COMMUNITY-BASED APPROACHES TO THE IMPLEMENTATION OF THE NEW YORK STATE ELECTRONIC WASTE RECYCLING LAW IN NEW YORK CITY

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Abstract

The New York State Electronic Equipment Recycling and Reuse Act took effect on April 1st, 2011, requiring manufacturers of electronic equipment and retailers to accept back items for collection, handling and recycling. This law also requires manufacturers to educate consumers on their electronic waste acceptance programs. This thesis does not address so much the necessity of e-waste recycling, which has already been heavily documented, but rather the potential and limitations to the electronic waste recycling law in New York State as it applies to the city of New York, as the law is phased in from April 2011 to January 2015.

Unlike some state electronic waste bills, the New York State law does not specify in any level of detail how the residential ban should be implemented at the local level, nor does it require municipalities to bear any onus for collection or public education. As an extended producer responsibility bill, the New York State law puts sole responsibility on the manufacturers to handle the collection and recycling or reuse of electronic waste, along with financing and implementing a campaign for public education.

More critical is the nature of the law itself. Since manufacturer quotas in New York State are state wide with no geographical requirements, manufacturers have been able to meet their quotas by collecting in areas outside of New York City, where collection can be cheaper, more efficient and convenient. On the consumer end in New York City currently, the process to recycle electronic waste is non-systematic and ad-hoc. However, New York City is unique due to the large number of non-profit and community organizations that are actively involved in electronic waste collection.

This thesis aims to address two primary research questions. First, what challenges may arise in the application of the New York State electronic waste recycling law at the local level in New York City? And second, how might New York City take advantage of existing community-based organizations with electronic waste recycling activities to more effectively collect and recycle electronic waste, as well as educate residents and businesses?

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Introduction

Since 2007, the state of New York has implemented a series of electronic waste recycling legislation affecting retailers, manufacturers and residents. As of January 1st, 2007, the *New York State Wireless Recycling Act* required all wireless telephone service providers to accept up to ten old phones for recycling or reuse. The *New York State Rechargeable Battery Recycling Law* was passed in December 2010 requiring manufacturers of covered rechargeable batteries to collect and recycle batteries at no cost to consumers starting in March 2011. The law also stipulated that beginning June 8th, 2011, retailers that sell covered rechargeable batteries must also accept back used rechargeable batteries for recycling.

The *New York State Electronic Equipment Recycling and Reuse Act* (*Environmental Conservation Law Article 27 Title 26*, henceforth to be also referred to as the "New York State electronic waste recycling law") was passed in May 2010 and took effect on April 1st, 2011, requiring manufacturers of electronic equipment and retailers to accept back items for collection, handling and recycling. This law also requires manufacturers to educate consumers on their electronic waste acceptance programs. A landfill disposal ban is also phased in over the course of four years.

On January 1st, 2011, it became illegal for manufacturers, retailers, and electronic waste consolidation or recycling facilities to dispose of electronic waste in the waste stream or at a solid waste or hazardous waste management facility. On January 1st, 2012 it became illegal for businesses and institutions to do so. The final piece of the puzzle, the residential disposal ban, will take effect on January 1st, 2015 from whence it will become illegal for residents to dispose electronics. To quote, the law states:

> No individual or household shall place or dispose of any electronic waste in any solid waste management facility, or place electronic waste for collection which is intended for disposal at a solid waste management facility or hazardous waste management facility in this state.[1]

However, unlike some state electronic waste bills, the law does not specify in any level of detail how the residential ban should be implemented at the local level, nor does it require municipalities to bear any onus for collection or public education. As an extended producer responsibility bill, the New York State electronic waste recycling law puts sole responsibility on the manufacturers to handle the collection and recycling or reuse of electronic waste, along with financing and implementing a campaign for public education.

Despite state regulation, the process to recycle electronic waste is non-systematic and ad-hoc on the consumer end in New York City. In the days after the New York State electronic waste law was enacted, *The New York Times* reported that New York City officials found that "few [manufacturers] were forthcoming"[2] with information on recycling pickup or drop-off sites. The week the manufacturing recycling act took place, only 69 manufacturers had registered with the Department of Environmental Conservation (DEC), a registration that required, among other stipulations, disclosure of the manufacturer's plan to collect, handle, recycle or reuse its share of electronic waste.[3] The document was not updated until five months later in a PDF dated September 15th, 2011 available on the DEC website, which showed an additional eleven manufacturers

[1] New York State Department of Environmental Conservation. *Environmental Conservation Law Article 27 Title 26: Electronic Equipment Recycling and Reuse*.
http://www.dec.ny.gov/docs/materials_minerals_pdf/ewastelaw2.pdf. Web. 29 March 2011.
[2] Navarro, Mireya. "In New York, E-Waste Recycling Law Takes Effect." *New York Times. 2* April 2011.
http://www.nytimes.com/2011/04/02/science/earth/02ewaste.html. Web. 29 March 2011.
[3] Navarro, Mireya. "In New York, E-Waste Recycling Law Takes Effect."

had registered.[4] The total figure of 80 registered manufacturers remained constant in the January 18th, 2012 update to the PDF document.[5]

More critical is the nature of the law itself. Since manufacturer quotas in New York State are state wide with no geographical requirements, manufacturers have been able to meet their quotas by collecting in areas outside of New York City, where collection can be cheaper, more efficient and convenient—at least in the first year of the law. According to Christine Datz-Romeo, the director of the Lower East Side Ecology Center, over half of the population of New York State lives downstate but the law "never really made any provisions to make sure people here in New York City have access to programs. What we are seeing is that a lot of manufacturers are really working very hard upstate to get tonnage but in [New York] City, at least in 2011, we haven't seen that many events sponsored by manufacturers."[6]

On the manufacturer end, companies have joined forces to manage the collection and recycling process through collectives. On prominent collective is MRM, the Electronic Manufacturers Recycling Management Company. As of March 2012, it consisted of 41 companies, a number that increased from 26 just last year,[78] reflecting the popularity of this form of outsourcing. In the New York metro area, MRM works directly with two partners, The Salvation Army and Best Buy. Manufacturers that are not part of

[4] "New York State Electronic Equipment Recycling and Reuse Act. Registered Covered Electronic Equipment (CEE) Manufacturers and Their Brand(s)." *New York State Department of Environmental Conservation.* http://www.dec.ny.gov/docs/materials_minerals_pdf/regceemfrs.pdf. 15 September 2011. Web. 5 November 2011.
[5] "New York State Electronic Equipment Recycling and Reuse Act. Registered Covered Electronic Equipment (CEE) Manufacturers and Their Brand(s)." *New York State Department of Environmental Conservation.* http://www.dec.ny.gov/docs/materials_minerals_pdf/regceemfrs.pdf. 18 January 2012. Web. 26 March 2012.
[6] Datz-Romero, Christine. Personal Interview. 30 January 2012.
[7] "Consumer Recycling." MRM Electronic Manufacturers Recycling Management Company. http://www.mrmrecycling.com/collection_map.htm. Web. 24 March 2011.
[8] Navarro, Mireya. "In New York, E-Waste Recycling Law Takes Effect."

collectives forge partnerships with local organizations and companies and/or operate a mail-back option.

