The Product Stewardship Institute

The Product Stewardship Institute (PSI) is a national nonprofit organization dedicated to reducing the health and environmental impacts of consumer products. Founded in 2000, PSI brings together key stakeholders with varying interests to develop product end-of-life solutions in a collaborative manner, with a focus on having manufacturers assume primary financial and managerial responsibility. With a robust membership base of 47 state governments and over 200 local governments, as well as partnerships with more than 95 companies, organizations, universities, and non-U.S. governments, PSI advances both voluntary programs and legislation to promote industry-led product stewardship initiatives. For more information, visit PSI online at [www.productstewardship.us](http://www.productstewardship.us). You can also follow PSI on Twitter at [twitter.com/ProductSteward](http://twitter.com/ProductSteward) and on Facebook at [facebook.com/ProductStewardship](http://facebook.com/ProductStewardship).

Project Contact

For more information, please contact Scott Cassel, PSI CEO and Founder, at scott@productstewardship.us, or (617) 236-4822.

Acknowledgements

This report was developed by the Product Stewardship Institute for the Natural Resources Defense Council, which played a leading role in enacting New York’s electronics recycling law and continues to monitor implementation of the program. PSI would like to thank the many individuals who provided information for this report.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXECUTIVE SUMMARY</td>
<td>III</td>
</tr>
<tr>
<td>I. BACKGROUND</td>
<td>1</td>
</tr>
<tr>
<td>II. STAKEHOLDER PERSPECTIVES</td>
<td>4</td>
</tr>
<tr>
<td>III. IMPACT OF CRT GLASS MARKETS</td>
<td>9</td>
</tr>
<tr>
<td>IV. SERVING NEW YORK CITY– AN ONGOING CHALLENGE</td>
<td>11</td>
</tr>
<tr>
<td>V. FINDINGS</td>
<td>14</td>
</tr>
<tr>
<td>VI. RECOMMENDATIONS</td>
<td>17</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

Each year, New York State residents generate more than 309 million pounds of scrap electronics – televisions, computers, and peripherals – for post-consumer management. Electronics contain a variety of heavy metals and flame retardants categorized as hazardous waste, as well as gold and rare earth minerals that serve as valuable resources for use in new products. Managing scrap electronics has become a costly portion of local household hazardous waste (HHW) management programs.

Prior to 2011, New Yorkers had limited access to affordable collection and recycling opportunities for electronics. That changed in 2010, when New York State adopted the Electronic Equipment Recycling and Reuse Act, requiring manufacturers of electronic equipment to create and finance a system for collecting, transporting, and processing end-of-life electronics. The Act took effect on April 1, 2011.

The Natural Resources Defense Council (NRDC) contracted with the Product Stewardship Institute (PSI) to evaluate the effectiveness of New York’s extended producer responsibility (EPR) legislation for electronics, particularly in New York City. In March 2012, PSI released an interim report, New York State's Producer Responsibility Law for Electronics: Reflecting on the First Year, which provided an overview of the impacts of the new law in the first year, based on survey results and interviews with more than 30 state and local government officials, recyclers, and manufacturers. The interim report also set the stage for what PSI had intended to be a more in-depth, quantitative analysis of the law based on performance data from manufacturers and recyclers, which would be compiled and analyzed by the New York State Department of Environmental Conservation (DEC). To date, DEC has not released the data. Therefore, this final report summarizes findings from PSI’s interim report and provides an analysis of new and emerging issues that have impacted New York’s electronics producer responsibility program.

PSI's findings include the following:

- **The volume of scrap electronics collected in New York has increased substantially:** Reports from local governments and recyclers indicate that increased ease of recycling for residents has led to increases in amounts collected over previous years. The average New Yorker recycled more than 3 pounds of electronics in 2011.

- **Local governments have reduced costs due to manufacturer-funded collection:** The high cost of e-waste recycling prior to the law’s enactment restricted collection to municipalities that could afford it. As a result of the new producer responsibility law, the number of municipalities collecting has increased dramatically, and most are receiving revenue (which offsets collection costs) for the material they collect. Exact savings are difficult to pinpoint due to lack of baseline data, but anecdotal evidence shows municipal cost savings in the

---

millions, if not tens of millions, of dollars, enabling municipalities to shift their resources to provide other needed services.

- **The number of scrap electronics collection sites has increased.** The number of collection sites in New York has significantly increased since the law’s implementation, rising by 77 percent overall in the first year, with increases across municipal, retail, and independent programs.

- **There is insufficient outreach and education about the law statewide:** Stakeholders report that New York residents are not well informed about where and how to recycle their electronics. While on-line resources like the greenergadgets.org website are available, they are not well known.

- **Residents in New York City lack information about the program, and do not have access to convenient collection options:** Public awareness of the electronic recycling program remains low in New York City. In addition, the collection options in New York City are not as convenient to residents as they are in other areas of the state. The New York City Department of Sanitation’s (DSNY) new contract for collection services aims to address these two deficiencies.

- **The New York DEC has resource limitations:** The New York DEC faces resource constraints in administering and enforcing the program, due in part to budget cuts in recent years, and compounded by the law’s stipulation that fees collected under the Act are directed to the State’s Environmental Protection Fund, and not to implement the electronics stewardship program.

- **New York’s e-waste program has inadvertently created an uncertain marketplace with heightened risk.** The program has resulted in increased risks for both recyclers and manufacturers. Competitive forces may lead recyclers to commit to collecting more material than they have contracted for payment from manufacturers. Meanwhile, competition for supply has led to increased costs for manufacturers.

- **DEC has not released data provided by collectors, consolidators, recyclers, and manufacturers:** Public disclosure of collection data is needed to gauge program success and identify challenges.

- **The high cost of responsible CRT management puts a stress on the system.** As new flat panel screens have replaced cathode ray tube (CRT) displays, CRT recycling markets—while they still exist—have declined in value over the past decade. This change has resulted in a greater cost for recyclers.

