Form 1100-001N (Rev. 10/12)

Wisconsin Department of Natural Resources
Natural Resources Board Agenda Item

Item No. 8.A.1

SUBJECT: Update on implementation of Wisconsin's electronics recycling law and E-Cycle Wisconsin results

FOR: February 2013 Board meeting

TO BE PRESENTED BY: Sarah Murray, DNR E-Cycle Wisconsin coordinator

SUMMARY:

Wisconsin's electronics recycling law establishes a statewide program to collect and recycle electronic devices from households and schools and banned most electronics from landfills and incinerators beginning in September 2010. Under the law, manufacturers of TVs, computers and desktop printers must register with the DNR brands they sell to households and schools in Wisconsin, and 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 program is called E-Cycle Wisconsin.

One requirement of the law is that, beginning in 2012, the DNR annually evaluate several aspects of the law and make recommendations to the Legislature on any needed changes, along with providing an annual report on the law's implementation and effects. DNR submitted its first report to the Legislature and Governor in December 2012.

This item will present highlights of the report and DNR's role in implementing the law. Key points include:

- By the end of 2012, Wisconsin households and schools had recycled close to 100 million pounds of electronics through E-Cycle Wisconsin.
- During program year 3 (July 2011 to June 2012), registered collectors took in 39.1 million pounds of electronics, or 6.8 pounds per Wisconsin resident—one of the highest rates in the country.
- The number of registered collection sites available to Wisconsin residents has increased 70 percent since early 2010. During program year 3, there were collection sites in 69 of Wisconsin's 72 counties, covering 99.5 percent of the state's population. While the availability of recycling increased significantly, costs to local governments decreased.

Electronics recycling laws in Wisconsin and neighboring states have allowed electronics recyclers in Wisconsin and the Midwest to open new facilities, expand existing ones, add shifts and hire new employees. More than 90 percent of the electronics collected under E-Cycle Wisconsin are processed initially in Wisconsin or other Midwest states.

Remaining challenges include the fact that not all residents are aware of the law, and some still put electronics in the trash or illegally dispose of them on public and private property. In addition, some small-scale recyclers and collectors not participating in the E-Cycle Wisconsin program are mismanaging potentially harmful materials.

RECOMMENDATION: Information only

LIST OF ATTACHED MATERIALS (check all that are applicable):

- ☐ Background memo
- ☒ E-Cycle Wisconsin 2012 report
- ☐ Type name of attachment or type N/A if not applicable
- ☐ Type name of attachment or type N/A if not applicable

Approved by	Signature	Date
Ann Coakley, Bureau Director	Ann Coakley by cas	12-14-12
Pat Stevens, Administrator	Pat Stevens	12/19/12
Cathy Stepp, Secretary	Matt Moroney	1/30/13

cc: Board Liaison – AD/8

E-Cycle Wisconsin 2012 report

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

December 2012

Executive summary

Wisconsin's electronics recycling law took effect Jan. 1, 2010, when manufacturers of certain consumer electronics were required to collect and recycle electronics from Wisconsin households and schools under the E-Cycle Wisconsin program. Beginning Sept. 1, 2010, many consumer electronics—including TVs, computers, printers and cell phones—could no longer be put in the trash or sent to landfills and incinerators in Wisconsin.

This report provides an update to the Legislature and governor on the law's implementation and achievements. Based on data and stakeholder input the DNR has collected throughout its implementation of 2009 Wisconsin Act 50, there is good news to report on progress toward meeting the law's goals. The DNR is recommending only a few minor changes to improve the functioning of the E-Cycle Wisconsin program, and is monitoring several other issues that may require more attention in the future.

Successes

- By the end of 2012, Wisconsin households and schools will have recycled close to 100 million pounds of electronics through E-Cycle Wisconsin. During program year 3 (July 2011 to June 2012), registered collectors took in 39.1 million pounds of electronics, or 6.8 pounds per Wisconsin resident—one of the highest rates in the country.
- During program years 2 and 3, nearly all manufacturers met or exceeded their recycling targets, with only a handful of companies with small recycling targets choosing to pay a shortfall fee to the state instead of purchasing recycled pounds.
- The number of registered collection sites available to Wisconsin residents has increased 70 percent since early 2010. During program year 3, there were collection sites in 69 of Wisconsin's 72 counties, covering 99.5 percent of the state's population.

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Consumers in most parts of the state have free or low-cost recycling options for most electronics.
- The manufacturer-funded recycling program has reduced costs for many local governments.
- The vast majority of manufacturers, recyclers and collectors are complying with the law, and the DNR has taken actions to ensure a level playing field for program participants.
- Electronics recycling laws in Wisconsin and neighboring states have allowed electronics recyclers in Wisconsin and the Midwest to open new facilities, expand existing ones, add shifts and hire new employees. More than 90 percent of the electronics collected under E-Cycle Wisconsin are processed initially in Wisconsin or other Midwest states.

Challenges

- Not all Wisconsin residents are aware of the law, and some are still putting electronics in the trash or illegally disposing of them on public and private property. Residents in a few parts of the state still lack good electronics recycling options, or may be unwilling to pay the fees charged by existing collectors.
- The rising cost of recycling leaded glass from cathode ray tubes and diversion of the more valuable electronic components from the program are posing economic challenges to recyclers and manufacturers. At the same time, electronics collection has been exceeding manufacturer targets by several million pounds, putting downward pressure on the payments recyclers receive per pound they process.
- Small-scale recyclers and collectors not participating in the E-Cycle Wisconsin program are, in some cases, mismanaging potentially harmful materials. Residents aware of the disposal ban but not E-Cycle Wisconsin may be increasing the volume of materials sent to irresponsible recyclers

Policy recommendations

Potential changes that would require legislative action are outlined here; for a complete discussion of these and other issues, see the policy recommendations section at the end of this report.

- To gain a firmer understanding of how the mix of products being recycled under E-Cycle Wisconsin compares to the mix of products being sold, make small modifications to the manufacturer registration and reporting requirements in s. 287.17(5)(a) and the reporting requirement for recyclers under s. 287.17(8)(b).
- Change the registration fee levels in s. 287.17(4)(b) to assist small businesses by reducing or eliminating registration fees paid to the state by very small electronics manufacturers.
- Set up a simple grant program, using manufacturer shortfall fees and some portion of registration fees, to help fund electronics collection sites or events for areas or populations currently underserved by E-Cycle Wisconsin.
- 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.

Introduction

Electronics are one of the fastest-growing components of the municipal solid waste stream in the United States. The number of electronics used at home and work has expanded significantly over the past few decades, and rapid changes in technology have meant many consumer electronics quickly become obsolete. The 2009 conversion from analog to digital TV signals spurred many consumers to purchase new TVs and store or dispose of older sets, most of which contain leaded glass.

Concern over this rapidly growing, potentially hazardous waste stream was one of the primary motivations for Wisconsin's electronics recycling law, both because of the potential environmental problems and the desire to capture the valuable materials in old electronics for productive use.

Wisconsin's electronics recycling law (s. 287.17, Wis. Stats.) establishes a statewide program to collect and recycle certain electronics. It is based on a product stewardship approach, in which manufacturers fund collection and recycling programs for their products. To support recycling and minimize disposal, the law banned many electronics from Wisconsin landfills and incinerators beginning in September 2010.

Under the law, manufacturers of TVs, computers and desktop printers must register with the DNR the brands they sell to households and schools in Wisconsin, and 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. If a manufacturer fails to meet its recycling target for a given program year, it pays a shortfall fee. Annual manufacturer registration fees fund DNR administration of the program.

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 each year. These include basic information about the weight of electronics collected under the program and other information provided by program participants, information about electronics recycling outside of E-Cycle Wisconsin, a summary of compliance and any enforcement actions taken related to the disposal bans, and recommendations for any changes needed.

To help evaluate the law and the DNR's administration of it, we also examined 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

Electronics in Wisconsin

In 2010, there were approximately 7.4 million TVs in Wisconsin households, 16 percent of which were unused; 4.3 million computers, 26 percent of which were unused; and 5 million cell phones.

The average household had three or more TVs, about two computers, and two or more cell phones. Surveys have shown that many people are storing old electronics, either because they may use them again or because they're not sure how to dispose of the devices.

Based on a 2010 DNR survey of Wisconsin households. For more details, see http://dnr.wi.gov/topic/Ecycle/wisconsin.html.

E-Cycle Wisconsin program years

Program years run from July 1 to June 30, coinciding with the state's fiscal year. The first program "year" lasted just six months, to get the program on this calendar. Here are the dates for program years referenced in this report.

Program year 1
January 1 to June 30, 2010

Program year 2
July 1, 2010, to June 30, 2011

Program year 3
July 1, 2011, to June 30, 2012

Program year 4
July 1, 2012, to June 30, 2013

Table 1: Program year 3 registration and participation

Category	Registered	Active
Collectors	152	133 (89%)
Recyclers	32	25 (78%)
Manufacturers	80	n/a
Brands	120	n/a

government intervention.