New York City is unique however, due to the large number of non-profit and community organizations that are actively involved in electronic waste collection, including the Lower East Side Ecology Center, Sustainable Flatbush and Brooklyn Heights Association. These organizations, even prior to the passage of the New York State electronic waste recycling law, managed collections and contracted out with local companies such as WeRecycle! which specializes in electronic waste collection and recycling. Resa Domino, director of legislative programs at WeRecycle!, and formerly with the New York State Department of Environmental Conservation, finds that community organizations in New York City are

> playing a critical role and really form the core of the collection network. If you look at New York City, it's mostly non-profit doing the collection there. But if you go to Connecticut, there's very little community-based organization because [collection is] done by the municipalities.[9]

Domino says she has not heard a lot of community-based organizations having a significant role in the electronic waste collection and recycling activities outside of New York City.

This thesis aims to address two primary research questions. First, what challenges may arise in the application of the New York State electronic waste recycling law at the local level in New York City? And second, how might New York City take advantage of existing community-based organizations with electronic waste recycling activities to more effectively collect and recycle electronic waste, as well as educate residents and businesses?

[9] Domino, Resa. Personal Interview. 7 February 2012.

The research has implications on both policy formulation and urban planning. First, New York City has a vested interest in reducing overall waste stream through PlaNYC. Although electronic waste is a small percentage by weight—less than half a percent of the overall waste stream—it presents a significant threat to public health, safety and the environment.[10] The April 2011 update to PlaNYC includes an initiative on toxic waste stream and specifically calls out the need for greater public education in regards to the state e-waste law.[11]

Second, electronic waste collection and recycling do not benefit from any positive spillover effects from current planning mantras such as planning for greater urban density or investment in public transit. Electronic waste requires targeted initiatives due to the nature of the items and their associated mobility challenges. The state legislation is targeted for cities and towns under 10,000 persons but contains no solutions for highly urbanized areas.

Thirdly, collection of items must take place in physical space and lastly, collection and recycling requires cooperation between multiple stakeholders on many levels: state, city, region, for-profit and non-profit entities, institutions and community organizations.

Electronic waste disposal and recycling remains a pressing issue for New York City. According to a 2008 informational pamphlet by the National Resources Defense Council, the Department of Sanitation in New York City collects 25,000 tons of

[10] The City of New York, Mayor Michael R. Bloomberg. "Solid Waste," *PlaNYC Update April 2011 A Greater Greener New York,* 144.
[11] *ibid*.

electronic waste annually that is discarded instead of recycled.[12] With the residential disposal ban set to take effect on January 1st, 2015, a comprehensive plan will need necessary to successfully divert electronic goods from the solid waste stream.

Research Design and Methods

This thesis does not address so much the necessity of e-waste recycling, which has already been heavily documented, but rather the potential and limitations to the electronic waste recycling law in New York State as it applies to the city of New York, as the law is phased in from April 2011 to January 2015. The thesis assesses the existing capabilities of local community-based organizations and small businesses with existing electronic waste collection and recycling programs, and evaluates whether such organizations can be harnessed to provide a more comprehensive plan for electronic waste management in New York City.

The thesis begins with an in-depth analysis of the New York State electronic waste recycling law and the development of electronic waste recycling legislation nationally. The New York State law will be situated *vis-à-vis* other state legislation and the electronic waste recycling program in the state of Maine analyzed as a case study. Sources used will be individual state legal statutes, reports from state and national departments of environmental protection, publicly available data and analysis by non-profit organizations, such as the National Center for Electronics Recycling (NCER) and the Electronics Takeback Coalition, and existing literature on electronic waste recycling, including journal articles and books, along with newspaper articles.

[12] "What You Need to Know About E-Waste and New York City's Intro. 104-A, the Electronics Collection, Recycling, and Reuse Act." *Natural Resources Defense Council*. February 2008. http://www.nrdc.org/cities/recycling/ny104A.pdf. Web. 29 March 2011.

Current stakeholders in the electronic waste recycling industry in New York City will be identified. Interviews will be aimed at those involved in the electronic waste recycling process. All interviewees will be employed by the organizations they represent. The intent is to determine current practices in public education, electronic waste collection, and processing, as well as to understand the challenges of implementing the New York State electronic waste law at the local level.

In determining the organizations selected for analysis, maintaining a diversity in core business operation—non-profit, for-profit, government—was considered. In addition, organizations with high levels of reciprocity with the community were particularly targeted. One of the unifying factors between all the organizations, irrespective of incorporation status, was their interest in serving the public good. Only organizations that adhered to the highest industry standards, e-Stewards and R-2, were interviewed.

Staffers or directors were interviewed at the following:

- Non-profit organizations with electronic waste recycling events and collection activities:
    - Lower East Side Ecology Center
    - First Unitarian Church/ Brooklyn Heights Association
    - GrowNYC
    - The Urban Renewal Corporation
- For-profit recyclers:
    - The 4th Bin

- WeRecycle!

- Policy makers:
  - New York City Mayor's Department of Long Term Planning and Sustainability

Background

One of the fundamental objectives of this thesis is to highlight the potential challenges in the implementation of the New York State electronic waste law at the local level for a city the size and complexity of New York. This inquiry about the relative role of state and municipality has its origins not only in the current state legislation, but also in the prior passage of electronic waste legislation in New York City. Controversy in regards to the previous New York City electronic waste law highlights the challenges facing electronic waste recycling on many levels—city, state, industry, government and community.

A New York City electronic waste legislation was originally passed in May 2008 for a July 2009 implementation date. The law passed in a 47-3 vote, with Mayor Bloomberg in opposition. In negotiations Bloomberg also refused to sign the bill if it included a recycling quota.[13] Before the law was implemented however, two industry groups—the Consumer Electronics Association (CEA) and the Information Technology Industry Council (ITIC)—filed an injunction against the city.

The numerous challenges to the law included undue and excessive burden regarding portions of the law including pick-up requirements, orphan share or other

[13] MacCurdy, Meline. "Electronics Manufacturers Challenge New York E-Waste Law." *Marten Law PLLC*. http://www.martenlaw.com/newsletter/20090812-nyc-e-waste-law-challenged. Web. Accessed 27 March 2011.

branded products, the scope of the term "manufacturer," retroactive liability and more general claims against producer responsibility.[14] The city law would have also required "convenient collection" for items weighing over 15 pounds, a clause that the New York Department of Sanitation later clarified to include direct, door-to-door collection.[15] This was a key point in the legal dispute, despite the fact that the "convenience" clause is widely used in other state electronic waste legislation without mandating door-to-door pickup.