**Based on findings in this assessment, PSI recommends:**

- **The Governor and Legislature should ensure that adequate funds are directed to New York DEC to oversee the program.** Manufacturers pay a registration fee to cover the cost of
running the program. However, these funds are being redirected for other purposes. This practice should stop, and instead adequate funds should be allocated to DEC to administer, enforce, and oversee the program.

- **New York DEC should report on the program’s progress and challenges:** According to the 2010 Electronic Equipment Recycling and Reuse Act, DEC was required to submit a report to the Governor and General Assembly by April 1, 2012. However, as of late June 2013, DEC has yet to publish its first performance evaluation. DEC officials interviewed for this report said that a staff shortage has contributed to the delay in data compilation and reporting.

- **The State should track local government cost savings resulting from manufacturer-funded collection.** A significant benefit of the electronics recycling law is that local governments are saving money while also expanding service and collecting a greater quantity of electronic material. PSI recommends that DEC conduct a survey of local governments to determine the financial benefits of the program.

- **Manufacturers should improve public education; all stakeholders should promote existing educational resources.** Informing consumers about the e-waste program is required by statute, and is critical to program success. While manufacturers are responsible for educating the public on the program, all stakeholders have a responsibility to better promote these services, particularly local and state governments that are often the public’s first point of contact.

- **The State should closely monitor New York City’s new contract to offer convenient recycling options to residents.** DEC should carefully monitor the outcome of DSNY’s contract with Electronic Recyclers International for electronics collection services to ensure that New York City residents have convenient collection options.

- **The State should require recyclers to be certified or meet equivalent requirements.** Two third-party systems, e-Stewards and Responsible Recycling (R2), certify that recyclers practice environmental, health, and safety principles. Through its on-going rulemaking process, DEC should require that all recyclers registered to collect e-waste in New York demonstrate either that they are third-party certified or that they meet equivalent requirements. Through legislative changes, New York should require manufacturers and local governments to use recyclers that obtain third-party certification, or adhere to equivalent requirements.

- **New York DEC should maintain a disposal ban on CRT glass.** Since there are markets for CRTs, albeit costly ones, PSI recommends that New York’s hazardous waste and solid waste disposal ban on CRT glass be maintained. This action will support prior investments in technologies that reclaim CRTs and ensure that the material value in CRTs (glass and lead) is retained.

- **New York DEC should convene a stakeholder dialogue on CRT market issues.** Although this report evaluates the New York electronics stewardship program, many of the issues
outlined in it – including, perhaps most significantly, the decrease in CRT markets – are also faced by those recycling electronics in other states. The best way to address this issue may be through a forum that includes all relevant stakeholders.

- **New York DEC should convene a stakeholder dialogue to improve program implementation:** Implementing the program’s many facets requires close coordination and cooperation among electronics manufacturers, recyclers, retailers, state and municipal officials, and other stakeholders. A collaborative dialogue offers the opportunity to address these issues in a manner that ensures that stakeholder concerns are understood and interests addressed.
I. BACKGROUND

Used electronic products continue to be a significant waste problem due to their quantity, rapid obsolescence, and toxicity.\(^2\)\(^3\) Electronics contain hazardous substances, including lead, mercury, cadmium, lithium, flame retardants, and phosphorous coatings. These toxic materials can be released upon disposal or when mismanaged in unscrupulous recycling operations, posing a threat to human health and the environment. Global inconsistencies in worker safety and environmental protection present health risks and potential liability concerns for those sending electronics to developing countries with inadequate regulatory safeguards.

The Natural Resources Defense Council (NRDC) contracted with the Product Stewardship Institute (PSI) to evaluate the effectiveness of New York’s extended producer responsibility (EPR) legislation for electronics, particularly in New York City. In March 2012, PSI released an interim report, *New York State’s Producer Responsibility Law for Electronics: Reflecting on the First Year*, which provided an overview of the first-year impacts of the new law based on survey results and stakeholder interviews. The interim report also set the stage for what PSI had intended to be a more in-depth, quantitative analysis of the law based on performance data from manufacturers and recyclers, which would be compiled and analyzed by the New York State Department of Environmental Conservation (DEC). To date, DEC has not released the data. Therefore, this final report summarizes findings from PSI’s interim report, provides an analysis of new and emerging issues that have impacted New York’s electronics producer responsibility program, and presents recommendations to address these issues and improve the program.

**New York State Electronic Equipment Recycling and Reuse Act**

In May 2010, New York enacted the New York State Electronic Equipment Recycling and Reuse Act, requiring that manufacturers of certain electronic products assume responsibility for collecting and recycling them across the state. This law, which took effect on April 1, 2011, establishes statewide collection targets, measured in pounds-per-capita. The target for 2011 was 3 pounds per capita (prorated to 2.25 pounds per capita to reflect a program year of April to December 2011). By 2013, that target increased to 5 pounds per capita. These targets were developed based on an analysis of the performance of other state programs in operation at the time. The initial goals were set at a modest range – well below the highest performing states, collecting 6 to 7 pounds per capita – with the expectation that collection would mature over time.


From 2014 and forward, the law requires that DEC adjust the target annually, based on actual e-waste collections in the prior three years: if collections grow, the target increases; if collections diminish, the target decreases. Each year’s statewide collection goal can be no less than 90 percent, and not more than 110 percent, of the average collected weight from the previous three years. This formula is designed to allow DEC to adjust the target in response to trends in collections, and indirectly sales. For example, if heavy CRT-based equipment is replaced by lighter alternatives and the weight of collections goes down, so will the collection target. If the weight collected goes up, the target will increase.

Under the law, each manufacturer is responsible for a portion of the total collection target based on its market share, as determined by DEC. The law creates a competitive market for used electronics because manufacturers covered under the law need to collect — or get credit for collecting — a certain amount of electronic scrap. Manufacturers can choose to work together or develop their own programs. Either way, they must provide free collection to residents, small businesses, small nonprofit organizations, schools, and government entities to meet their share of the statewide collection target. Manufacturers can also collect used electronics from larger businesses and nonprofits to meet their performance goals, but they are not required to provide these services for free.

