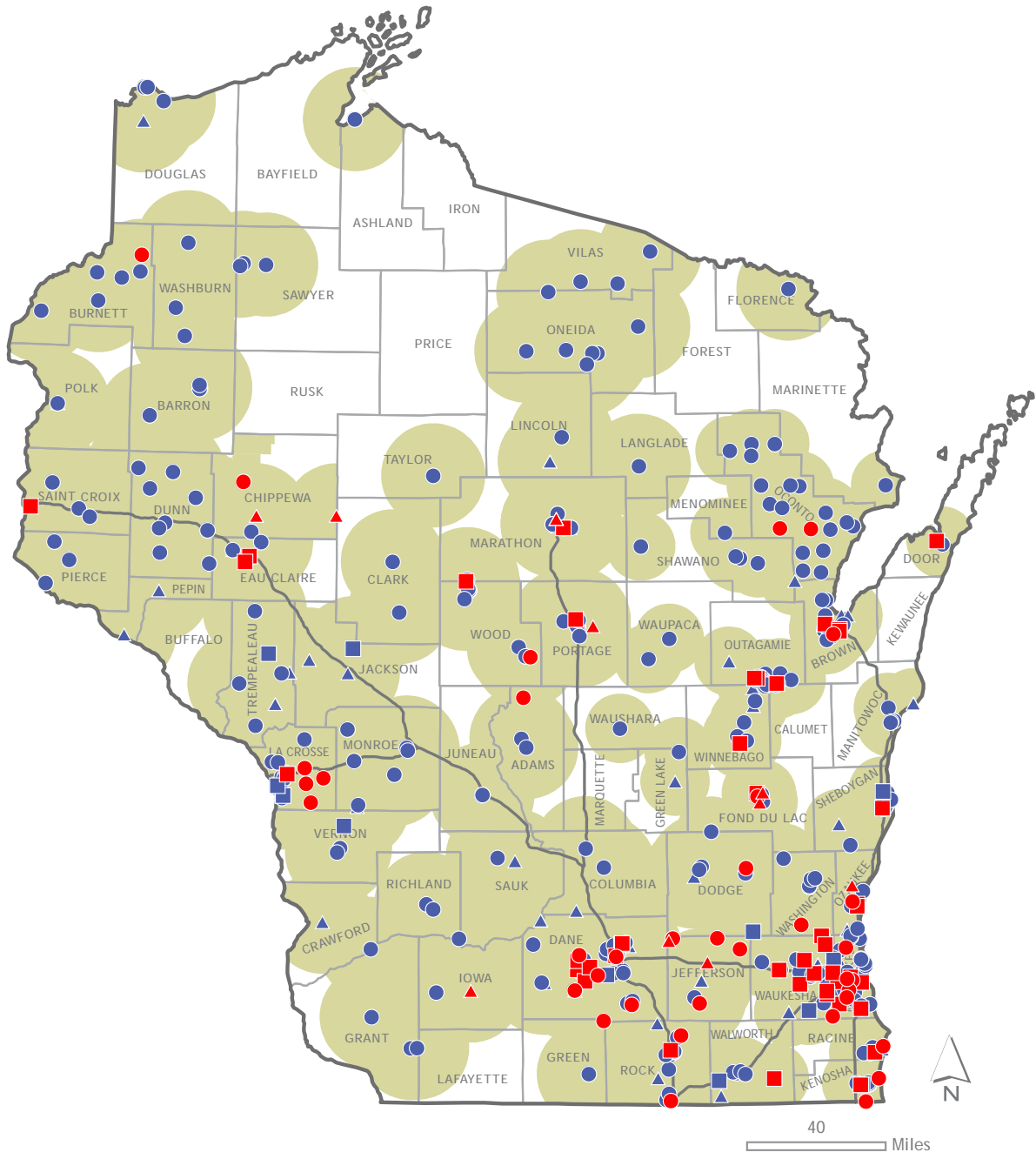
The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services, and functions under an Affirmative Action Plan. If you have any questions, please write to Chief, Public Civil Rights, Office of Civil Rights, U.S. Department of the Interior, 1849 C. Street, NW, Washington, D.C. 20240.

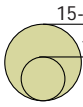








This publication is available in alternative format (large print, Braille, etc.) upon request. Note: If you need technical assistance or more information, call the Accessibility Coordinator at 608-267-7490 / TTY Access via relay - 711.

Appendix A: Map of urban and rural counties under E-Cycle Wisconsin



Appendix B: Map of collection sites registered under E-Cycle Wisconsin during program year 11



	15-mile coverage area: Northern, South Central, West Central*		Permanent collection sites		Interstate highways
	10-mile coverage area: Northeast, Southeast*		One-day collection sites		Temporary collection sites
*Based on the 2018 WDNR Household Survey question, "How far would you be willing to travel to recycle electronics?"					Collection sites available only to employees and customers of a company or residents of a village, town, or county.