Kate Sindig, a senior attorney with the National Resources Defense Council (NRDC), contends that the lawsuit had implications on the future of producer responsibility electronic waste laws across the nation as "the suit was so broadly framed that it put in jeopardy any law based on the notion that the manufacturers of consumer products should bear the financial responsibility for their disposition at end-of-life."[16] Oral arguments began in January 2010 but the case was rendered moot when the *New York State Electronic Equipment Recycling and Reuse Act* was signed on May 28, 2010. The city lawsuit was officially dismissed on June 28, 2010

The challenge to the city law galvanized state and local officials across many states, along with non-governmental organizations, to call on the CEA and ITIC to drop the lawsuit. By underscoring the contradictory stance of manufacturers, the officials and

[14] Murphy, Michael G. and Megan R. Brillault for Beveridge and Diamond, P.C. "Complaint. Consumer Electronics Association, Information Technology Council, and ITAC Systems, Inc. v. City of New York, Michael R. Bloomberg, et al." 24 July 2009.
[15] Sindig, Kate. "NYS Passes Cutting Edge E-Waste Law." *National Resources Defense Council Switchboard*. 29 May 2010. http://switchboard.nrdc.org/blogs/ksinding/nys_passes_cutting_edge_e-wast.html. Web. 29 March 2011.
[16] Sindig, Kate. "NYC e-waste lawsuit officially dismissed." *National Resources Defense Council Switchboard*. 28 June 2010. http://switchboard.nrdc.org/blogs/ksinding/nyc_e-waste_lawsuit_officially.html. Web. 29 March 2011.

non-governmental organizations created a public relations problem for the industry groups—making both settlement and support of a state law more likely.[17]

New York State thus became the 23rd state to pass an electronic waste recycling law. Sindig hailed it as one of "the most progressive, best researched e-waste bills in the country,"[18] as well as "one of the strongest of its kind in the nation."[19] But while the law places New York among the states with more stringent recycling goals/quotas and includes a greater number of products covered than other state legislation, the law places responsibility for collection, recycling, and education solely on producers. This thesis will address the shortcomings of this type of legislation as well as provide solutions for the city of New York.

Electronic Waste Recycling Laws in the United States

Electronic waste recycling laws are crafted individually by state. There is a wide range of stringency between states, in terms of quota (if it exists at all), covered products and stakeholder responsibility. I have identified the major categories of criteria in electronic waste law, although it should be noted that a state usually uses a combination of the criteria. The main categories are:

I. Consumer Responsibility: The purchaser of covered electronic devices pays a fee at point of sale that covers collection, recycling and other fees associated.

II. Producer Responsibility: The manufacturer is responsible for electronic waste management.

[17] "Federal Judge Dismisses Industry Lawsuit against NYC e-waste law." *Earth911.* 28 June 2010. http://earth911.com/news/2010/06/28/federal-judge-dismisses-industry-lawsuit-against-nyc-e-waste-law/
[18] Associated Press. "Another State Passes Tough E-Waste Law." *CBSNews.* 7 June 2010. http://www.cbsnews.com/stories/2010/06/07/tech/main6556885.shtml.
[19] Sindig, Kate. "NYC e-waste lawsuit officially dismissed."

This is broken down into sub-categories, of which some states provide choice:

a. *Producer-operated program*: A manufacturer or group of manufacturers manages its own recycling program, either directly, through a collective or in contract with an approved consolidator and/or recycler.
b. *State-run program*: The state runs a recycling program, paid for via manufacturer registration fees and operational fees.

In addition, electronic waste legislation can contain one or more of the following sub-criteria:

A. Municipal Responsibility: This stipulation, when included, is in addition to points I and II and requires municipalities to provide collection sites and/or electronic waste recycling education for residents.
B. Residential Responsibility: This requirement, enforced via a landfill ban, prohibits individuals from discarding electronic products into the solid waste stream.
C. Retailer Responsibility: This criteria prevents retailers from selling products to consumers from manufacturers that are not registered. In some cases, retailers must also provide information on electronic waste recycling and/or accept back products for recycling.
D. Government Responsibility: Role of the government agency in terms of education, resident access to information and administration.
E. State collection targets and manufacturer recycling goals: States vary in their method to determine targets for manufacturer and state-wide quotas, whether

by return share, market share or some combination. Some states do not have collection targets.

F. Registration: States have different stipulations as to which types of organizations (manufacturers, recyclers, collectors and transporters) are required to register.

G. Labeling: Most states require manufacturers to clearly label their devices with name of manufacturer or manufacturer's brand label.

H. Covered Electronic Device: Each state defines what electronic devices are covered under the legislation, and this differs by state.

While most research and action groups break down legislation types into three broad categories—producer responsibility, consumer fee, or manufacturer education laws—this thesis will further subdivide the types of legislation to look at state-run programs and municipal responsibility. As such, there are six main groupings of electronic waste laws:

1. State-run recycling programs with consumer responsibility
2. State-run recycling programs with producer responsibility that:
    a. require local municipal participation
    b. recommend local municipal participation
    c. do not require municipal participation
3. Municipal participation without state-run programs
4. Producer responsibility only
5. Takeback programs only

6. Public education only

Disposal bans do not necessarily accompany electronic waste recycling laws, but many states have enacted legislation either in addition to or in conjunction with their electronic waste recycling laws.

The New York State Electronic Waste Law

The *New York State Electronic Equipment Recycling and Reuse Act* is a producer responsibility law that allows manufacturers to run their own electronic waste collection and recycling programs, to contract with an approved recycler or to join a collective program with other manufacturers. There is no state-wide recycling program in New York. Although there is a residential disposal ban, there is neither municipal responsibility for enforcement nor state or municipal responsibility for collection.

There are statewide recycling and reuse goals and manufacturer recycling quotas that increase in stringency over time. For the first three years of the law, the state recycling and reuse goal is calculated yearly, based on the most recent U.S. Census population estimate for New York State multiplied by a weight per capita that increases yearly. A manufacturer's quota is determined based on market share by weight calculated using state sales data and other available data over the previous three-year period.

In 2014 and thereafter, the state recycling goal will be based on a return share model. The collection rates of the previous three years is multiplied by a "goal attainment percentage" to encourage improvement over collection the year prior. The calculation of

manufacturer share will remain the same as before 2014. The recycling and reuse goal is determined using this formula:

Recycling and Reuse Goal = Base weight x Goal Attainment Percentage

The base weight is the greater of:

1. Average weight of all electronic waste collected in the previous 3 calendar years

   or

2. 3 year average of the sum of all electronic waste collected for recycling or reuse during previous 3 calendar years

The goal attainment percentage is 90% if the base weight is less than 90% of the statewide recycling or reuse goal of the previous year, 95% if the recycling or reuse goal is 90% or above but below 95%, 100% if the recycling or reuse goal is 95% or above but below 100%, 105% if the recycling or reuse goal is 100% or above but below 105%, and 110% if the recycling or reuse goal is 105% or above but below 110%. Using this calculation, the state can theoretically encourage improvement over the year prior.