Manufacturers’ programs must include convenient collection options, including retail or municipal sites, collection events, or mail-back programs. The law requires that manufacturers provide at least one collection option in every county, as well as one in every municipality with more than 10,000 residents. Allowing a variety of methods to meet the convenience standard provides manufacturers with the flexibility to determine the most cost-effective approach to meet their performance targets. Including a range of options — physical locations (municipal sites, retail locations), and collection events — ensures some level of on-the-ground collection, but does not require every manufacturer to have a collection location or event in every county of the state. Mail back programs can also fill the gap.

Beginning in 2013, manufacturers that fail to meet their mandatory collection targets must pay DEC a recycling surcharge. Beginning in 2014, companies that collect more than their mandated target in a given year can bank credits and apply them toward targets for up to three subsequent years, or they can sell them to other companies. Companies that choose to bank their credits can use them for up to 25 percent of their annual obligation for three years after they were accrued.

Manufacturers rarely collect materials directly from residents. Instead, they work with other market actors to orchestrate a statewide collection system. Figure 1 shows just one example of how a manufacturer might meet its collection obligation under the law. Companies design different systems to create the most cost-effective collection network possible, working either individually or as a group (or “collective”). Typically, they work with large retailers (e.g., Staples, Best Buy, Office Max, etc.), large nonprofits (e.g., Goodwill, Salvation Army, etc.) and/or with electronics recyclers. Many manufacturers, particularly those that produce smaller products (e.g., not TVs) also accept used electronics through mail-back programs, which ensures
compliance with the convenience requirements for all parts of the state by enabling consumers to use common courier services, like FedEx or UPS, to recycle their products. If working as a collective, a third party may facilitate arrangements between manufacturers and recyclers.

Most of the material collected is through arrangements that manufacturers or their collectives have with e-waste recyclers. Typically, an electronics recycling company commits to collect (and usually processes) a specified quantity of used electronics. To meet those obligations, recyclers collect materials directly from generators (e.g., large businesses or institutions) or establish agreements with local governments, retailers, and nonprofits that already collect used material from residents and customers. In this type of system, recycling companies are the “middlemen,” striving to serve two divergent interests: (1) local governments seeking maximum reimbursement for their collection service, and (2) manufacturers seeking to minimize collection costs.

Figure 1. How a manufacturer can meet its collection obligations under New York’s e-waste law

The New York DEC oversees this entire system, including the review and approval of manufacturer registration and annual reports, and the establishment of manufacturer-specific collection targets. Beginning in 2014, DEC will also establish the statewide collection goal on which the manufacturer collection targets are based. The goals for 2011, 2012, and 2013 were established in the statute.

DEC also collects data that manufacturers and other regulated entities (recyclers, collectors, and consolidators) are required to provide at the end of each program year. In addition, the State collects registration and reporting fees, and any recycling surcharges that manufacturers must pay. However, these funds are not directed to a specific fund to cover the cost of DEC’s e-waste program. In the first program year, the State collected $282,250 in registration fees and $222,000 in annual reporting fees; as noted, recycling surcharges do not begin until 2013.
II. STAKEHOLDER PERSPECTIVES

PSI interviewed more than 30 stakeholders for this report, including state and local government representatives, recyclers, and manufacturers, to determine their views on New York’s e-waste law and the law’s implementation. Their perspectives and opinions, summarized below, often differ, reflecting their unique perspectives and experiences with the law. These perspectives are not presented as fact and should not be construed as reflecting the positions or opinions of PSI or NRDC.

**Government Perspectives**
Before New York’s producer responsibility law was implemented, many local governments declined to collect used electronics because they did not have the funds to cover the significant costs of collection and recycling. Those that chose to collect were paying the costs of operating collection sites or events, as well as paying recycling vendors to pick up and manage the materials. Some municipalities offset the costs by charging residents fees.

After the law took effect, municipalities realized substantial cost savings, as they were no longer paying recycling vendors for used electronics pick-up. In addition, enterprising local officials were able to negotiate agreements that completely covered the out-of-pocket costs of collecting and managing electronics, and included an additional per-pound payment. These payments help defray local government program costs, such as the costs of labor at the collection site, public outreach, and education. These cost savings have dramatically changed the ability of smaller governments to serve as collection points. As such, many areas of the state have seen a proliferation of collection sites.

Government stakeholders expressed significant concern about the lack of effective public education regarding the e-waste law and collection options. Local government officials interviewed by PSI reported that residents across the state are still unclear about where and how to recycle their electronic equipment. Government officials report being inundated with questions and required to intervene when residents bring scrap electronics to ineligible locations. Rural residents, in particular, present a unique challenge regarding education. The local officials interviewed believed that they bore the disproportionate burden of educating residents, especially since they are not obligated under the law, and since they do not have resources to conduct a concerted public education campaign.

**Manufacturer Perspectives**
Manufacturers report that compliance with New York’s law is among the most expensive and difficult of the 25 states with electronics product stewardship laws, primarily due to the combined impact of three main program aspects – convenience requirements, collection targets, and administrative burden. They also report concerns about the stability of the network of responsible recyclers in the state, given challenges to remain profitable and as evidenced by the exit of one major e-waste collector from the New York market.
Westchester County: Seeing Significant Savings

Westchester County decided, for environmental reasons, to begin collecting certain used electronics in the late 1990s. By actively promoting its recycling program, the County was able to increase the amount of e-waste collected from 3.1 million pounds in 2008 to more than 3.6 million pounds in 2010. The County’s costs grew as the amount collected increased, and by 2010 the County had spent nearly $1 million dollars each year —more than $75,000 a month— just to manage e-waste. As a result of New York’s producer responsibility law, Westchester County’s expenditures dropped significantly. While the County still incurs some operational costs, it no longer has to pay a vendor to collect and recycle the material. The majority of the $85,000 the county spent managing e-waste in 2011 was spent before the law was implemented in April.