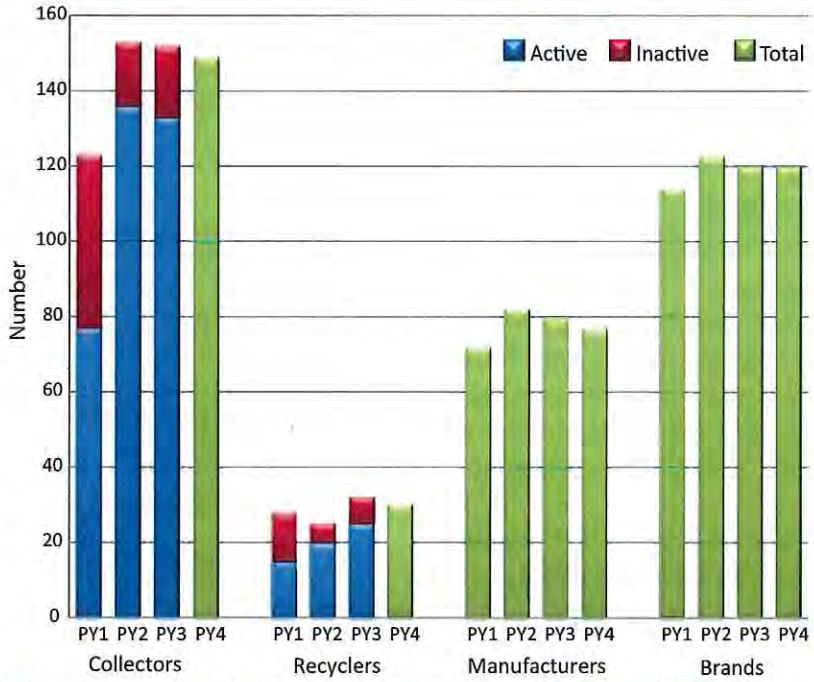
- Reducing electronics recycling costs and improving recycling convenience for consumers.
- Reducing the financial and administrative burden on local and state governments of managing e-waste.
- Ensuring a level playing field for all participants in the electronics recycling program, including accountability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

The results presented below suggest the E-Cycle Wisconsin program, coupled with the disposal bans, is largely satisfying these criteria. Stakeholders and DNR staff have identified certain aspects of the program that could be improved, as well as a few key issues that will bear watching over the next few years. These potential improvements and issues are discussed at the end of this report.

Program participation

Overall, it appears that a strong market for used electronics has developed within E-Cycle Wisconsin, with competition among registered recyclers and manufacturers encouraging lower-cost recycling for all parties involved. The DNR has focused its program management on making sure all E-Cycle Wisconsin participants have the information they need and on maintaining a level playing field for manufacturers and recyclers.

Figure 1: Summary of registration and participation



PY = program year. Program year 4 totals as of October 2012

E-Cycle Wisconsin registrations in program year 3 were very similar to program year 2. The number of registered collectors, manufacturers and brands declined slightly, while the number of registered recyclers increased. Table 1 shows registrations for program year 3, and Figure 1 illustrates registration trends over the first four program years (with program year 4 numbers as of October 2012). In the table and figure, "active" means a collector that sent electronics to a registered recycler or a recycler that received electronics from registered collectors.

The majority of registered collectors are local governments or for-profit businesses, though the proportion that were local governments decreased slightly during program year 3 and the percentage that were for-profit businesses or non-profits increased slightly. Figure 2 shows the number of each type of collector registered over the first three program years.

During program year 3, there were 446 permanent and 166 temporary or event collection sites registered with E-Cycle Wisconsin for at least part of the year, a total of 612. For-profit collectors operated the highest number of sites (319, or just over half the total), though many of these were at retail or government locations, as seen in Figure 3.

Figure 2: Collector registration by type

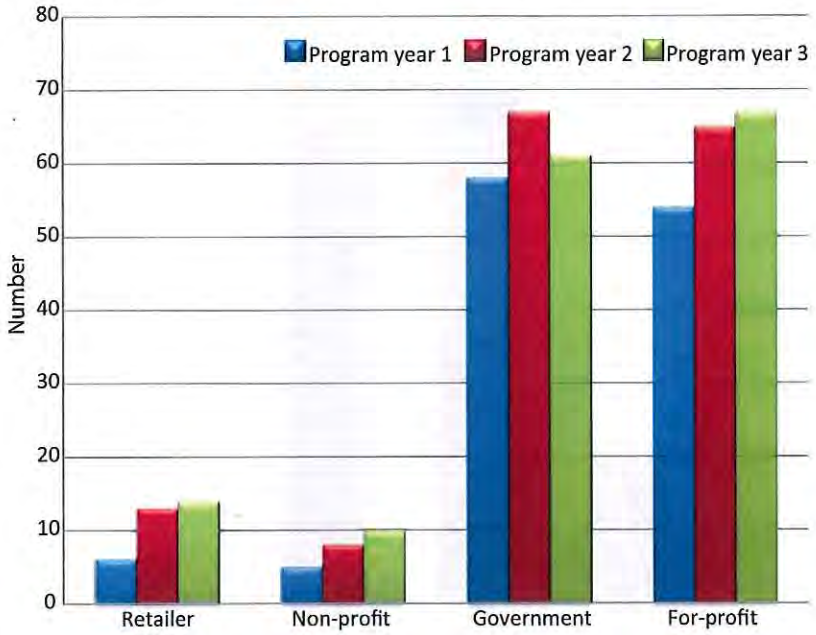


Figure 3: Program year 3 collection sites, by type

Collection and recycling totals and analysis

Collection of eligible electronics under E-Cycle Wisconsin during program year 3 increased by 11 percent over program year 2. From July 2011 through June 2012 (program year 3), registered collectors took in 39.1 million pounds of electronics from Wisconsin households and schools (see Table 2). This was equivalent to 6.8 pounds per capita, one of the highest rates among states with electronics recycling laws, and up from 6.2 pounds in program year 2. Figure 4 shows collection totals for the first three program years, a cumulative total of 85 million pounds. We expect the program will have collected close to 100 million pounds by the end of 2012.

Of the 39.1 million pounds collected, about 765,000 pounds (2

Table 2: Eligible electronics collected by registered collectors, program year 3

Type	Pounds
Urban	33,846,683
Rural	5,020,416
Not sent to registered recyclers	231,218
Total collected	**39,098,317**

Figure 4: Pounds collected by registered collectors

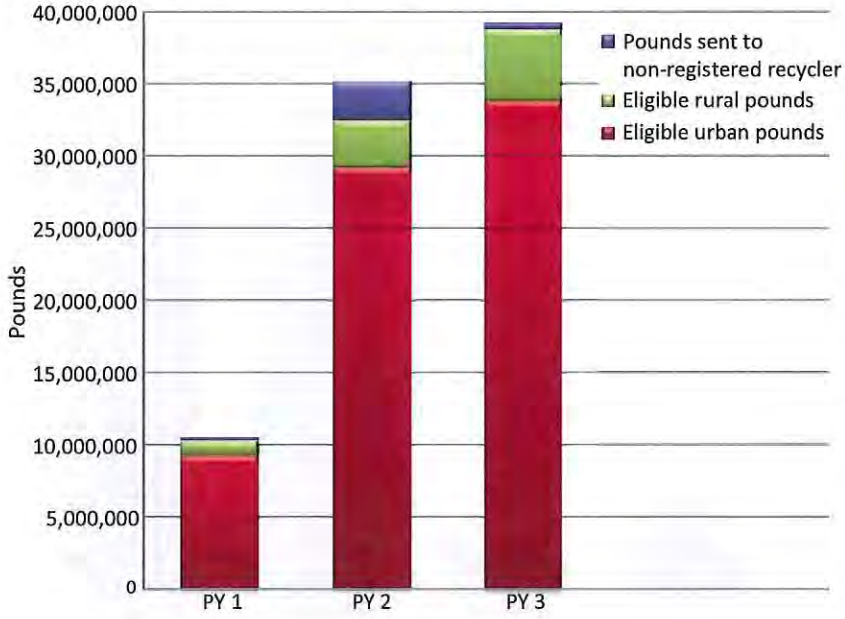


Table 3: Pounds collected, by collector type

Type	PY2	PY3
Retailer	5,674,573	6,534,563
Non-profit	7,433,391	7,883,078
Gov't	6,291,347	7,045,440
For-profit	15,750,598	17,635,236
Total	**35,149,909**	**39,098,317**

PY = program year

Table 4: Program year 3 collection, by product type

Product type	% of total weight
TVs	62%
Monitors	11%
Computers	9%
Other EEDs	18%

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

percent) came from schools, according to voluntary collector reports. (For more information about electronics recycling in schools, see the report on this topic at http://dnr.wi.gov/topic/Ecycle/wisconsin.html.)

Collection increased from program year 2 to program year 3 among all types of collectors (retailer, non-profit, government and for-profit), as shown in Table 3. The biggest growth was among for-profit collectors (businesses), though, as noted above, many for-profit collectors partner with local governments, non-profits or retailers, so the totals may be slightly skewed. A small number of registered retailer and non-profit collectors accounted for a large portion of the total in all three program years (Figure 5 illustrates the breakdown for program year 3). Some of the largest collectors include the various Goodwill store groups across the state, Best Buy stores and American TV and Appliance stores.

Collectors were not required to provide a breakdown of what they collected by product type (TV, computer, etc.). However, about a quarter of those that reported collection totals did provide this breakdown, giving a rough picture of the types of electronics being collected under E-Cycle Wisconsin (see Table 4). TVs and computer monitors made up about three-quarters of what was collected overall, by weight. This distribution indicates a slight shift from what voluntary reports showed for program year 2 and is a little closer to the estimated product breakdown for program year 1 (see Figure 6). It may be that the group of collectors choosing to report this information is not representative of the full group; the DNR is exploring options for obtaining more complete data (see the policy recommendations section.)

Collection exceeded the overall manufacturer recycling target for program year 3 of approximately 31 million pounds. With the rural credit factored in and pounds diverted for reuse subtracted out, Table 5 shows that registered recyclers had 39.1 million eligible pounds available for purchase and sold 33.9 million pounds to manufacturers. Thirty-nine manufacturers recycled more than their target weights during program year 3 and earned credits for use in future

program years (though in some cases, the amounts were negligible—a few pounds or less). At the end of program year 3, just under 2.8 million pounds of credits were available to manufacturers for future use.

Manufacturer recycling programs

In May 2012, the DNR sent a survey to registered manufacturers asking about their experiences with E-Cycle Wisconsin thus far.

Among the responding manufacturers, about 90 percent had some type of contract in place with recyclers (to purchase credit for pounds of recycled electronics to help meet the manufacturer's recycling target) by early in a program year, either individually or as part of a group. Three of the four manufacturers that said they purchased pounds without a standing contract did so to supplement contracted purchases. Half the responding manufacturers said their cost per pound for recycling was the same in Wisconsin as in other states; 16 percent said the cost per pound was lower in Wisconsin and 9 percent said it was higher. (The remaining respondents were unsure.)