Base Weight vs. Statewide Goal	Goal Attainment Percentage
< 90%	90%
Between 90% and 95%	95%
Between 95% and 100%	100%
Between 100% and 105%	105%
Between 105% and 110%	110%

Figure 1 Goal Attainment Percentage

All manufacturers must register and pay a registration fee of $5000, which is deposited into the state environmental protection fund. Manufacturers are not allowed to sell within the state of New York unless they have registered with the New York State Department of Environmental Protection and actively maintained an electronic waste

acceptance program, for which they cover all costs. The waste acceptance program must include at a minimum:

- Convenient collection. "Reasonably" convenient methods, as defined in the law, include:
    - Mail or ship back program
    - Collection agents by manufacturer or agent of manufacturer, including local government or private party events
    - Fixed acceptance locations operated by manufacturer or agent of manufacturer
    - Agreements with local governments, retail stores, sales outlets, and non-profits which have agreed to provide facilities for collection
    - Community collection events
    - Any combination of the above
- One method of acceptance in every county, at the minimum. All municipalities with a population of 10,000 or more must have at least one method of acceptance.
- A public education program including, at the minimum:
    - Website and toll-free number
    - Written information about reuse and recycling of product in the product manual or provided at time of sale, including information on how to destroy personal data
    - Advertisements and press releases (if any)

In New York State, retailers are no longer permitted to sell electronic equipment manufactured by those who have not registered with the department. Retailers must also provide purchasers with information about electronic waste recycling at point of sale. It should be noted that there are also requirements for collectors, consolidators and recyclers, including registration, reporting, and rules for the adherence to safety regulations, which will be elaborated upon later in the thesis.

Beginning April 1st, 2011, a disposal ban for manufacturers, retailers and owners/operators of electronic waste facilities or electronic waste recycling facilities went into effect, whereby electronic waste was no longer permitted to be dropped off at a solid waste or hazardous waste facility. On January 1st, 2012, the second phase of the disposal ban went into effect which states that "no person *except for an individual or household* shall place or dispose of any electronic waste in any solid waste management facility, or place electronic waste for collection which is intended for disposal at a solid waste management facility or hazardous waste management facility in this state."[20] Both Resa Domino from WeRecycle! and David Hurd of GrowNYC have stated that this part of the legislation effectively makes the residential disposal ban *de facto* effective because neither the Department of Sanitation nor private collectors will pick up electronics left at the curb.[21] [22] Finally, on January 1st, 2015 it will become illegal for residents to dispose electronics.

The New York law included a large scope of covered products in contrast to many other states, and included computers, laptops, monitors, televisions, small servers,

[20] New York State Department of Environmental Conservation. *Environmental Conservation Law Article 27 Title 26: Electronic Equipment Recycling and Reuse*.
[21] Domino, Resa. Personal Interview. 7 February 2012
[22] Hurd, David. Personal Interview. 7 March 2012.

cathode ray tube, small electronics (portable music players, VCRs, DVD, DVR, digital converter box, cable or satellite receiver, video game console), computer peripherals (printer, keyboard, mouse, fax, scanner) and attached cables, cords, and wiring. It does not cover cameras, video cameras, portable or stationary radios, cash registers, household appliances such as clothes washers and dryers, refrigerators, freezers, microwave ovens, ovens, ranges or dishwashers, GPS, commercial medical equipment, telephones, calculators, thermostats, hand-held transceivers, or elements part of larger industrial, R&D, or commercial equipment. Still, the list of covered products is extensive compared to the many states that only cover computers, laptops, monitors and televisions. Some states cover even fewer items—Missouri covers only computers, while Oklahoma and Virginia cover computers, monitors and laptops but not televisions.

Electronic Waste Law Precedents in the United States

State Recycling Goals and Manufacturer Quotas

The New York State law is modeled after different portions of other state electronic recycling legislation. The statewide recycling and reuse goal based on return share, as a product of the goal attainment percentage and the base weight, is adopted from the Illinois law (which has since been revised), along with the calculation for manufacturer market share. Vermont, which passed its electronic waste bill just over a month before New York State, also has a similar statewide recycling goal calculation.

If a state recycling goal and/or manufacturer quota exists, it is based off either a "return share" model, a "market share" model or a combination of both. However, not all states with individual manufacturer quotas have state electronic recycling goals. In fact,

only Illinois, New York and Vermont have such goals. States such as New Jersey include electronic waste reduction in overall recycling goals and have per-capita collection goals.

In the return share model, state recycling goals are calculated based on electronic waste recycling rates either from the year prior or a specified number of years prior. The market share model calculates manufacturer's market share by utilizing either state sales data or national sales data, depending on the individual state legislation. New York bases its market share calculation off of state sales data, while Connecticut and Pennsylvania use national sales data. Furthermore, Pennsylvania calculates a manufacturer's market share by multiplying the weight of covered devices sold nationally times the quotient of the state's population divided by the national population. In sum, it is up to the state how it chooses to define the state recycling goals (if any) and the manufacturer share.[23]

Disposal Bans

Residential disposal bans are active in California, Connecticut, Illinois, Indiana, Maine, Massachusetts, Minnesota, New Hampshire, New Jersey, North Carolina, Oregon, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, West Virginia, and Wisconsin, in addition to New York, but the scope of items covered under the disposal ban varies by state. The Electronics Takeback Coalition, a project of the social change non-profit Tides, contends that California has the most comprehensive landfill ban of any state.[24] The bans in half of the states took effect in the year 2011, with Pennsylvania to take effect in 2013. Arkansas, a state without an electronic waste recycling bill, has a

[23] Datz-Romero, Christine. Email with the author. 16 March 2011.
[24] "State by State E-Waste Law Summary. E-Waste Laws Passed and Legislation Being Considered in 2011. *Electronics Takeback Coalition*. http://www.electronicstakeback.com/wp-content/uploads/States_Summary_2011.pdf. 11 April 2011. Web. 29 March 2011.

disposal ban that took effect in 2008 but it was never implemented. Washington State does not have a disposal ban, but some of its counties have enacted their own bans. Massachusetts and New Hampshire also have disposal bans but do not have electronic waste recycling laws at this time.

As mentioned previously, New York's disposal ban is phased in over a period of three years, applied first to manufacturers, retailers and owners/operators of electronic waste consolidation or recycling facility in 2011, followed by all parties except for households, and finally to households in 2012.