Source: Westchester County (NY) Division of Solid Waste
Some manufacturers that PSI interviewed indicated that the convenience requirement—all counties and municipalities that have a population of 10,000 or more must have at least one collection method—has increased the costs of running a program. Manufacturers question whether these added costs translate into a corresponding increase in the amount collected. They also pointed to escalating payments to municipalities and other collectors as a factor in their perception that New York’s electronics recycling program is costly.

Most manufacturers believe that the collection targets included in the New York law are overly prescriptive and, when coupled with the law’s penalties for non-compliance, are far too onerous. This is particularly problematic because of the uncertainty in the program. For example, as of late June 2013, DEC had not yet provided manufacturers with their market share collection target, so they are unclear on their exact obligation. Furthermore, since manufacturers largely rely on agreements with recyclers to fulfill their obligations, the instability in the electronics recycling market adds to the uncertainty. Manufacturers also reported that the data management and reporting requirements of the law were administratively burdensome.

According to some manufacturers, the per capita collection targets in the New York law have created an artificial demand for heavy items, such as televisions and monitors. Although manufacturers are often considered as a single “stakeholder group,” individual companies are affected differently depending on the type of products they produce. For example, computer equipment generally has a higher residual value than other products, such as televisions, and might be “siphoned off” to non-legislated secondary markets rather than being collected in manufacturer-run programs. As a result, computer companies often need to collect televisions, which are costlier to manage and which they did not manufacture, to meet their performance targets. In 2012, for instance, lower-value televisions comprised 68 percent of the material that the IT company HP collected to meet its New York target, while high-value computers represented only 1.4 percent of the mix. One manufacturer stated that the introduction of mandatory collection targets put collectors in a position to make money selling material to recyclers, who are contracted by manufacturers, increasing the cost of collection between four to six cents per pound in the past year.

New York’s e-waste law requires manufacturers to complete an “Annual Report for Manufacturers of Covered Electronic Equipment,” which delineates the types and weight of electronic equipment collected. However, New York DEC has not yet released these data. Manufacturers mentioned that, when they do, it will be critical to better understand this issue. One manufacturer said that the data will enable New York to validate the claims made by the IT manufacturers that they are unable to meet their targets with their own products.

Lastly, one manufacturer strongly encouraged DEC to use a consulting firm that specializes in compliance auditing to audit electronics recyclers to determine whether, and to what degree,

---

4 Personal communication with Tony Morabito, Compliance Program Manager, Hewlett Packard Americas Environmental Leadership Team, May 17, 2013.
stockpiling occurs in New York. This manufacturer reasoned that firms experienced in conducting impartial onsite inspections of electronics recycling facilities are better trained to detect fraudulent activity.

**Recycling company perspectives**

Recycling companies interviewed for this report underscored the highly competitive environment that the law has created for their industry. They also indicated that their companies continue to expand their collection networks and aggressively pursue supply arrangements with generators, local governments, and other collectors to increase processed volumes. While these companies did not disclose the quantity of electronics they processed as a result of the law, several hailed the increase in material supply. In fact, many recycling companies interviewed for this report noted that New York’s e-waste law facilitated the expansion of their businesses into previously untapped markets and locales.

With more material available for collection, the electronics recycling industry in New York has grown quickly. While specific employment data are not available, many recyclers interviewed reported significant job growth in their companies, as well as an influx of new companies in the market since the law’s enactment. While this job growth is good news, there is a downside for existing recyclers to the increased competition — some recyclers expressed concerns about the thin profit margins for e-waste recycling, and noted further cost pressure exerted by inexperienced, and sometimes unscrupulous, recyclers joining the competition for supply. With lower operating costs than their competitors, irresponsible companies can undercut certified, responsible recyclers and offer municipalities a greater payment for the material they collect. This can also cause an unrealistic expectation by municipalities that e-waste collection should be a revenue generating (not just cost neutral) activity.

In most instances, recyclers establish contracts or agreements with generators, municipalities, and other collectors to obtain supply. Often, those agreements involve a per-pound payment to the generator or collector for the amount of material collected. Typically, recyclers “sell” those pounds to manufacturers, which need to meet a specific target under the law. Unless negotiated with the manufacturer, the recycler is not guaranteed compensation for collecting material beyond the manufacturer’s goal. However, their suppliers (such as municipalities) may insist that they take all of the material collected, even if it surpasses their volume expectations. Thus, the recycler may collect some material without receiving a manufacturer payment to cover the costs of servicing the collection site and processing that material.

Recyclers in the New York market mentioned that they have also been impacted by the high cost of managing cathode ray tubes (CRTs), which can comprise anywhere from 60 percent to more than 90 percent of the residential electronics stream by weight. CRTs, found in older model televisions and computer monitors, contain significant amounts of lead and, therefore, require careful management. “Glass-to-glass” recycling (i.e., recycling post-consumer CRT glass into new CRT glass) at one time yielded positive market value for collected CRTs. However, with the decline in CRT production—attributed largely to popular demand for flat screen monitors and
TVs—this once higher value market has dwindled, while costs for CRT recycling (including transportation and processing at a lead smelter) have increased.

The value of other electronic equipment, such as laptops and computer processing units, can offset the cost of handling CRTs. However, this is not always the case, as many recyclers operating in New York report that the manufacturer payments and material revenue combined do not fully cover operating costs. One New York-based recycler generally considered to be socially and environmentally responsible recently stopped collecting electronics from multiple New York local governments due to a lack of profitability. The company still collects from businesses, which generate a higher-value material stream. Other New York recyclers that PSI interviewed also reported that CRT management costs are eating into profits and challenging their business models.

Recyclers stated that the wide variability in potential revenues and costs for CRT management in New York illustrates the difficulty they have in collecting electronics that contain a high percentage of CRTs and still turn a profit. The typical mix in a residential e-waste collection program includes more than 60 percent CRTs (televisions and monitors), 30 percent or more low-value items (e.g., printers and DVD players), and often less than 5 percent high-value computers and laptops.