During program year 3, just under one-third of registered manufacturers (24) participated in a manufacturers' collective that contracts with recyclers for a large total sum of pounds and distributes the recycled pounds among its members. The largest active collective is MRM, with a smaller number of manufacturers participating with E-World Online and AERCCR. These collectives were responsible for one-third of the recycled pounds purchased by manufacturers during program year 3.

Figure 5: Program year 3 collected pounds, by collector type

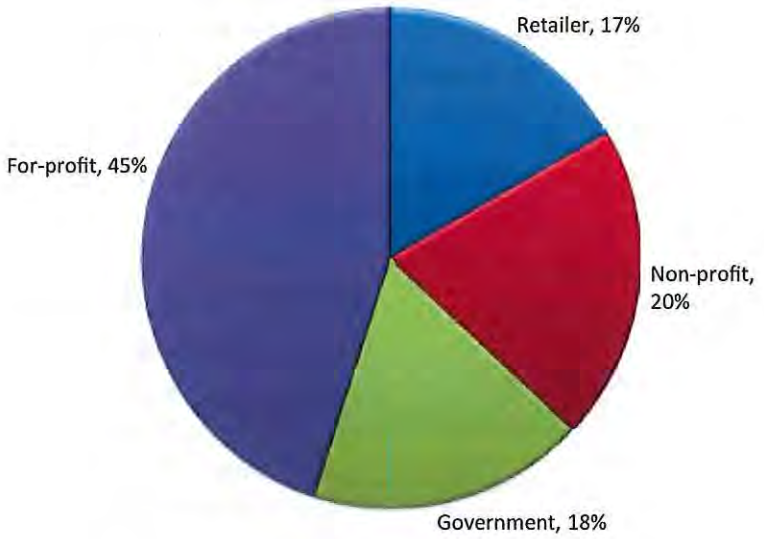


Figure 6: E-Cycle Wisconsin collection by product type

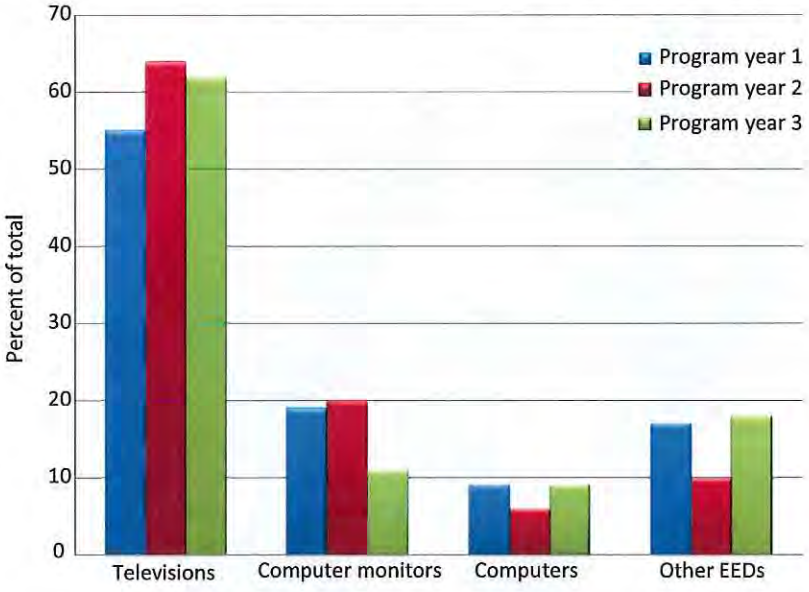


Table 5: Eligible pounds received and recycled, program year 3

Type	Pounds
Urban received	33,573,923
Rural with credit	6,054,802
Diverted for reuse	533,725
Counted for manufacturer targets	33,851,692

Rural credit is 1.25 pounds per pound collected. For a map of which counties are designated urban and rural, see http://dnr.wi.gov/topic/Ecycle/documents/countiesmap.pdf.

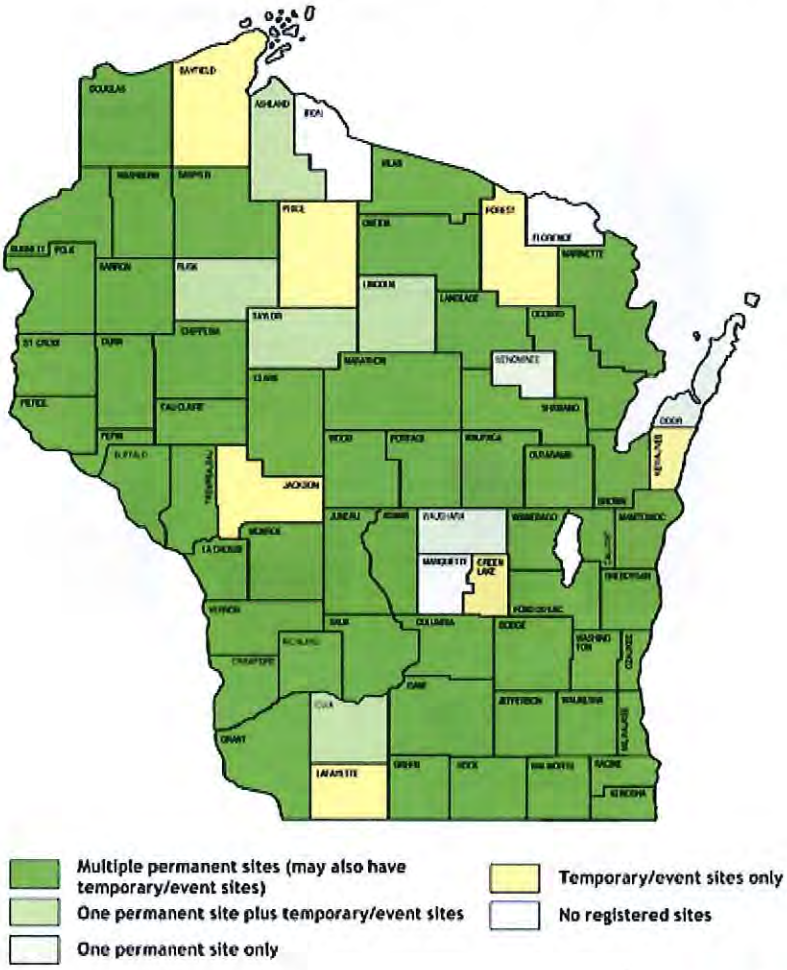
Urban and rural pounds differ slightly from Table 2 because of how collectors and recyclers report pounds collected before a program year end but not received by a recycler until the next year. The last row shows pounds manufacturers purchased from registered recyclers.

Based on responses to the 2012 manufacturer survey, it appears that most manufacturers rely on the recyclers they contract with to find and/or set up collection networks; only about one-fifth of the manufacturers responding to the survey said they had been directly involved with setting up collection sites. Prominent exceptions include the Dell Reconnect program, which works with several networks of Goodwill stores; Best Buy's collection program; and a partnership between Hewlett Packard (HP) and the Staples retail chain.

Recycling access and costs for consumers

As of October 2012, there were more than 400 permanent collection sites and several dozen temporary/special event collection sites registered with E-Cycle Wisconsin. During program year 3, there were E-Cycle Wisconsin collection opportunities in 69 of Wisconsin's 72 counties, covering 99.5 percent of the state's population (see Figure 7). The number of collection sites increased by 70 percent between February 2010 (just after the E-Cycle Wisconsin program began) and October 2012. This is mostly due to an increase in the number of permanent sites (see Figure 8). The number of temporary or event sites varies somewhat by season. Most events are held between late spring and early fall.

Figure 7: Registered collection sites by county, program year 3



Fees charged by registered collectors

Collectors report that fees charged to consumers to recycle electronics have declined since E-Cycle Wisconsin began, though the proportion of collectors charging fees held relatively steady between program years 2 and 3. We expect that either the proportion of collectors charging fees or the amounts being charged may increase during program year 4, due mostly to increased processing costs for cathode ray tube (CRT) glass

from older TVs and computer monitors.

Overall, since the law took effect there are more opportunities for free electronics recycling. During program year 3, 62 percent of active collectors reported charging some type of fee for some items. The majority of fees were assessed per item (e.g., $15 to recycle a TV), but some collectors charged per-pound fees or used other fee systems (see Figure 9). Of the 82 collectors that charged a fee, about half accepted some items for free. Overall, about 70 percent of collectors active during program year 3 accepted at least some items for free. All collector types were equally likely to either offer free collection or charge a fee—that is, a government collector was no more likely than a for-profit collector to charge a fee.

TVs and computer monitors, especially larger or older, CRT-style models, were the items most likely to be assessed a fee. Some collectors (especially local governments) charged a nominal fee ($5 or less) to cover handling costs for larger items or to illustrate to consumers that there is a cost to recycling these large items. Some of the charges in the "other" category included charges for home pick-up or a small, flat fee per visit to a drop-off center.