Overview of State Programs

Eight states[25] have statewide electronics recycling programs that manage collection, transportation, recycling, or all three, but only four states involve the municipality in collection.[26]

State-Run Electronic Recycling Programs with Consumer Responsibility:

California

California administers its electronic waste program via the CalRecycle Department. Fees ranging from $6 to $10[27] are collected from consumers by retailers at point of sale on covered video display devices, submitted by retailers and deposited into a recycling fund. The state uses this fund to reimburse eligible recyclers at fixed rates per pound. California was the first state to pass an electronic waste law in December 2002, known as

[25] California, Connecticut, Maryland, Indiana, New Jersey, Oregon, Rhode Island, Vermont, Washington State and West Virginia
[26] Connecticut, Maine, Maryland, New Jersey, Oregon,
[27] Starting on January 1, 2009, the fee was raised to a range between $8-$25 depending on screen size but was reduced to the original fee structure starting January 1, 2011.

the *Electronic Waste Recycling Act of 2003*[28] and remains the only state in the United States to levy a fee directly on consumers. Laws enacted in the United States thereafter were producer responsibility laws, or "extended producer responsibility laws" (EPR) which are intended to create financial incentives for manufacturers to design products with lower toxicity and ease of recyclability in mind.

State-Run Electronics Recycling Program without Municipal Participation:

Washington State:

Manufacturers in Washington have the choice to participate in the state run electronics recycling plan administered by the Washington Materials Management and Financing Authority or an independent plan (if approved) for a manufacturer or group of manufacturers to operate their own system for collection, transportation and recycling. Manufacturers in the state pay an annual fee to cover the costs of electronic waste recycling in the state. Each manufacturer's return share is determined by the Department of Ecology based on sampling at E-Cycle Washington processors throughout the year. In addition, a percentage of "orphan" products collected with no identifiable producer or by a company no longer in business is added proportionally to all companies. Manufacturers that do not meet their return shares pay into a fund based on the deficit, and vice versa.

State-Run Programs with Encouraged Municipal Participation:

Oregon

Oregon operates a state run program called Oregon E-Cycles. Municipal participation is not required but local activity is encouraged. Under the duties of the department, the law

[28] An additional amendment was passed on January 9, 2003.

suggests that "to the extent practicable, use existing local collection, transportation and recycling infrastructure."[29] Manufacturers are automatically enrolled in the state program, paying an annual fee ranging from $40 to $15,000 depending on manufacturer market share. If manufacturers choose to operate an independent program, they must fulfill requirements such as providing convenient and free collection in each county and at least one collection site for any city with a population of 10,000 or greater. They must also use environmentally sound practices, advertise and promote collection opportunities, and fulfill other stipulations. The Oregon electronic waste law also requires all manufacturers to meet a return share by weight.

Maryland

The Maryland electronic waste recycling law, passed in 2005, also does not place manufacturers directly responsible for collection or recycling. Instead, it stipulates that manufacturers must pay an annual registration fee into the Maryland State Recycling Trust Fund, which is allocated as grants to local municipalities to develop and implement local recycling plans, including a computer recycling program. Maryland provides incentive for counties to provide separate collection and recycling, with covered electronic devices eligible towards the county's "required reduction through recycling of the solid waste stream."[30]

[29] 76th Oregon Legislative Assembly. *Senate Bill 82*.
http://www.leg.state.or.us/11reg/measpdf/sb0001.dir/sb0082.en.pdf. Web. 19 March 2012.
[30] State of Maryland. *Maryland House Bill 488*.
http://www.mde.state.md.us/assets/document/HB488_Third_Reader.pdf. Web 19 March 2012.

Vermont

The Vermont statewide plan involves the use of existing electronic waste collection infrastructure in each county. The secretary has the authority to add additional collection activities, if the existing is deemed insufficient. The Vermont law also specifies a higher density requirement than other states: three facilities in each county (unless deemed unnecessary by the secretary) and one permanent facility in each city or town with a population greater than 10,000.

State-Run Electronic Recycling Programs with Required Municipal Participation:

Connecticut

Connecticut requires each municipality to participate in its statewide electronics recycling program, either directly or indirectly via a regional authority. Collection opportunities to residents must "give priority to convenience and accessibility."[31] Collection sites, preferably at an existing transfer station, in addition to one-day recycling events and retail collection points, were recommended in the legislation. For the most part, based on the Connecticut Department of Energy and Environmental Protection website, transfer stations, resource recovery facilities and recycling centers form the bulk of the municipal collection locations.[32] Unlike municipalities in New York State, Connecticut municipalities are responsible for the education of residents on the recycling program. Manufacturers must pay an annual fee of $5000, but can opt out of the state-run

[31] State of Connecticut. *Public Act No. 07-189, An Act Concerning the Collection and Recycling of Covered Electronics*. http://www.cga.ct.gov/2007/ACT/Pa/pdf/2007PA-00189-R00HB-07249-PA.pdf. Web. 18 March 2012.
[32] "Drop Off Locations for Residential Electronics. *Connecticut Department of Energy and Environmental Protection*. http://www.ct.gov/dep/cwp/view.asp?a=2714&q=463108&depNav_GID=1645. Web. 18 March 2012.

recycling plan if they submit a private plan that fulfills the standards set forth in the legislation.

Municipalities in Connecticut must also work with a list of state approved recyclers, who provide the service to towns free of charge and are reimbursed by the manufacturers at a fixed rate. The market is very regulated, with just six recyclers currently approved and no competition for price.[33] Recyclers apply individually to the state for a recycling rate but can request an extension after their approval period is up. According to Resa Domino of electronic waste recycling firm, WeRecycle!

> In Connecticut, the towns are required to collect and they have six recyclers to choose from that can provide the service. It's [sic] a very simple and straightforward system that towns have to do collection and they pick among the six of us. In New York, the manufacturers have to meet a goal and have to provide convenient collection and its much more of a free market system. You go out and you try to incentivize people to collect because they're not obligated to do [so] like they are in Connecticut.[34]

Since quotas in Connecticut are based on a return share model for computers (but not televisions), recyclers are required to do auditing. Domino describes the process: "Every computer monitor and printer needs to be logged and weighed and then invoiced to the appropriate manufacturer."[35] In a market share model, recyclers simply need to track the total pounds; manufacturers need not be invoiced.

New Jersey

In New Jersey, there is a state run recycling program for televisions whereby manufacturers pay an annual $5000 registration fee that is submitted to The Used Television Recycling and Management Program Fund. The Department of Environmental

[33] Domino, Resa. Personal interview. 7 February 2012.
[34] *ibid.*
[35] *ibid.*

Protection establishes criteria for a county/municipal "Used Television Recycling and Management Program," and has the authority to create programs in municipalities where counties have not adopted a program. For non-television covered electronic devices, manufacturers must pay a separate $5000 registration fee and an additional fee based on a manufacturer's return share in weight of covered electronics multiplied by a fixed rate of $0.50/lb. A manufacturer, or group of manufacturers, can opt out of the state program by submitting a plan in lieu of the fee to cover the collection, transportation and recycling of covered electronic products.