A series of interviews with New York-based electronics recyclers conducted in the fall of 2012 found that the average cost to recyclers for collecting scrap electronics was 10 cents per pound, which reflects payments made to municipalities or other collectors, and the cost of packaging and transportation. While the collection cost was more than offset by the average payment that recyclers received from manufacturers, reported at the time to be 22 cents per pound, recyclers also assume the cost of processing and preparing materials for market. Assuming that material revenues from the sale of the plastic, metals, and other valuable components cover the processing costs for both low-value and high-value products, recyclers may have yielded a net profit of 13 cents per pound on non-CRT streams. By contrast, there was a net cost to recyclers predominantly collecting higher-cost CRTs—recyclers in New York reported a net loss of between 2 and 20 cents per pound, depending on the recycler payment to municipalities and manufacturer payment to recyclers. Given the typical mix of materials in residential collection programs, the profit margin during that time for recyclers was somewhere between half a cent and two cents per pound.

Simply put, recyclers report that the percentage of the electronics waste stream comprised of CRTs is generally the main difference between whether a recycler experiences a profit or a loss. While all materials markets are fluid and subject to change, this basic dynamic is likely to persist. As noted by one recycler, product mix is crucial, as high-grade materials help fund the high cost of CRT processing. Currently, there is great uncertainty for recyclers about their ability to collect a profitable mix of electronics.

---

5 Source: Interviews conducted in 2012 by Resa Dimino with electronics recyclers operating in New York State.
III. IMPACT OF CRT GLASS MARKETS

CRTs are made of two types of glass: “funnel” glass, which contains the majority of lead typically found in a CRT display (e.g., up to eight pounds of lead in older-model television screens and computer monitors), and “panel” glass, which contains trace amounts of lead, as well as other dangerous metals (e.g., barium). Lead shields radiation that is released from CRTs during use and improves the optical quality of the glass. Recyclers must separate the funnel glass and panel glass prior to recycling a CRT. Recycled CRT glass is typically used to manufacture new CRTs, but can also be sent to a smelter for lead recovery or directed to other beneficial uses.

In June 2012, California state environmental agency officials began finding stockpiles of CRT video displays, including whole and partially disassembled units. PSI surveyed state solid waste and recycling officials from across the U.S. and determined that several other states have also found CRT stockpiles, although discussions with government representatives in New York suggest that the issue has not surfaced in the State.

In New York, CRTs are allowed to be stored for up to 12 months. On March 27, 2013, DEC issued a Proposed New Commissioner Policy Regarding Use of Enforcement Discretion for Cathode Ray Tube (CRT) Glass. Under the new policy, CRT collectors and processors would be allowed to comply with the requirements of the federal "CRT Rule"6 until such time as DEC promulgates new regulations. The CRT Rule exempts unbroken CRT units and broken units that meet certain requirements from being regulated as hazardous waste, with a goal of streamlining the recycling process. The public comment period for this proposal closed on April 26, 2013.

To better understand emerging CRT market trends, PSI interviewed state officials and electronics recyclers in late Fall 2012. These interviews uncovered a complex chain of economic stressors and market conditions that led to the creation of the CRT stockpiles in other states, as well as a number of other outcomes that may have significant impacts on the future sustainability of New York’s electronics EPR program.

What Contributed to the Current CRT Market Dynamic?

- Decreased demand for processed CRT glass. As video display technology advances and becomes more affordable, demand for flat screen devices has increased, while demand for CRT devices has plummeted. Few new CRT monitors are currently being manufactured. As a result, demand for processed CRT glass for use in new CRT units has fallen precipitously—including the demand for “glass-to-glass” recycling, which was once the most prevalent use of processed CRT glass.

---

6 “CRT Rule” promulgated by USEPA at 40 Codes of Federal Regulation (CFR) 261.39; 71 Federal Register (FR) 42928-42949, July 28, 2006. The CRT rule includes several requirements, notably: broken CRT tubes must be stored in clearly marked containers, and be shipped and stored in such a way as to minimize toxic releases; “[s]peculative accumulation” is not allowed (e.g., regulated parties must be able to show at least 75 percent of stored material is recycled or sent away for recycling each year (6 NYCRR 371.1(a)(1)); and toxic materials cannot be applied to lands or otherwise used in a manner that constitutes disposal (e.g., leaded glass cannot be used in road construction materials and recycled materials must meet state beneficial use standards before being used (6 NYCRR 360-1.15)). More details available at: [www.epa.gov/epawaste/hazard/recycling/electron/index.htm#crt].
Additionally, because of the toxicity of lead, few new applications have been developed to safely and effectively repurpose the lead contained within scrap CRTs.

- **Increased supply of CRT glass.** Many factors have increased the amount of CRT glass that is now available for recycling. On the market side, falling prices of flat screen video display devices, like plasma TVs, have made it increasingly possible for people of all income levels to replace their old CRT TVs and computer monitors with plasma technology and liquid crystal displays (LCDs), causing more CRTs to enter the recycling stream. Additionally, the federally mandated digital TV transition, which required that television stations broadcast exclusively in a digital format as of June 12, 2009, further hastened the transition to new flat screen sets.

State government waste and recycling policies, while preventing hazardous material from entering the environment, also contribute to the glut of CRTs. Twenty states have passed solid waste landfill disposal bans on CRTs. Seventeen of those were in effect as of late May 2013, with another two projected to be in effect by July 2013. Lead in tube glass can contaminate the ash from waste-to-energy facilities and reduce or prevent its beneficial reuse in asphalt and other products, and lead in unlined landfills can leach into groundwater or require expensive treatment in lined landfills. Additionally, 25 states have laws that encourage electronics recycling, many of which hold manufacturers responsible for collecting and recycling an annual quota of material.

- **Increased cost of CRT processing.** As a result of the decreased demand for CRT glass, recyclers have gone from earning over $200 per ton for CRT glass (in 2004) to paying more than $200 per ton (in 2012).  In New York, these costs have climbed as high as $400 per ton.