Figure 8: E-Cycle Wisconsin registered collection sites

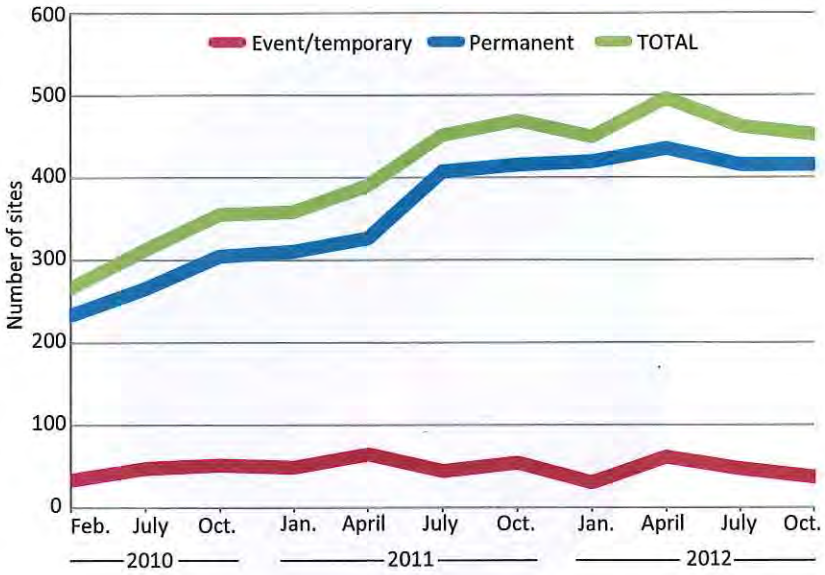
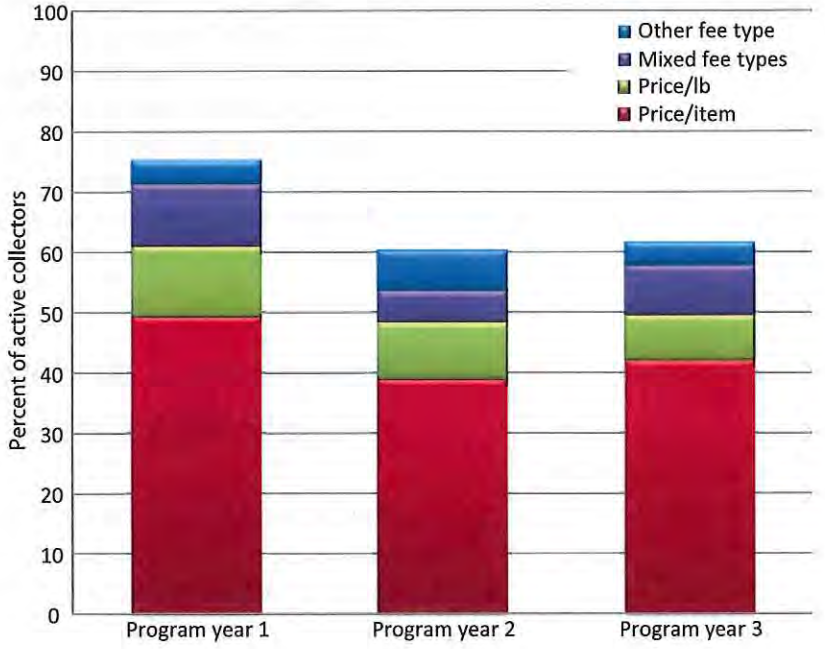
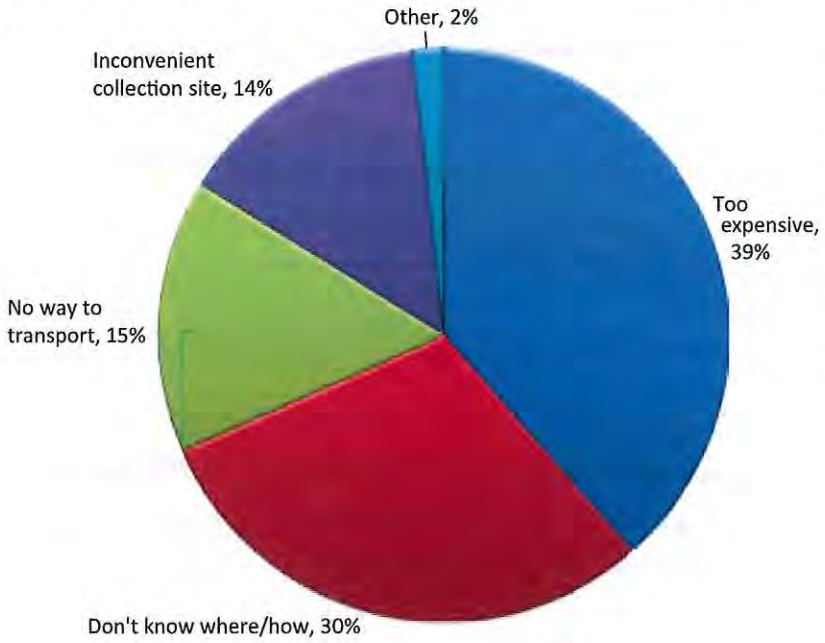


Figure 9: Fees charged by registered collectors, by year and fee type



Fee levels in program year 3 were similar to previous program years. Most collectors charging for TVs differentiated by size, with smaller TVs typically costing $5 to $10 and larger ones costing $20 to $30. A few charged $40 or more for very large, console or projection

Figure 10: Reported barriers to recycling electronics



TVs. Most monitor charges were in the $5 to 10 range. Collectors that charged for computers typically charged $5 to $10 for desktops and $10 to $15 for laptops. Per pound fees ranged from 10 to 35 cents, with the most common amounts in the 25- to 30-cent range.

Barriers to recycling electronics

In 2011, the DNR conducted a statewide household recycling survey to gather current information on Wisconsin residents' opinions, behaviors and knowledge of household recycling, including electronics recycling. Perceived expense and not knowing where to take electronics for disposal are the two barriers that most survey respondents listed as preventing them from recycling their old electronics (see Figure 10). These are the same two factors landfill operators, transfer station operators and public lands managers cite as leading to continued illegal disposal of electronics. These perceived barriers persist despite the fact that recycling old electronics is no longer as costly nor as inconvenient in this state as it was prior to implementation of the electronics recycling law. The DNR has an opportunity to address the perception of these barriers through targeted outreach.

Compliance and enforcement within E-Cycle Wisconsin

Manufacturer and retailer compliance

Manufacturer and retailer compliance are important foundations of E-Cycle Wisconsin. It is a manufacturer's responsibility to register all brands of covered electronics sold to households and K-12 schools in Wisconsin. Manufacturers pay a graduated annual registration fee depending on the number of units they sell in Wisconsin (the fee is waived for manufacturers that sell fewer than 25 units). For their part, electronics retailers have a responsibility to only sell brands that have been registered in the state.

Overall, there has been good compliance from manufacturers of major electronics brands. As has been the case in other states with electronics take-back laws, getting all manufacturers to register and pay applicable registration fees on time has been a challenge, but the DNR continues to work with manufacturers that contact us to help them comply, to reach out to new manufacturers of covered electronics and to follow up with manufacturers registered in other states but not in Wisconsin.

Steps the DNR has taken to assist manufacturers and retailers and to ensure compliance with the new law include:

- Following up with manufacturers that fail to submit their annual re-registration and report form. In 2010, two manufacturers failed to submit the required re-registration forms and payment. In 2011, one manufacturer submitted the required form but not the registration fee payment. In 2012, six manufacturers had failed to submit their required form and/or payment as of the end of November.
- Working with other states through the Electronics Recycling Coordination Clearinghouse, a national organization of which Wisconsin is a member. States share manufacturer contact and compliance information to help ensure consistent manufacturer compliance.
- Conducting in-person visits of retail stores to help inform a retailer outreach effort the DNR launched in fall 2012. Of the four in-person retailer visits the DNR conducted, three retailers were selling unregistered brands. Phone conversations with these retailers and others helped the DNR create a toolkit to explain retailer obligations and to assist retailers in training staff. The DNR also added the phrase "Do Not Sell" to the unregistered brand list posted online to make retailer obligations more explicit.
- Conducting Internet searches to find unregistered brands available for sale online. These searches greatly expanded the DNR's list of unregistered brands. Previously, the DNR's list had been based on lists generated by other states. Internet searches allowed the DNR to add many of the new brands that rapidly enter the marketplace and remove brands no longer available for sale. The DNR is in the process of contacting manufacturers of unregistered brands to help them comply with the law.

In addition to registration, the law requires manufacturers to meet weight-based targets for recycling. Beginning with program year 2 (the report submitted in 2011), manufacturers could choose to pay shortfall fees to the state to meet part or all of their recycling obligation. During program year 3, nine manufacturers paid a fee, and seven of those paid the fee for their entire obligations. All had very small

Registration lists

The DNR keeps updated lists of registered and unregistered manufacturers and brands, registered recyclers and collectors, and registered collection sites on its website. Lists are available at http://dnr.wi.gov/topic/Ecycle/wisconsin.html.

Table 6: 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	$251,250	--

Figure for program year 4 as of November 2012. The law did not assess shortfall fees for program year 1.

recycling obligations (ranging from 13 to 26,742 pounds out of the 31 million-pound total obligation). Similarly, during program year 2, 14 manufacturers paid a shortfall fee, and 11 of those paid the fee for their entire obligations. All had very small recycling obligations (ranging from 13 to 4,173 pounds, compared to the total obligation of 29 million pounds). Each year, the DNR has worked with manufacturers to help them purchase eligible recycled pounds rather than pay a fee, but several have said it is more convenient for them to pay the fee than to go through the process of contracting with a recycler.

Table 6 summarizes the registration and shortfall fees paid during the first four E-Cycle Wisconsin program years.

Inspections of registered recyclers and collectors

Recyclers registered with E-Cycle Wisconsin must meet standards beyond those required of recyclers that operate outside of the program. These higher standards include maintaining owner financial responsibility (OFR) to cover proper closure of the facility, pollution liability insurance of at least $1 million, and a written contingency plan to manage emergencies. Registered recyclers are also required to maintain adequate records showing the weights of eligible electronic devices collected and processed and the downstream vendors that receive the materials.

To ensure that registered recyclers are in compliance with these requirements, as well as other solid and hazardous waste management regulations, in-state registered recyclers are subject to routine DNR inspections that are conducted at a minimum frequency of once every other year. Inspections include an evaluation of paperwork to verify that OFR, insurance and other recordkeeping is in order, and a visual assessment to determine compliance with regulations related to processing, storage and transportation.

Out-of-state recyclers have not been physically inspected, but they are required to provide proof of OFR, liability insurance and paperwork verifying that the electronics collected under E-Cycle Wisconsin are managed in an environmentally sound manner. DNR staff monitor industry news to stay informed about out-of-state recyclers, and work with other states' regulatory agencies when concerns are identified. In addition, most out-of-state recyclers have achieved one or both of the industry's third-party certifications, R2 and E-Stewards, which provides DNR staff with more confidence that those companies are adhering to high environmental management standards.