States without State-Run Electronic Recycling Programs that Require Municipal Participation:

Maine

Maine does not have a state-run recycling program but does require municipalities to deliver covered electronic devices to consolidation facilities. It is the only state to give proscriptive suggestions as to how this can be done:

> A municipality may meet this requirement through collection at and transportation from a local or regional solid waste transfer station or recycling facility, by contracting with a disposal facility to accept waste directly from the municipality's residents or through curbside pickup or other convenient collection and transportation system.[36]

Maine was the second state to pass electronic waste legislation in 2004. The Maine statute holds manufacturers financially and administratively responsible for recycling. The law states:

> It is the intent of the Legislature that manufacturers of electronic products and components will be responsible for ensuring proper handling, recycling and disposal of discarded products and that

[36] State of Maine. *Maine Revised Statute Title 38 §1610 – Electronic Waste*. http://www.mainelegislature.org/legis/statutes/38/title38sec1610.html. Web. 14 March 2012.

> costs associated with consolidation, handling and recycling be internalized by the manufacturers of electronic products and components before the point of purchase.[37]

Maine also instituted an annual manufacturer registration fee and a manufacturer annual recycling quota calculated based on market share. However, Maine places responsibility for recycling on multiple parties, citing that "municipalities, consolidators, manufacturers and the State share responsibility for the disposal of covered electronic devices."[38] The Maine statute does not require manufacturers to cover the cost of collection but they are responsible for the costs from point of consolidation on, including transportation and recycling.

It is the responsibility of the municipality to collect and deliver covered electronic devices to consolidation facilities. As mentioned previously, the law gives suggestions as to mode of collection, ranging from curbside pickup, contracting with a disposal facility to accept waste directly from residents, collection at and transportation from a local or regional solid waste transfer station or recycling facility or any other "convenient collection and transportation system."[39] In 2011, Maine amended its bill to cover electronic recycling in schools, non-profits and small businesses—namely that these institutions can deliver up to seven covered electronic devices (unless the site or consolidator is willing to accept more) at a time to municipal collection sites or events. Small businesses are defined in the law as those with 100 or fewer employees.

[37] State of Maine. *Maine Revised Statute Title 38 §1610 – Electronic Waste*. http://www.mainelegislature.org/legis/statutes/38/title38sec1610.html. Web. 14 March 2012.
[38] *ibid.*
[39] *ibid.*

Illinois

Illinois introduced the base weight and goal attainment percentage calculations that were incorporated into the New York State and Vermont electronic waste recycling laws. Illinois also requires that manufacturers selling in Illinois must recycle a minimum of 60% (changed to 50% in the 2011 amendment) of their individual recycling or reuse goal in the first year of the law (as calculated by market share) or face a penalty based on weight. In 2013, the minimum recycling percentage will increase to 75% (changed to 60% in the 2011 amendment). However, it is important to note that an August 2011 amendment removed the return share model calculation for the recycling goal and shifted to a simpler formula based on market share by weight. A 2011 Electronics Takeback Report elaborates on the reason:

> Illinois is a good example of what happens if you set your goal too low. In Year 1, companies had to meet a goal of 2.5 pounds per person, and the idea was that the goal would slowly increase overtime, based on the volumes collected. This created a clear incentive for the companies to do little in Year 1, and in fact they did little – collecting only 2.12 lbs per person, despite having a very large scope of products covered for free recycling.[40]

As per the amendment, in 2012 manufacturers must recycle or reuse at least 40% of the total weight sold in that category by the manufacturer in the year 2010.[41] However, the minimum recycling percentage (both in the original law and the amendment) is lower compared to the 80% required in Minnesota. The statewide recycling goal is now simply the sum of each manufacturer's share.

Illinois also provides incentive for manufacturers to collect in undeserved counties or from undeserved populations, as defined by counties with a population

[40] Electronics Takeback Coalition. "Ten Lessons Learned from State E-Waste Laws." September 2011.
[41] State of Illinois. *Illinois Electronics Products Recycling and Reuse Act.* Public Act 097-0287. Section 5 The Electronic Products. http://www.ilga.gov/legislation/publicacts/97/PDF/097-0287.pdf. Web. 19 March 2012.

density of 190 persons or less per square mile. Weight collected is doubled when procured from "undeserved" counties. Weight collected is tripled if the items are donated for reuse to a primary or secondary school where the majority of the students are low-income or developmentally disabled. The legislation also triples weight collected if the manufacturer contracts out to a non-profit in which 75% of its employees are developmentally disabled.

Case Study: Maine

Due to the recent enactment of electronic waste recycling laws (all in the last five years with the exception of California), only a handful of states have published reports on their electronic waste recycling programs. For the purpose of this study, I have included a case study from the state of Maine due to the availability of the report, its thoroughness, and the incorporation of the report's recommendations in a later amendment to the legal statute. Maine was also the first state to put forth an extended producer responsibility law and its municipal requirement provides a viable contrast to New York State's producer responsibility law that does not include municipal responsibility.

Although the Maine statute is a producer responsibility law, it does not require manufacturers to finance collection. Instead, municipalities manage collection through one-day recycling events and/or on-going collection at transfer facilities. This shared responsibility was a critical component of the legislation. According to a report by the Maine Department of Environmental Protection, "the Maine legislature sought to share responsibility for household e-waste recycling between manufacturers and municipalities by utilizing the extensive UW collection network already offered by municipalities to

fulfill their municipal solid waste management responsibilities. Unlike some other states, Maine does not prohibit against charging a fee to drop off electronics, i.e., collection sites are allowed to charge an end-of-life fee to help cover their operational costs."[42]

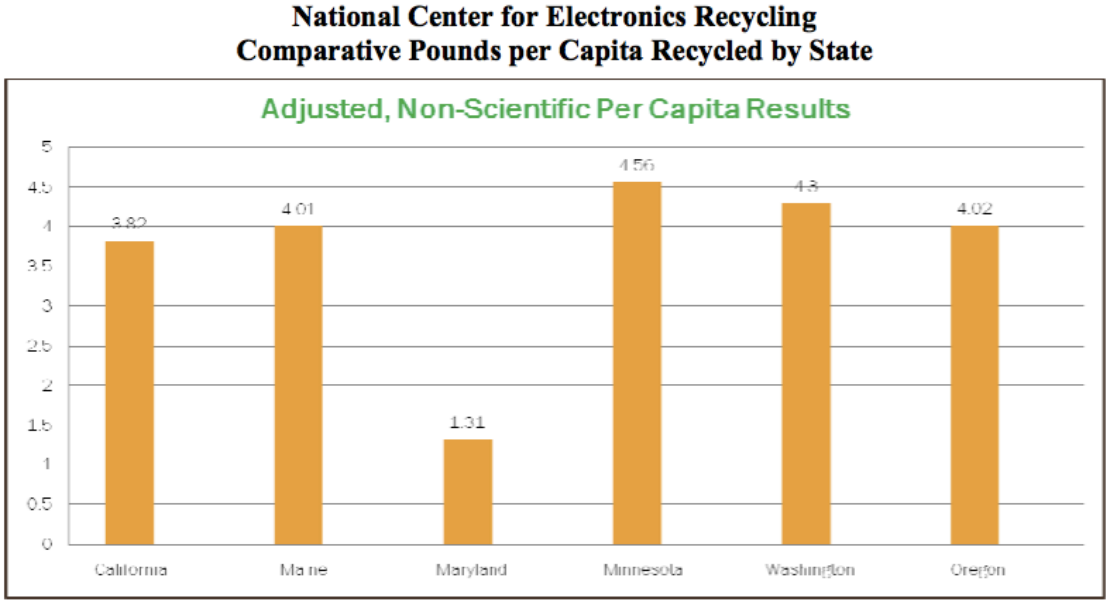

Figure 2 *from Department of Environmental Protection State of Maine. "Report on Maine's Household E-Waste Recycling Program." January 15, 2010.*