**How is the Problem Being Addressed?**

- **The extent of the problem in New York is being investigated.** Before New York can address the CRT stockpiling issue, it needs to understand the extent of the problem, including the locations of any stockpiles. Although DEC officials have found no evidence of CRT stockpiles in New York, DEC officials noted that they are investigating a stockpile in Pennsylvania that contains equipment processed in New York. DEC intends to visit 60 electronic waste recyclers operating in the state to determine if material generated in New York is being stockpiled in-state or out-of-state, and to verify compliance of facilities with other storage and operational regulations. They want to eliminate the possibility that New York recyclers, or their downstream vendors, are stockpiling New York generated materials in other states. Adding to the challenge in addressing this issue is the fact that multiple stakeholders have already paid

---


9 Source: Interviews conducted in 2012 by Resa Dimino with electronics recyclers operating in New York State.

10 Source: PSI conversation with NY DEC staff, April 2013.
to recycle the stockpiled material and, most likely, manufacturers have received credit for it being recycled.

- **One state has removed landfill restrictions.** California has addressed its CRT issue, at least in the short-term, by removing restrictions on landfilled CRT glass for two years, a move that was controversial with environmental advocacy and consumer rights organizations. These and other groups believe that, as long as lead is being mined for products such as x-ray devices and lead acid auto batteries, there would be fewer lifecycle impacts if recycled CRT glass were the source for that lead. Others want the agency to develop new markets for the CRT glass. And still others argue that, to reduce public health risks, lead should be disposed of and not incorporated back into new consumer products. Many other states have had similar discussions. However, rescinding the CRT disposal ban may be controversial for New York, particularly because it is prohibited in the State’s e-waste law. It also contradicts DEC’s mission and the State’s solid waste management plan.

- **Several states have extended the allowable time for CRT storage.** Several state agencies, including New York DEC, have proposed that CRTs in their state be managed in accordance with the federal “CRT Rule.” Promulgated in 2006, the rule allows CRTs and CRT glass to be stored for up to one year.

- **CEA and ISRI are encouraging new end-use markets.** The Consumer Electronics Association (CEA) and the Institute of Scrap Recycling Industries (ISRI) have begun working together to identify new markets for CRT glass. The two organizations recently announced a CRT Challenge, offering $10,000 to the developer of a technology that finds new uses for CRT glass that yield economic and environmental benefits. CEA and ISRI will share the winning solutions with manufacturers, retailers, and recyclers, and will seek to implement them. A prior solicitation in 2011 yielded three awards, including one to Nulife Glass Processing, which has developed a process for separating lead and glass via a high temperature furnace. The lead ingots resulting from the process can be used to make other products such as automotive batteries. NuLife, which is planning to establish a facility in Dunkirk, New York, has received a permit from DEC and, as of late May 2013, was in the process of acquiring an existing industrial property in the area.

**IV. SERVING NEW YORK CITY—AN ONGOING CHALLENGE**

A critical concern in the first year of implementation of the New York e-waste law was the lack of convenient collection options for New York City residents. New York City is home to 8.2 million people – more than 40 percent of the state’s population. While manufacturers have established multiple collection sites through partnerships with organizations like Goodwill and the Salvation Army, and retailers like Staples and Best Buy, stakeholders report that residents have not found

---


these to be convenient. Concerns about convenience include some locations not being in walking distance for those without cars, some items are too heavy to walk over to a store, or that store employees might not be aware that their employer is part of an e-waste collection network.

To address this concern, the New York City Department of Sanitation (DSNY) began soliciting bids in October 2012 to establish collection bins at large apartment complexes and to run a limited number of collection events for its “e-cycleNYC” program. Eligible bidders were either manufacturers, collectives, or recyclers with manufacturer support, since DSNY believes that manufacturer support is crucial for program success.

In interviews with PSI conducted prior to the January 23, 2013 deadline for bid submission, several recycling companies noted that they faced the following challenges in preparing a bid:

- **Unpredictable quality and value of the electronics stream coming from apartments.** Recyclers interviewed by PSI were eager to be New York City’s contractor for collection events. However, they also believed that having unsupervised collection bins will result in mishandled or broken units, unwanted items in the bins, and theft of the higher-value items, such as laptop computers and CPUs.

- **Falling value of residential electronics, driven by downward trends in recycling markets for CRT video displays.** In addition to lower expected values of the scrap electronics stream from apartments, recyclers were concerned about the reduced profitability of residential electronics recycling, due largely to the cost of responsible CRT management.

- **Additional challenging contract terms.** Certain requirements and economic terms were difficult for recyclers to agree to, or required an administrative burden. For example, DSNY was looking for a 10-year commitment from the winning bidder, which some companies viewed as too risky given current market conditions. Recyclers also did not like the requirement to put the City’s “e-cycle NYC” logo on their trucks, given that the same collection trucks often serve multiple programs.

While the above challenges were of concern to some recycling companies, other recyclers found the following opportunities with the DSNY bid:

- **Ability to develop an industry leading collection program.** No other municipality or local government has attempted to implement such a comprehensive program. Some recyclers felt that the opportunity to develop, implement, evaluate, refine, and improve this program could result in significant opportunities for the selected recycler to use the “e-cycleNYC” program as a template across the U.S.

- **Long-term stability of the contract.** Some recyclers found that the 10-year commitment allowed an opportunity for recyclers to make significant investments in the “e-cycleNYC” program and be able to experience a return on investment without the risk of having to participate in a bidding process where they could lose the contract shortly after those investments were made.
• **Ability to reach and educate a large population regarding electronics recycling.** Educating the 8.2 million residents of New York City presents an opportunity to reach a large population on the importance of recycling electronics. It also represents the potential to educate their family, friends, and the companies or organizations where residents are employed.

At the end of April 2013, DSNY selected Electronic Recyclers International (ERI) as its “e-cycleNYC” partner. ERI’s manufacturer sponsor(s) has not been publicly disclosed.

The DSNY/ERI initiative has the potential to enable City residents to recycle their electronics safely, conveniently, and regularly. The new program includes collection from events and potentially permanent sites, as well as an innovative apartment building collection program. The apartment complex program will be particularly valuable for New York City, where the low rate of vehicle ownership makes transporting electronics to collection events challenging.