Collectors registered with E-Cycle Wisconsin must also meet minimum standards, including recordkeeping and reporting to the DNR, and are subject to DNR inspections. Compliance for collectors is

mostly assessed through reporting, due to the large number of collection sites (more than 400). However, collectors are inspected as time permits, with priority based on complaints or other indications that a collector is having difficulty maintaining compliance. At a minimum, 10 collection sites are inspected per year.

Table 7: DNR inspections conducted, by program year

	Jan. 1 to June 30, 2010	July 1, 2010, to June 30, 2011	July 1, 2011, to June 30, 2012	July 1 to Dec. 1, 2012
Recyclers	4	8	8	3
Collectors	1	12	21	--
Collection sites	5	20	29	--

Table 7 lists the number of inspections the DNR has conducted each program year.

Collector and recycler compliance

Since E-Cycle Wisconsin began, several recyclers and collectors have been removed from the program. In all cases, the DNR gave collectors and recyclers extra time to submit paperwork (several weeks or more) and offered technical assistance to help them comply.

The most common reason recyclers have been removed is for failure to maintain adequate OFR. The other common reasons for removal of recyclers and collectors include failure to submit registration forms or meet reporting requirements. Many recyclers and collectors have voluntarily left the program because it did not fit with their business plans or other activities. Through November 2012, no registered collectors or recyclers have been removed from the program because of environmental violations.

- During program year 2, 10 collectors failed to submit their re-registration and report forms and were removed from the program. Six recyclers were removed from the program for failing to provide proof of OFR, though one subsequently submitted this information and was reinstated.
- During program year 3, four collectors failed to submit their re-registration and report forms and were removed from the program. No recyclers were removed from the program.
- During program year 4, as of November 2012, five collectors had failed to submit complete re-registration and report form and were suspended from the program. A sixth was briefly suspended but subsequently submitted its completed form and was reinstated. One recycler was suspended for failure to have adequate OFR, but was reinstated when it met this requirement. Another recycler was suspended for failure to have OFR and pollution liability insurance and had not yet complied with these requirements.

Electronics recyclers listed in the Wisconsin Recycling Markets Directory

The Wisconsin Recycling Markets directory (http://wisconsinrecyclingdirectory.com) is operated by the UW-Extension Solid and Hazardous Waste Education Center, with some funding support from the DNR. Businesses, local governments and others that collect or recycle a wide variety of materials may list themselves in the directory. One category included in the directory is electronics, and as of November 2012, there were 98 locations listed under that category—a mix of collectors and recyclers. Just over half of the listed locations (51) were not registered under E-Cycle Wisconsin.

Electronics recycling separate from E-Cycle Wisconsin

Other than the bans on landfilling or incinerating several types of consumer electronics, the 2009 electronics recycling law did not change the electronics recycling landscape outside of the manufacturer-funded E-Cycle Wisconsin program. This landscape includes all electronics recycled from businesses, government offices, institutions and others not eligible for E-Cycle Wisconsin. It also includes electronics from households and schools that are not processed by registered E-Cycle Wisconsin collectors and recyclers.

Currently, collectors and recyclers that perform basic disassembly and dismantling of electronics are exempt from most solid and hazardous waste rules. Consequently, only recyclers participating in E-Cycle Wisconsin are operating under regulatory oversight. Monitoring recycling activities that occur outside of the E-Cycle Wisconsin program has been extremely challenging; often these activities only come to the DNR's attention when a problem occurs.

In general, DNR staff know there are many individuals and businesses involved in small-scale electronics recycling with the primary goal of recovering metal from the devices for scrap value. Desktop computers are an especially popular target for this type of operation because of the steel and precious metals the computers contain. This may not pose a significant environmental threat if the operations limit themselves to dismantling the devices and selling them for scrap, but if an individual or small business tries to extract precious metals through the use of chemicals or undertakes other, more complex processing, there are risks to worker safety and the environment. There are also data security risks if unscrupulous collectors or recyclers attempt to recover personal data from hard drives and other memory components.

Of special concern are reports of individuals or small-scale scrappers smashing the cathode ray tubes of older TVs and computer monitors while extracting copper and other metals from these devices. Much of the glass in the tubes is leaded, and the broken glass poses risks to workers and others in the processing area (often a garage or elsewhere on a homeowner's property), as well as to the environment if the lead should leach into the soil, water or air.

This is not to say that all electronics recycling done outside of E-Cycle Wisconsin is illegitimate or irresponsible. However, because unregistered collectors and recyclers operate with little or no regulatory oversight, the DNR does not have a good way of monitoring these operations or providing technical assistance to make sure they are following solid and hazardous waste laws.

Inquiries from aspiring recyclers

Since before E-Cycle Wisconsin began, electronics recycling has appealed to some as a business opportunity, based on increased demand for recycling and the misinformed idea that recycling electronics is simple. DNR staff working on E-Cycle Wisconsin receive one or two inquiries a week, on average, from individuals or businesses interested in collecting and/or recycling electronics. During the state's 2012 fiscal year, which corresponds with E-Cycle Wisconsin's program year 3, staff handled approximately 45 formal inquiries (where the DNR provided written information in response to a request) and several less formal inquiries about electronics recycling requirements and whether E-Cycle Wisconsin registration was appropriate.

Recyclers that register with E-Cycle Wisconsin should be working on behalf of a manufacturer or intending to sell pounds to other registered recyclers that are working with manufacturers. Therefore, the majority of inquiries have not resulted in recyclers that register with E-Cycle Wisconsin.

Electronics dumped by an unregistered collector at an abandoned property (top) and electronics accumulated on the property of an individual dismantling electronics for scrap (bottom).

Disposal ban compliance and enforcement

With all of Wisconsin's bans on landfilling or incinerating recyclable materials, a key component of the DNR's efforts to ensure compliance has been public education—making sure residents, businesses, institutions and everyone else in the state know what cannot be thrown away and how to recycle those materials. Since the electronics disposal ban is so new, outreach and education has been a primary focus of DNR compliance and enforcement efforts to date.

The electronics recycling law requires that the DNR conduct outreach activities using a portion of the manufacturer registration fees. The result has been remarkably high public awareness of the electronics disposal ban and the E-Cycle Wisconsin program just two and a half years after the law took effect.

Early outreach efforts focused on general public and stakeholder awareness about the ban and E-Cycle Wisconsin. The DNR developed webpages for each of the stakeholders affected by the law explaining their obligations and providing information and resources to assist stakeholders in fulfilling their roles. The DNR also created a brochure, two different fliers and a poster to assist in spreading the word about the disposal ban, the E-Cycle Wisconsin program and the electronics recycling webpages. E-Cycle Wisconsin graphics on all of these materials created a uniform appearance and program identity, helping to establish the program's "brand." Underlying all of these outreach materials is a list of all registered collection sites that is kept up to date on the DNR's website. The list is organized by county and

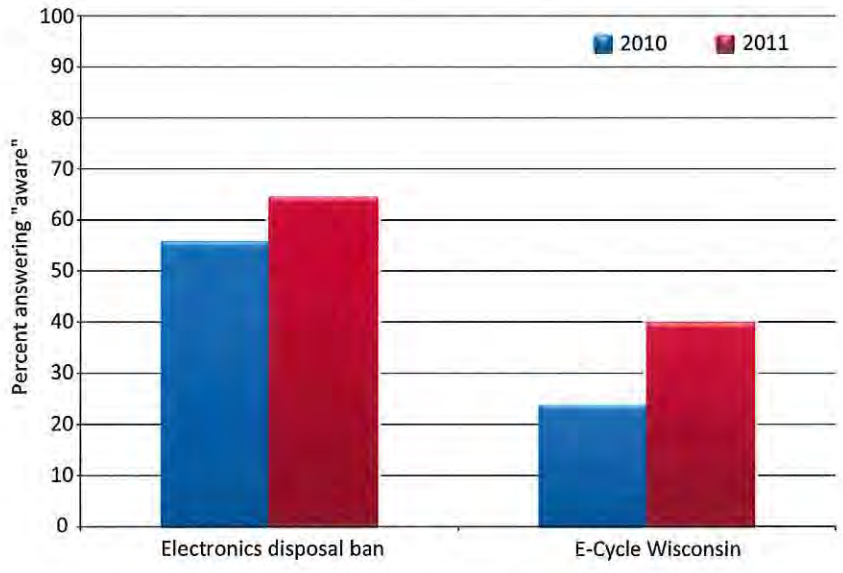
includes information about what types of electronics each site accepts and other site details.

Local governments, waste haulers and electronics retailers have been important partners in these public education efforts. All of the DNR's E-Cycle Wisconsin publications are available for free, and the DNR has distributed more than 70,000 copies to local governments, retailers and others that make use of them to meet their own educational requirements or desires. To better serve local governments, the DNR has also created newsletter templates, displays and radio advertisements that may be used for free.

The DNR's own efforts have included several public education campaigns, with press releases coordinated with public service announcements on radio networks across the state to spread the word about the disposal ban and E-Cycle Wisconsin. Each campaign has received good coverage in news media, especially the campaign for the disposal ban taking effect in September 2010. DNR staff have distributed E-Cycle Wisconsin publications at many public events, such as the State Fair, Farm Technology Days, Milwaukee's SummerFest and other large community events. DNR staff have also given many presentations at conferences, classes and workshops statewide.

As a result, the DNR's 2011 Household Recycling Survey indicates an increasing public awareness of E-Cycle Wisconsin, with more than 60 percent of Wisconsin's population aware of the electronics disposal ban and 40 percent aware of the E-Cycle Wisconsin program (see Figure 11). This is an increase from the 2010 Electronics Recycling Survey in both areas.

Figure 11: Awareness of electronics disposal ban and E-Cycle Wisconsin



The variety of outreach methods has allowed the public to hear about the electronics disposal bans and E-Cycle Wisconsin through many different avenues. The most common ways of reaching people, according to the 2011 Household Recycling Survey, are through news stories and local community outreach (Figure 12).