In Maine, the per capita amount of e-waste recycled from households nearly doubled between 2006, the first year the state's electronic waste recycling law was in effect, and 2009. In 2006, 3.2 pounds per capita were recycled, 3.61 in 2007, 4.06 in 2008 and 6.19 pounds in 2009.[43] [44] Although it is difficult to compare per capita collection between states, as each state has differing legislation and covered products, the National Center for Electronics Recycling published adjusted results to account for differences between programs (Figure 2). Of the six states compared, Maine was the fourth highest in terms of electronic waste recycled per capita, on par with Oregon. The department also

[42] Maine Department of Environmental Protection. *Report on Maine's Household E-Waste Recycling Program.* January 15, 2010. Web. 5 Nov 2011.
[43] *ibid*.
[44] Quimby, Beth. "Maine may dump e-waste statute." *Maine Sunday Telegram.* 8 Feburary 2011. http://www.pressherald.com/news/maine-may-dump-e-waste-statute_2011-02-06.html. 5 Nov 2011.

reported a monitor recycling rate of 50% and a television recycling rate of 51%, both posting 7% increases since the first year of the law.[45] However, the study also found that Maine had one of the highest average per pound recycling costs paid by manufacturers, even without requiring them to pay for collection.

The higher costs were attributed to a smaller population (and thus recyclable material), the higher cost of recycling TVs, transportation distances, less competitive price bidding process, and other program differences (i.e. target share for recycling based on total eligible waste collected vs. set weight based on percentage of sales).

In the report, the department recommended some changes to the legislation to improve the program. It was recommended that the legislation be revised to include recycling from municipalities, schools and/or small businesses, in addition to households to create a greater economy of scale for recyclers. The report found that "programs that have a more competitive system for establishing the costs for collection, transportation and recycling services generally have lower costs."[46] The EPA also recommended that the $3000 registration fee be reduced or eliminated for manufacturers with low market share. On the department end, they would implement new processes to improve price competition among recyclers and ensure only a "reasonable profit."[47] An extension of the scope of the program was also encouraged to include televisions, computer monitors and desktop printers.

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[45] Maine Department of Environmental Protection. *Report on Maine's Household E-Waste Recycling Program.*
[46] Maine Department of Environmental Protection. *Report on Maine's Household E-Waste Recycling Program.* January 15, 2010. Web. 5 Nov 2011.
[47] Maine Department of Environmental Protection. *Report on Maine's Household E-Waste Recycling Program.* January 15, 2010. Web. 5 Nov 2011.

While municipalities were "generally very satisfied with the service they received from approved consolidators/recyclers in the program…the level of municipal satisfaction with the overall program was a bit lower."[48] The municipalities requested improvements such as streamlining paperwork and collection site inspections, extending the program to cover small businesses and "expanding the State's role in promoting local collection events"[49] in terms of marketing and public outreach.

State-by-State Comparison

The below chart summarizes the state-by-state comparison, using state abbreviations:

Program Type	
State-run recycling programs with consumer responsibility	CA
State-run recycling programs with producer responsibility that require local municipal participation	CT, ME, MN, NJ
State-run recycling programs with producer responsibility that recommend local municipal participation	OR, RI, VT
State-run recycling programs with producer responsibility requiring that do not require municipal participation	IN, WA
Municipal participation without state-run programs	MD
Producer Responsibility Only	HI, IL, MO, NC, NY, OK, PA, WI
Takeback Programs Only	MI, WV, SC, TX, VA, WY
Public Education Only	UT

In the September 2011 study by the Electronics Takeback Coalition, per capita collection results were compared across states with available data. States with the highest collection volumes are Oregon, Washington and Minnesota, all states that have a state-run recycling program, regardless of municipal collection. Conversely, the states with the

[48] *ibid.*
[49] *ibid.*

lowest results are those with only takeback programs, such as Texas and Virginia, those with mild producer responsibility laws with limited coverage such as Oklahoma, or those without a state-run program, such as West Virginia. Results also differ by large factors, 0.22 lbs/capita at the lowest to 6.31 lbs/capita at the highest.

	State	Year	Total Lbs Collected	Pounds per person in State
Highest Volumes	Oregon	2010	24,149,774	6.31
	Washington	2010	39,467,798	5.92
	Minnesota	2009-2010	33,082,894	6.37
Lowest Volumes	Texas	2010	24,370,894	0.97
	Virginia	2010	4,439,446	0.56
	West Virginia	2009	1,646,155	0.51
	Oklahoma	2009	817,277	0.22

Figure 3 Per Capita Collection Results, Highest and Lowest Volume States (Source: Electronics Takeback Coalition[50])

The Electronics Takeback Coalition report also provided ten lessons on electronic waste legislation. These include recommendations on convenience, quotas, covered products, and regulation:

1. Make collection very convenient or establish collection goals
2. Include a variety of collection types
3. Manufacturers will only do what the law requires them to do and not more
4. Goals should be high and set as minimums, not ceilings
5. Manufacturers focus efforts on urban areas, not rural ones
6. Landfill bans boost recycling levels
7. States should be proactive to make sure e-waste is handled responsibly
8. E-waste laws can inadvertently discourage reuse if not careful
9. Consumers want to be able to bring back everything—including TVs and printers

[50] Electronics Takeback Coalition. "Ten Lessons Learned from State E-Waste Laws." September 2011.

10. Transparency and reporting is key to understanding what's happening in the programs

The New York State electronic waste recycling law fulfills most of these stipulations, but the ones that are not met have discernible repercussions, to be discussed in the next section.

Electronic Waste Recycling in New York City

Since this thesis focuses on the implications of implementing the New York State electronic waste legislation, which mandates for "convenient" collection at no cost to consumers, the analysis in this section will focus on existing collection methods and the types of organizations involved in collection and recycling in New York City. In the absence of municipal responsibility for collection in New York City, there are five main groups of organizations that are involved in electronic waste collection: for-profit collectors, for-profit recyclers, manufacturer-partnered collectors, the city, and non-profit collectors.

For-Profit Collectors

Although there are numerous for-profit companies in New York City that handle electronic waste (sometimes coupling data destruction), only a few are recommended on New York City government's NYCWasteLess website. As such, I have focused on two of the three for-profit firms on NYCWasteLess's "Highlighted Takeback Programs" list.