One focus of the “e-cycleNYC” program is to provide convenient apartment building collection. Currently, apartment residents are often asked to leave their bulky waste in the basement so that maintenance staff can haul it to the curb. By providing more convenient options for those living in large buildings, the program will allow residents to handle their materials in a similar manner, but ensure that they are recycled. Collection options at apartment buildings will now include the following:

- Collection containers placed inside apartment buildings so that building managers can request a pickup when it is full.
- Room cleanouts, which will allow for periodic collections once a building has consolidated enough material to warrant a collection.
- Events for large buildings, where the vendor accepts material directly on the building property.

Two specifications in the bidding process deserve emphasis:

1. The City required that all bidders be certified, or be in the process of getting certified, by either of the two leading electronics recycling certification standards: Responsible Recycling (R2) or e-Stewards. This requirement goes further than the New York State law that sets basic operating standards for in-state recyclers and ensures that materials are “properly handled and processed.” The winning vendor, ERI, is dual certified through e-Stewards and R2.

2. One of the most heavily weighted criteria for selecting the winning bidder was the amount of money that a bidder agreed to set aside, per collected ton, for outreach and educational activities. ERI plans to work with DSNY to create and execute a comprehensive outreach campaign, with DSNY having ultimate authority over content.

---

DSNY and ERI are planning to roll out the program in the summer or fall of 2013. To do so, the agency will rely on a network of buildings currently enrolled in its apartment building recycling initiative and re-fashionNYC (clothing collection bin) program. With the bid award, ERI and DSNY will be establishing the most comprehensive municipal electronics recycling service in the country—a potential national model—at no cost to taxpayers.

V. FINDINGS

Based on interviews with various stakeholders, PSI’s findings include the following:

The volume of scrap electronics collected in New York has increased substantially. According to DEC, manufacturers collected 44,817,992 pounds from April to December of 2011, just surpassing the legislative goal of 43,968,269 pounds. After pro-rating these data to a full-year, New York’s 3.1 pounds per capita collected was the eleventh best of all states with electronics recycling laws in 2011 (see Figure 2). Since the quantity of electronics recycled throughout New York was not officially tracked in previous years, it is difficult to quantify the degree to which collections increased. However, reports from recyclers, government recycling coordinators, and manufacturers do suggest that the increased ease and convenience of recycling has led to a significant increase in the quantity collected in 2011 as compared to previous years. DEC was due to release data and an analysis of the law’s impact by late 2012. However, as of late June 2013, DEC’s progress report had not yet been released; thus a more definitive analysis is not feasible at this juncture.

![Figure 2: Pounds per capita collected in 2011 (or July 2011-June 2012)](source)

Source: Electronics Recycling Coordination Clearinghouse
June 2013 data tables

---

15 Electronics Recycling Coordination Clearinghouse (ERCC). March 2013 State Data Summary. Data tables acquired March 5, 2013 from Jason Linnell, ERCC Executive Director. Data for New York have been extrapolated from nine months of collection experience, to provide an annual per capita collection.
Local government cost of managing electronics has decreased significantly. The high cost of e-waste recycling prior to the law’s enactment restricted collection to municipalities that could afford it. As a result of the new producer responsibility law, the number of municipalities collecting has increased dramatically, and most are receiving revenue to offset the collection costs for the material they collect. Since no baseline data were collected on local government costs to recycle electronics, PSI could not determine definitive cost savings as a result of the new law. However, based on data from Westchester County (see page 5) and other counties around New York State, cost savings for municipalities are likely millions, if not tens of millions, of dollars, enabling municipalities to shift their resources to provide other needed services.

The number of scrap electronics collection sites has increased. Earth911, a company that specializes in providing consumers with recycling information, provided PSI with data on the number of collection sites before and after the implementation of the New York e-waste law. Based on Earth911 data, the number of collection sites in New York has significantly increased since the law’s implementation, rising by 77 percent overall in the first year, with increases across municipal, retail, and independent programs (see Figure 3). (Independent programs are those that are operated by organizations or companies that collect material but are not associated with a municipality or major retailer.) These data corroborate anecdotal information obtained from PSI interviews that suggested a significant increase in the number of collection sites and services in the first program year.

There is insufficient outreach and education about the law. Stakeholders report that New York residents are not well informed about where and how to recycle their electronics. The law requires manufacturers to establish a public education program including, at a minimum, a toll-free hotline and website that provides residents with recycling information. While on-line resources are available, including greenergadgets.org, which is operated by electronics manufacturers, they are not well known.
Residents in New York City lack information about the program, as well as convenient collection options. Public awareness of the electronics recycling program remains extremely low in New York City. In addition, collection options in New York City are not as convenient as they are for residents in other areas of the state. Most city residents do not own a vehicle and, therefore, need more convenient access to a collection location than someone who can transport their equipment to a retail or municipal site. DSNY’s new contract for collection services aims to address these two deficiencies so that recycling is as convenient as waste disposal.

NY DEC has resource limitations. New York DEC faces resource constraints in administering and enforcing the program due in part to budget cuts in recent years. Additionally, the registration and reporting fees generated by the New York State Electronic Equipment Recycling and Reuse Act, along with any penalties paid by manufacturers for not meeting collection targets, are directed to the New York State Environmental Protection Fund, which is predominantly used for funding state parks, open space conservation, and land acquisitions. Therefore, fees collected under the Act are not directed to electronics stewardship program implementation. The complex network of collection sites and recyclers makes it difficult for DEC, without adequate resources, to provide effective oversight of the program, engage in education and outreach, investigate possible fraud, and otherwise ensure that used electronics are managed in an environmentally sound manner.

New York’s e-waste program has inadvertently created an uncertain marketplace with heightened risk. The program has resulted in excessive risks for both recyclers and manufacturers. From the recyclers’ perspective, competitive forces may lead them to commit to collecting more material than they have contracted for payment from manufacturers. From the manufacturers’ perspective, competition for supply has led to increased costs, primarily related to escalating recycler payments to municipalities and CRT management costs. These risks are compounded by DEC’s delay in communicating manufacturer’s 2013 collection targets, coupled with the threat of financial penalties if manufacturers do not meet performance goals.