Current DNR outreach efforts are aimed at increasing general population awareness through a continuation of the coordinated

efforts described above, while also beginning to target specific stakeholder groups with more detailed information and assistance. The DNR recently created a toolkit, handout, training video and supplemental materials for retailers selling electronics to Wisconsin residents and schools. The materials explain retailer obligations under the law. Having retailers play a bigger role in customer education should help reach parts of the population not yet aware of the electronics recycling law, especially young people, at the point when they are considering what to do with the old electronic devices they are shopping to replace.

Trends in consumer management of unwanted electronics

The overall trend for electronics disposal in Wisconsin is toward an increasing rate of recycling. The 2011 Household Recycling Survey found that Wisconsin residents report recycling nearly 40 percent of unwanted TVs and computers and more than 40 percent of unwanted cell phones. Many unwanted electronics are also being reused—residents are giving them to family and friends, donating them to nonprofits or selling them. According to the 2011 survey, fewer electronics are ending up in trash cans (around 5 percent for all three items). This recycling trend is illustrated most dramatically in comparing TV disposal methods reported in the 2006, 2010 and 2011 Household Recycling Surveys (see Figure 13).

Figure 12: Where people heard about the disposal ban/ E-Cycle Wisconsin (2011)

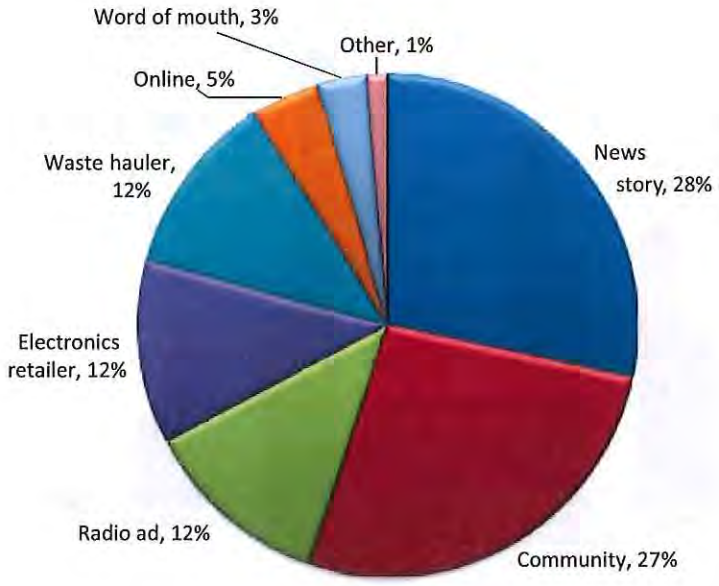


Figure 13: WI household TV disposal methods over time

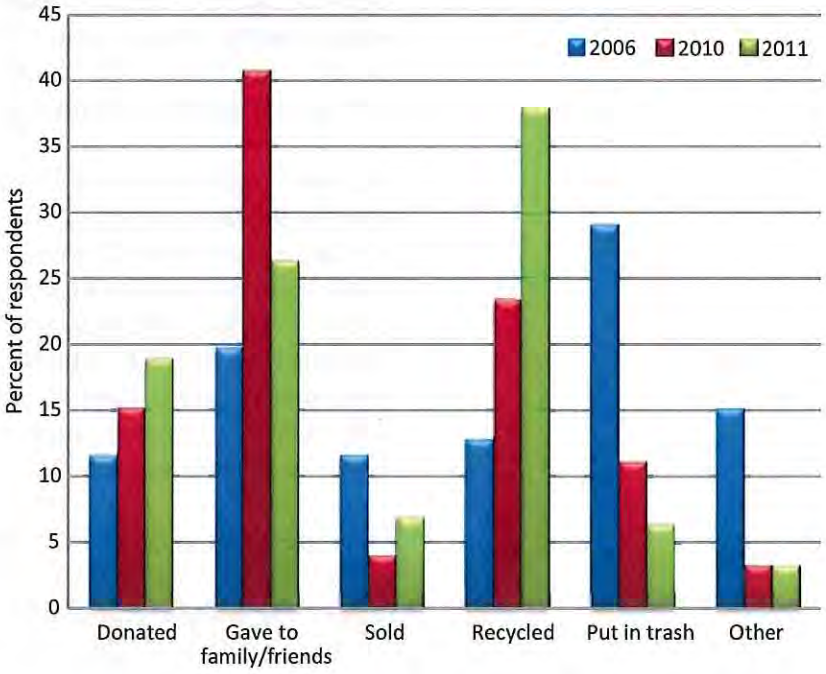
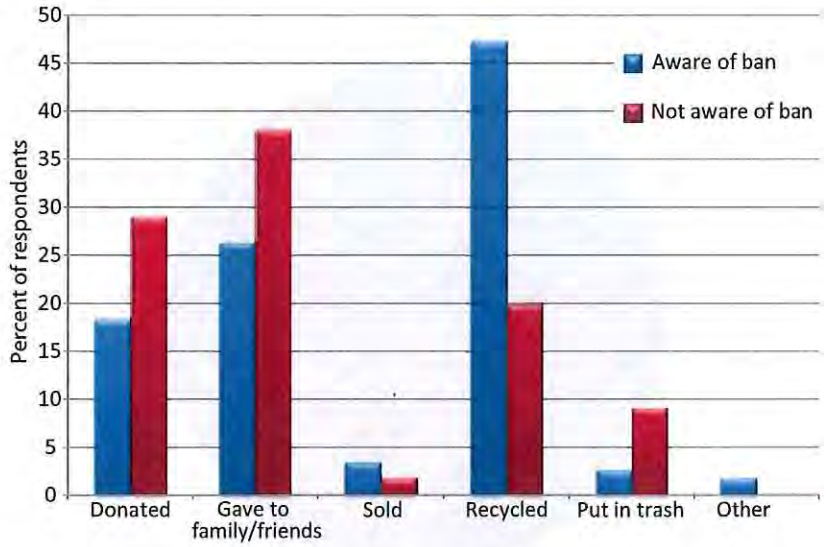


Figure 14: WI household computer disposal method based on disposal ban awareness



The 2011 survey indicates respondents who knew about the disposal ban were more likely to recycle old electronics than those who were not aware of the ban. This relationship, present with respect to computers, TVs and cell phones, is illustrated for computers in Figure 14.

Improper recycling and illegal disposal of electronics

As discussed earlier, monitoring recycling activities that occur outside of the E-Cycle Wisconsin program has been extremely challenging and often these activities only come to the DNR's attention when a problem occurs. More than 25 complaints regarding electronics disposal and recycling have been addressed by DNR Waste and Materials Management Program staff since January 2010. These complaints include illegal dumping of whole or dismantled electronics, businesses stockpiling material because they don't have a market or can't afford to pay the cost of proper recycling, and illegal processing of electronics, such as by smashing cathode ray tubes (CRTs).

The most significant complaints have dealt with people who have attempted to start a recycling business and began taking in electronics without a clear understanding of how to manage the entire device. These types of "backyard recycling" operations often dismantle electronics to recover the easy-to-recycle metals, such as copper yokes from the back of CRTs, steel and aluminum. Backyard recyclers can make money taking these metals to salvage yards, but are then left with piles of difficult-to-recycle electronic carcasses that may cost money to dispose of properly.

The CRT glass is one of the most problematic materials for all recyclers, but especially for the backyard or small-scale recyclers, to responsibly handle. Markets for CRT glass are dwindling, and the smelters and glass-to-glass processors will not work with small-scale operations. In addition, the weight of CRT glass makes transportation costs high and if the CRTs are not recycled and need to be disposed of in a landfill, they are considered a hazardous waste. Therefore, some backyard recyclers have attempted to manage their CRTs by smashing them and disposing of them as regular trash. These cases often occur

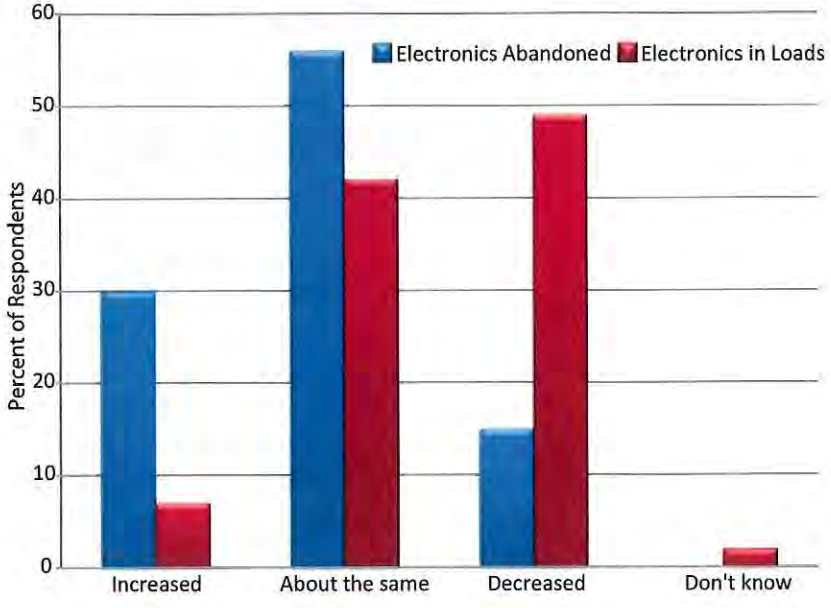
in residential areas where there is great potential for neighbors to be exposed to hazards from the broken leaded glass.

To address complaints regarding electronics management, DNR staff have sent letters requiring cleanup and have often provided technical assistance to help recyclers find markets for difficult-to-recycle materials. In addition, DNR staff informs anyone inquiring about starting a new recycling business about the difficulty of managing CRTs and cautions that they need to have markets established for all material as part of their business plans.

Beyond the complaints received, and despite the reported increase in awareness of the ban and the increase in the amount of electronics destined for recycling rather than disposal, landfills and transfer stations are still seeing these items arrive at their facilities. A 2012 DNR survey of landfill and transfer station operators found that 80 percent of respondents see banned electronics arrive in loads weekly or several times per month. This represents a perceived decrease in the number of electronics arriving at nearly half of the responding facilities since the law went into effect, with the perceived number of arriving electronics remaining "about the same" for 42 percent of facilities (see Figure 15).

While not significant in terms of overall tonnage, most facilities report seeing about the same or increased levels of electronics being abandoned at their facilities (e.g., left at the gate overnight) over the same time period. While most respondents say that the types of electronics they see at their facilities have not changed since September 2010, some respondents mention that TVs and computer monitors make up a larger proportion of the mix since the disposal ban took effect.

Figure 15: Changes in electronics abandoned and brought in loads at WI solid waste facilities since 2010



The large majority of landfill and transfer station operators responding to the 2012 survey report recycling the electronics they find in loads and abandoned at facilities, but this is an indirect form of recycling—and the facilities can't find or remove all electronics arriving in trash loads. To paraphrase one survey respondent, "Many Wisconsin

Survey results

More detailed reports on the surveys discussed in this section are available on the E-Cycle Wisconsin program results page at http://dnr.wi.gov/topic/Ecycle/wisconsin.html#tabx2.

residents know that these materials are banned from landfills but they do not know where to take them. Instead of seeking out a recycler, they bury the electronics in the loads they bring to the landfill or transfer station." Operators of these facilities have taken a variety of measures to inform their customers about the disposal ban and help them find responsible recycling locations, if the landfill or transfer station is not itself an electronics collection site. Still, results from the 2012 survey indicate that, while the amount is decreasing, many electronics continue to be thrown in the trash despite the disposal ban. Residents are also, perhaps increasingly, abandoning old electronics at drop-off sites, but the overall tonnage of material abandoned is still believed to be insignificant compared to the amount recycled (or landfilled).

A 2011 DNR survey of public lands managers regarding illegal dumping of electronics on public lands in Wisconsin echoes these findings. A majority of respondents noticed no changes in the amount of illegal dumping in the years after Wisconsin's electronics recycling law took effect. While some public land managers have noticed an increase in dumping over the past few years, several wrote in open comment boxes that they were not convinced this increase had anything to do with the electronics recycling law. Many felt the increase they saw had more to do with the June 2009 national transition to digital TV. No respondents reported seeing a decrease in dumping since 2010. As with the landfill and transfer station survey, public land managers reported that the types of materials being illegally dumped on their properties has not changed much over the years. Most electronics dumps consist of "old-style" TVs and computer monitors with cathode ray tubes. Some public land managers also feel that while Wisconsin residents may know about the disposal ban, many appear not to know where to take banned items or do not take banned items to appropriate locations because they might have to pay to recycle them.

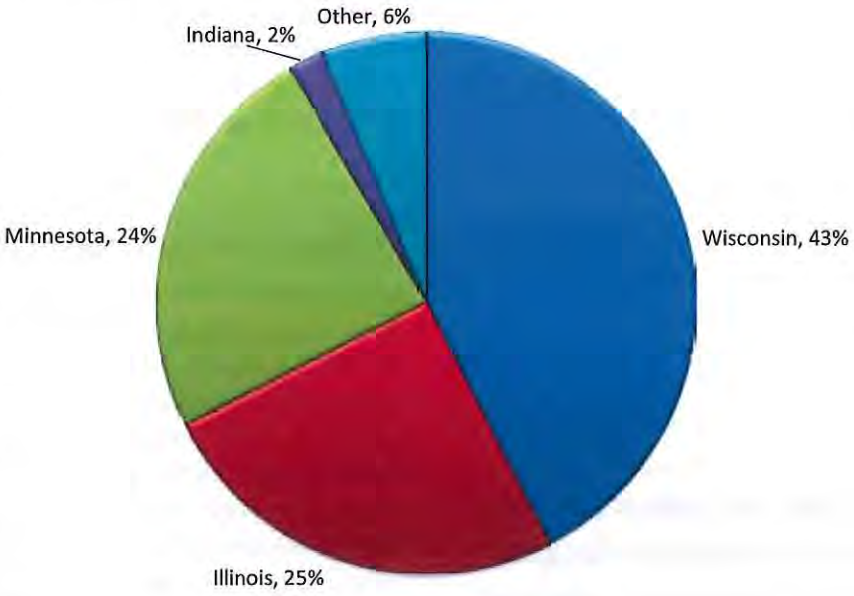
Economic impacts

The electronics recycling industry has grown rapidly in the United States and around the world in the last decade. Wisconsin and neighboring states are home to several electronics recyclers considered leaders in the industry, and the electronics recycling laws passed by Wisconsin and neighboring states (including Illinois, Indiana, Michigan and Minnesota) seem to be encouraging expansion and job creation among recyclers because of the large, steady volume of electronics collected under these programs. There have been several new or expanded recycling facilities and new collection operations within Wisconsin since the program started.

Nearly all electronics collected under E-Cycle Wisconsin have been processed in the upper Midwest; Figure 16 illustrates this for program

year 3. Almost 70 percent of registered recyclers surveyed by the DNR in May 2012 said the electronics recycling law had increased or otherwise helped their business; 5 percent said the law had decreased or hurt their business; and the rest said the law had not affected their business or were unsure of its effects. Several registered recyclers have expanded existing facilities, added shifts or hired new workers as a result of E-Cycle Wisconsin participation; some are planning to do one or more of these in the next year.

Figure 16: Percent of program year 3 pounds received by registered recyclers, by state



Collector responses to the May 2012 survey were more mixed: about a third of respondents said the law had increased or otherwise helped their business, while a third said it had not had much effect. Only 6 percent said the law had decreased or hurt their business; the rest were unsure.

Collectors and recyclers that have told the DNR that the law has hurt their business have mostly been smaller operations that have been unable to contract with manufacturers or compete with large recycling operations.

Local governments continue to operate permanent collection sites and one-day collection events, such as this one in Madison in 2010.

Local government costs

Before the electronics recycling law passed in 2009, many local governments had set up electronics collection programs to serve their residents. While many of these programs charged consumers some fee for taking the electronics, most of them were primarily funded by taxpayers.

Three years into the E-Cycle Wisconsin program, local governments are still a critical part of collection infrastructure, especially in rural areas. However, many have been able to reduce their costs substantially or hold them steady despite a dramatic increase in the amount and types of electronics they are collecting. Several groups of local governments have partnered on recycling contracts to negotiate better deals with recyclers. Some local governments have chosen to end their collection programs and instead direct residents to private-sector collectors—an option available to them because of the increase in collection sites following the passage of the electronics recycling law.

Local governments still face challenges in dealing with electronics. With the very competitive marketplace that has developed under E-Cycle Wisconsin, local governments (as well as other collectors) may not be able to count on long-term contracts or consistent terms with recyclers. Some governments struggle with storing, transporting and finding recyclers for large, expensive items other collectors may not accept, such as large TVs.

Policy recommendations

In evaluating whether any changes might be needed to make the electronics recycling law function better for stakeholders or the public, the DNR gathered input through surveys of registered collectors, recyclers and manufacturers; surveys of residents, public lands managers and landfill/transfer station operators; and conversations with stakeholders and the public during the first three years of E-Cycle Wisconsin. Below is a discussion of issues and recommendations for the components of the law the DNR is asked in s. 287.17(10)(c) to review, along with other topics that arose from stakeholder discussions.

Manufacturer target calculation

Wisconsin's law is designed to operate on free-market principles, with collectors, recyclers and manufacturers conducting private negotiations to set recycling prices. In theory, supply and demand should help find the correct price manufacturers pay for recycling. If recyclers' costs are rising and they aren't able to process enough weight at current manufacturer payment levels, manufacturers will have trouble meeting their targets and thus will need to pay recyclers more per pound. Manufacturers should have an incentive to negotiate higher prices rather than pay shortfall fees, as shortfall fees are set at rates significantly higher than the current going rates for recycling.

Responses to DNR surveys of registered collectors, recyclers and manufacturers suggested that, overall, manufacturer recycling targets and recycling payments are corresponding fairly well with what most recyclers are processing. However, there were a few issues mentioned by individual stakeholders that may be an early sign of larger issues.

- Some IT manufacturers feel they are spending more than they should on recycling because the majority of what has been collected through the program is TVs, which are often more costly to recycle (especially with the tightening of markets for the leaded glass from cathode ray tubes).
- Because of increased costs for recycling/proper disposal of CRT glass, several recyclers report rising costs, while manufacturers continue to press for a lower cost per recycled pound to meet their recycling targets.

DNR recommendation: manufacturer targets

Given that there is currently no clear better alternative offered by other states' laws and a lack of consensus among stakeholders, leave manufacturer target calculations the same for now, but continue to monitor this issue.

To gain a firmer understanding of how the mix of products being recycled under E-Cycle Wisconsin compares to the mix of products being sold, change the manufacturer registration and reporting requirements in s. 287.17(5)(a) and (b) to require manufacturers to break their sales data report into TVs and IT equipment (all covered devices except TVs). Then, have them report the pounds recycled on their behalf by TVs, computer monitors, computers, printers and other eligible electronic devices.

Add a similar requirement for recyclers under s. 287.17(8)(b) to report the material they processed by five product categories: TVs, computer monitors, computers, printers and other eligible electronic devices.

- During program years 2 and 3, the weight of electronics actually collected and recycled was several million pounds higher than the total manufacturer obligation. This increased supply contributes pressure to lower rates manufacturers pay to recyclers, as manufacturers are generally having no trouble meeting their targets. Recyclers do not expect the supply of electronics to decrease in the near future, especially given that many of the devices being recycled are much heavier than devices being sold today.

Changing the way manufacturer targets are calculated is one possibility for addressing these issues, and is being considered by states like Minnesota. Among state programs, however, there is not a clear best model for setting manufacturer obligations. Therefore, it might be difficult to find a consensus on how Wisconsin's law should be changed, or even if this is necessary.