DEC has not released data provided by collectors, consolidators, recyclers, and manufacturers. Public disclosure of collection data is needed to gauge program success and protect against fraud. It is also critical to ensure that the material is handled in an environmentally sound manner and that it is not being exported to developing countries with inadequate environmental and health regulations.

The high cost of responsible CRT management puts a stress on the system. As new flat panel screens have replaced CRT displays, CRT recycling markets—while they still exist—have declined in value over the past few years. This has resulted in a greater cost for recyclers, as well as the stockpiling of CRTs by some recyclers around the country. Several recyclers we interviewed cited the increased cost of managing CRT glass as a significant financial concern.

---

VI. RECOMMENDATIONS

PSI puts forth the following recommendations for improving New York State’s electronic waste stewardship program.

- **The Governor and Legislature should ensure that adequate funds go directly to New York DEC to oversee the program.** Manufacturers pay a registration fee to cover the cost of running the program. However, these funds are being redirected for other purposes. This practice should stop, and instead adequate funds should be allocated to DEC to administer, enforce, and oversee the program.

- **New York DEC should report on the program’s progress and challenges:** According to the 2010 New York e-waste law, DEC was required to submit a report to the Governor and General Assembly by April 1, 2012. This report was to include an evaluation of the state’s electronic waste stream, recycling and reuse statistics for covered electronic equipment, an assessment of compliance and enforcement, and recommendations for changes. The report was also supposed to include a discussion of in-state market development opportunities for electronics covered under the law. However, as of late June 2013, DEC has yet to publish its first performance evaluation. DEC officials interviewed for this report said that a staff shortage has contributed to the delay in data compilation and reporting.

  Timely and accurate performance measurement is critical so that the state can adjust collection goals and outreach activities to reflect actual experience on-the-ground. In addition, manufacturers and recyclers need report data to understand market trends. And finally, the public needs assurance from the state that collected e-waste is being responsibly recycled.

- **The State should track local government cost savings resulting from manufacturer-funded collection.** One of the most significant benefits of establishing the electronics recycling law is that local governments are reducing costs while also expanding service and collecting a
greater quantity of scrap electronics. PSI recommends that DEC conduct a survey of local governments to determine the financial benefits of the program.

- **Manufacturers should improve public education; all stakeholders should promote existing educational resources.** Informing consumers about the e-waste program is required by statute, and is critical to program success. On-line resources are available, including [greenergadgets.org](http://greenergadgets.org) and [earth911.org](http://earth911.org), which enable New Yorkers to locate e-waste collection sites by zip code. While manufacturers are responsible for educating the public on the program, all stakeholders have a responsibility to better promote these services, particularly the local and state government sources that are often the public’s first point of contact. Since municipal officials are accustomed to educating their residents on recycling and waste management practices, manufacturers should ensure that municipalities are equipped with electronics recycling information to provide to their residents. PSI also recommends that manufacturers conduct a residential survey (with a statistically significant response rate) to measure awareness of recycling options and seek recommendations for improvement.

- **The State should closely monitor New York City’s new contract to offer convenient recycling options to residents.** DEC should carefully monitor the outcome of DSNY’s contract with ERI for electronics collection services to ensure that New York City residents have convenient collection options. If residential convenience is not demonstrated within a reasonable period (e.g., two years), further program changes may be needed, such as changing the convenience standard to increase the number of collection sites in larger cities. Reasonable time needs to be given for program implementation, consumer awareness, data collection, and seasonal variation so that trends can be identified and analyzed.

- **The State should require recyclers be certified or meet equivalent requirements.** Two third-party systems, e-Stewards and Responsible Recycling (R2), certify that recyclers practice environmental, health, and safety principles. Through its on-going rulemaking process, DEC should require that all recyclers registered to handle e-waste in New York demonstrate either that they are third-party certified or that they meet equivalent requirements. Through legislative changes, New York should require manufacturers and local governments to use recyclers that obtain third-party certification, or adhere to equivalent requirements.  

- **New York DEC should maintain a disposal ban on CRT glass.** Since there are markets for CRTs, albeit costly ones, PSI recommends that New York’s hazardous waste and solid waste disposal ban on CRT glass be maintained. This action will support prior investments in technologies that reclaim CRTs and ensure that the material value in CRTs (glass and lead) is

---

17 Similar changes were recently introduced into the Texas 83rd Legislature; HB 3465 would require that manufacturers follow the standards established under R2 or e-Stewards or an “equivalent independently audited certification standard for electronics recycling,” or otherwise use a recycler that complies with these same standards. [http://legiscan.com/TX/text/HB3465/id/780123](http://legiscan.com/TX/text/HB3465/id/780123), accessed May 22, 2013.
retained. If lead is landfilled or otherwise disposed of, it would mean a significant loss of raw materials for these investments.

- **New York DEC should convene a stakeholder dialogue on CRT market issues.** Although this report evaluates the New York electronics stewardship program, many of the issues outlined above — including, perhaps most significantly, the decrease in CRT markets — are also faced by those recycling electronics in other states. The best way to address this issue may be through a forum that includes all relevant stakeholders. Several people interviewed by PSI indicated the need to develop a multi-stakeholder dialogue on electronics recycling and the impact of producer responsibility laws on CRT markets. Some also suggested that state e-waste laws include incentives for investment into creating new CRT markets.

- **New York DEC should convene a stakeholder dialogue to improve program implementation:** As with any new program, and particularly one of this size and scope, New York’s electronics recycling program has faced a number of challenges, including increasing recycling convenience, enhancing education, attaining performance goals, and reducing program risk to all stakeholders. Implementing the program’s many facets requires close coordination and cooperation among electronics manufacturers, recyclers, retailers, state and municipal officials, and other stakeholders. A collaborative dialogue offers the opportunity to address these issues in a manner that ensures that stakeholder concerns are understood and interests addressed. Ultimately, it is in every stakeholder’s interest for the New York electronics program to operate as smoothly and cost-effectively as possible. A productive dialogue can help achieve that.