Possible solutions proposed by stakeholders:

- Because the return rate of small devices is slow, consider having a lower target for these devices (i.e., less than the current 80 percent of weight sold). The target could ramp up over time.
- Keep the list of eligible electronic devices the same or broader, but include only video display devices in the definition of covered electronic devices (which drive manufacturer target calculations) because computers may contain enough valuable components to support collection independent of E-Cycle Wisconsin. To meet consumer recycling demand, the targets for manufacturers of video display devices would likely need to be increased, perhaps to 90 or 100 percent of weight sold.
- Give manufacturers the option of meeting a convenience standard—for example, a requirement to have at least one collection site per county and per municipality with a population of 10,000 or more—rather than a numerical target.
- Find a way to give credit/reduce the obligation for devices that are being reused.

Manufacturer registration fees

The graduated fee system ($0 if fewer than 25 covered devices sold in Wisconsin; $1,250 if 25 to 249 devices sold, and $5,000 if 250 or more devices sold) has generally worked very well, allowing very small manufacturers and manufacturers just beginning to sell covered electronics to pay no fee. Through outreach to retailers, however, the DNR has found that many small electronics retailers are still manufacturing a small number of desktop computers under their own brand. While some are below the 25-unit threshold, others may be slightly above this and thus might have to pay a registration fee that is quite large per unit sold. If the threshold for not paying a registration

DNR recommendation: manufacturer fees

Change registration fee levels in s. 287.17(4)(b) to the following:

- $5,000 if the manufacturer sold more than 350 covered electronic devices in this state during the last program year.
- $1,250 if the manufacturer sold between 150 and 350 covered electronic devices in this state during the last program year.
- $0 if the manufacturer sold fewer than 150 covered electronic devices in this state during the last program year.

Do not change how manufacturer shortfall fees are calculated. The graduated scale, ranging from 30 to 50 cents, is sufficient to encourage manufacturers to recycle eligible electronics, rather than pay a fee to the state.

DNR recommendation: rural incentive

For now, keep the current rural incentive (1.25 pounds counted for every 1 pound collected from rural counties).

As a supplement, set up a simple grant program, using manufacturer shortfall fees and a portion of registration fees, to help fund drop-off sites or collection events in rural areas, with priority given to areas that have had no electronics collection under E-Cycle Wisconsin or only sporadic collection events. If, in the future, all counties have permanent collection sites, grants could focus instead on improving collection opportunities in more populated areas, such as making curbside electronics collection available to residents unable to transport their electronics to a drop-off site.

DNR recommendation: adding eligible devices and entities

Do not add any devices to the definitions of covered electronic devices or eligible electronic devices under s.287.17(1) or to the electronics banned from disposal under s. 287.07(5). To determine whether changes are necessary in the future, continue to monitor changes in the types of electronics being sold and disposed, and continue to survey stakeholders.

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. An alternative would be to remove schools entirely from the program, because they are required by existing hazardous waste laws to properly manage most electronics.

fee were raised to 150 units sold and the reduced fee level ($1,250) were raised to 350 units sold, it could encourage compliance among smaller manufacturers. The DNR estimates this could lower registration fee revenues by $10,000 to $15,000 per year.

Rural incentive

Only 9 percent of collectors and 6 percent of recyclers that responded to participant surveys in May 2012 said the law's incentive of counting 1.25 pounds for every pound collected in rural counties has encouraged them to collect in those areas. Meanwhile, though the number of registered collectors and collection sites has increased dramatically since E-Cycle Wisconsin began, a handful of counties have had no registered collection sites and several others have had only a few collection events.

Based on this, it appears the rural incentive may not be as effective at increasing collection in rural areas as the law's drafters hoped, and it simultaneously reduces the number of actual electronics that need to be collected. During program year 3, recyclers and manufacturers were able to count an additional 1.2 million "pounds" through the 25 percent bonus for weight collected in rural counties, meaning they needed to collect fewer pounds of actual electronics to meet the manufacturers' recycling obligations. Since the pounds collected overall exceeded what manufacturers purchased by several million pounds, even the small amount added by the rural incentive contributed to an oversupply during program year 3, leaving many recyclers with pounds not covered by manufacturers.

When the DNR solicited input from stakeholders in fall 2012 on whether to keep the rural incentive, several indicated that it was important to them and encouraged or reduced the costs of rural collection, while others echoed the view from the surveys that the incentive was not working in its current form.

Adding eligible devices or entities

Through surveys and conversations with DNR staff, many collectors and recyclers have expressed interest in adding stereo equipment and TV accessories to the list of eligible electronic devices. Adding these devices would most likely make public education easier, simplify operations for collectors and recyclers, and reduce the number of common items that recyclers end up processing without manufacturer reimbursement. Manufacturers were less supportive of adding new devices, however, and collection of eligible electronics during program years 2 and 3 was already much higher than manufacturer recycling targets.

A separate question is whether all private schools should be added

to the list of those eligible to use E-Cycle Wisconsin. Currently, the program only includes K-12 public schools and private schools participating in the Parental School Choice Program in Milwaukee and other districts. Making all K-12 schools eligible under E-Cycle Wisconsin would be a more consistent approach, make some public education simpler, and provide recyclers with another source of potentially higher-value material (more IT equipment than in the general consumer mix, which could help lower overall recycling costs in the program). However, it could increase the amount of eligible electronics collected, putting further downward pressure on the prices paid by manufacturers to recyclers and/or reducing recycling opportunities for households. During program years 2 and 3, electronics from schools made up only a small percentage, by weight, of the eligible electronics collected through E-Cycle Wisconsin.

Collector "cherry picking" of valuable devices/components

Recyclers and manufacturers have expressed concern about collectors "cherry picking" valuable devices, such as desktop computers, or partially dismantling electronics to remove valuable components before sending loads to a registered recycler. This makes the overall cost of recycling electronics under the program more expensive, and broken or dismantled devices pose safety hazards to workers.

This issue is not unique to Wisconsin, and it is unclear how much of this is intentionally being done by registered collectors. Devices may also be accidentally broken or stolen from collection sites, and collectors may receive broken or dismantled electronics from residents or from small-scale scavengers that remove metal and then take what is left from electronics to a collection site or event. Residents and schools may also respond to offers of free recycling, or even cash back for some devices, from scavengers or small-scale recyclers not participating in E-Cycle Wisconsin. What is clear, however, is that diversion of valuable components and devices from the program makes costs higher.

Incentives for green or recyclable design

One of the stated objectives of many product stewardship efforts (though not explicitly included in Wisconsin's law) is to encourage manufacturers to use "greener" product designs—e.g., using less toxic materials, using less packaging and making it easier to recycle a product at the end of its life. According to the 2012 survey and other manufacturer comments about state e-cycling laws, the current set of laws does not generally induce manufacturers to transition to green or more recyclable product designs (though several are doing this for other reasons).

DNR recommendation: collector cherry picking

Encourage registered recyclers to work cherry-picking problems out with the collectors they receive materials from. Plan to revisit this issue with recyclers in a year or two to determine if program-wide changes need to be made.

In the meantime, the DNR will reach out to collectors to make sure they understand and are following requirements and best management practices for handling electronics they collect, to minimize damage to devices, theft of valuable materials or other problems.

Possible future DNR administrative actions could include not allowing registered collectors to divert whole devices (they are already not allowed to dismantle devices they are sending to registered recyclers) and requiring solid waste processing licenses for all electronics recyclers in Wisconsin, to ensure they are meeting minimum standards and to deter small-scale scavenging and dumping.

DNR recommendation: incentives for green or recyclable design

Do not incorporate new incentives for green or recyclable design into Wisconsin's electronics recycling law. This is better done at a national or international level. If state and local governments want to encourage green or recyclable electronics design, they could incorporate this into purchasing specifications, such as requiring electronics to meet a certain level in the EPEAT standard http://www.epeat.net).

Conclusions

Three years after Wisconsin's electronics recycling law took effect, it appears to be fulfilling its goals. The manufacturer-funded E-Cycle Wisconsin program is achieving one of the highest per-capita collection rates in the country, and consumers report recycling more and wasting fewer electronics than they did before the law. A competitive market has developed for recycling electronics under the program, greatly expanding the number of electronics collection sites available to consumers and offering more free or low-cost recycling opportunities. Wisconsin's law and similar measures in neighboring states have spurred growth of the electronics recycling industry in the upper Midwest, and the DNR continues to make progress in ensuring that e-cycling is being done in a responsible manner.

There are, however, several issues that have a potential to erode the law's success in coming years, and therefore require close monitoring. The increasing cost of properly managing leaded glass from cathode ray tubes, combined with the fact that more valuable materials, such as desktop computers, are being diverted from E-Cycle Wisconsin into a more informal recycling system, is driving up costs for many recyclers. At the same time, manufacturers faced with complying with electronics recycling laws in two dozen states are looking to improve efficiency and reduce per-pound costs, and want to be sure their recycling targets are fair and achievable. State and local officials are still seeing illegal dumping of electronics throughout Wisconsin, and small-scale electronics recyclers and scavengers sometimes take on more they can handle, posing risks to human and environmental health.

While the DNR is not recommending significant changes to the electronics recycling law at this time, we will continue to gather information from stakeholders to assess whether to recommend bigger adjustments in future reports. For now, we are recommending small changes to manufacturer registration fees, manufacturer and recycler reporting, and the groups eligible to use E-Cycle Wisconsin, along with creating a small grant program to encourage electronics collection in underserved areas.

The results from implementation of Wisconsin's first product stewardship law show that, if designed carefully, it is possible to create a system that shifts at least some of the financial burden for managing products at the end of their useful lives away from local and state taxpayers to those that benefit from selling and using the products—all while benefitting the environment and the economy. The exact model used in the electronics recycling law may not work for all products, but its emphasis on a flexible, market-based approach with minimum requirements to ensure a level playing field seems to work well.

Electronics are becoming more and more central to our daily lives, and the electronics recycling industry—still very young—is growing and maturing. It will be important to keep this big picture in mind as we continue to implement and monitor the success of the E-Cycle Wisconsin program and electronics disposal ban, to evaluate whether changes to existing law or additional legislation might be needed.

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