The 4th Bin is a for-profit electronic waste collection company based in New York City. The 4th Bin specializes in door-to-door pickups from residents and businesses, for a

"simple and inexpensive"[51] way to recycle and reuse. The company was founded in 2009, a year after the original New York City electronic waste legislation was passed. Its mission is to be an "ethical e-waste rescue solution dedicated to e-Steward certified recycling standards"[52] and for the recycling process, the firm has chosen to partner only with recyclers that are e-Stewards certified, the highest certification standard in the industry.

Since The 4th Bin's clientele includes both residents and businesses, the company maintains an active social media presence in the form of a Twitter account, a Facebook business page, and a blog on its website. Concerned about regional scrap companies posing as legitimate electronic waste collectors and recyclers, The 4th Bin opened up their list of vendors and partners to the public earlier this year.

The 4th Bin also tested a pilot program for permanent drop-off locations but it has fallen through. According to Michael Deutsch, co-founder of The 4th Bin, drop-off locations are already being executed by a number of organizations and retailers in the city and this type of activity is simply not the company's strength, niche or what they want to focus on from a business standpoint:

> The entire concept of the company was built on the fact that New York City itself presents some challenges for electronic waste collection and recycling—primarily logistics, transportation, that sort of thing. So The 4th bin came about to address those issues. Drop off locations don't really address those issues and they're already being done.[53]

From a logistical standpoint as a consolidator, The 4th Bin is able to sell the electronics it collects to any recycler. Although The 4th Bin is currently working with WeRecycle!, this does not mean The 4th Bin is tied exclusively to them. "At the end of

[51] "The Solution." *The 4th Bin*. https://www.4thbin.com/the-solution/ Web. 24 March 2012.
[52] 4th Bin homepage. http://www.4thbin.com/ Web. 24 March 2012.
[53] Deutsch, Michael. Personal Interview. 26 March 2012.

the day," Deutsch says, "there's the supply and demand. The demand is that [manufacturers] need the volume to hit their requirements within the state, and [The 4th Bin] has the supply or part of the supply."[54] Nonetheless, residential pickups are by no means the most profitable for The 4th Bin. According to Deutsch:

> From the residential pickup side, it's hard from a business perspective. It's really cost prohibitive. Because remember, we do door-to-door pickups, so what are you getting from the consumer? You're going to get a computer. A laptop. You get one, two items here and there. We go to a business, and we can get two, three hundred [items].[55]

Companies like The 4th Bin, who work with recyclers adhering to the highest ethical standards available, such as e-Stewards and R2 recyclers, make their margins on pickups rather than on the recycling of goods:

> For the 4th Bin, we're making our money primarily on the pickup of the goods. Sometimes we can reuse and resell some of the stuff, but for the most part it's not in a condition good enough for us to actually refurbish and reuse it. So we make our money on the pickup side. Not even on the recycling side because it costs too much money as an e-Steward to recycle the goods.[56]

Even though the legislation has shifted the costs of recycling to the manufacturer, Deutsch says it isn't enough to offset the ethical choice of using eStewards recyclers:

> The legislation has changed [such that] some of the costs of recycling are shifted to the manufacturers. But we're talking pennies on the pound. We're not talking about major, major shifts in dollars. So, where[as] there was a loss before, you're not taking a loss now. [But] you're certainly not running your business on what the manufacturers are paying you. At least, The 4th Bin isn't.[57]

Deutsch admits that since The 4th Bin is a collector, not a recycler, there are layers of organizations between his firm and the manufacturers, which reduces the company's

[54] Deutsch, Michael. Personal Interview. 26 March 2012.
[55] *ibid.*
[56] *ibid.*
[57] *ibid.*

profit. “If I was working directly with the manufacturers, it might be a different story,” he says.[58]

For-Profit Recyclers

WeRecycle! and Sims Recycling, two companies listed on the NYCWasteLess website’s “Highlighted Takeback Programs” list, handle recycling and data destruction, in addition to collection. Compared to Sims, WeRecycle! has a more consumer-friendly website, using infographics on the homepage to highlight where to recycle, why to recycle electronics, how the firm works, a gallery of images from events, latest news, FAQ and contact information. In addition, WeRecycle! specializes in electronic waste management, whereas Sims Recycling is a general recycler.

WeRecycle! is one of only six e-Stewards certified recyclers in the United States and a signee of the Basel Action Network (BAN) Electronics Recycler’s Pledge of True Stewardship. The company is affiliated with manufacturer groups such as the Consumer Electronics Association (CEA) and interest groups such as the Northeast Recycling Council (NERC). WeRecycle! operates in New York, Connecticut and Pennsylvania with both mail-back programs and public collection programs.

For public collection events, WeRecycle! partners with Lower East Side Ecology Center, TekServe, The 4th Bin and other organizations. Under the New York State electronic waste legislation, WeRecycle! is also able to provide collection for any organization or business interested free of charge. The firm is reimbursed by manufacturers under the legislation. According to Resa Domino, “WeRecycle! provides the trucks, supply, labor for the day. We ask the local partner to do outreach and get

[58] Deutsch, Michael. Personal Interview. 26 March 2012.

whatever approvals are needed for the collection site, turn out the people. It's a pretty simple, straightforward system."[59]

Other firms involved with collection and recycling in New York City include Electronics Recyclers International (ERI), the largest electronics recycler by market share in the United States,[60] and CloudBlue. ERI has seven recycling centers in the United States and according to its website has the "strategic infrastructure in place to service all 50 U.S. States,"[61] including partnerships with state and local governments, institutions, Fortune 500 companies, retailers, non-profits such as Goodwill and Salvation Army, and electronic waste collectors and processors. Still, WeRecycle! is unique in its regional focus and direct support of local collection events in the New York City-area.

Manufacturer-Partnership Collection

The Electronics Manufacturers Recycling Management Company (MRM) was founded by Panasonic, Sharp and Toshiba with a mission to "bring manufacturers together into long-term relationships that help provide convenient, environmentally responsible recycling opportunities to consumers nationwide."[62] MRM is now a collective of 41 companies (as of March 2012), a number that increased from 26 just last year.[63] [64] In New York City, MRM works directly with two partners, The Salvation Army and Best Buy, for collection. However, it is important to note that not all of the

[59] Domino, Resa. Personal Interview. 7 February 2012.
[60] "About Electronics Recyclers International." *Electronics Recyclers International.* http://electronicsrecyclers.com/about_eri.aspx. Web. 16 March 2012.
[61] "ERI Locations." *Electronics Recyclers International.* http://electronicsrecyclers.com/eri-locations.aspx. Web. 16 March 2012.
[62] "About MRM." *Electronics Manufacturers Recycling Management Company*. http://www.mrmrecycling.com/aboutmrm.htm. Web 16 March 2012.
[63] "Consumer Recycling." MRM Electronic Manufacturers Recycling Management Company. http://www.mrmrecycling.com/collection_map.htm. Web. 24 March 2011.
[64] Navarro, Mireya. "In New York, E-Waste Recycling Law Takes Effect."

electronics collected by MRM are recycled by e-Stewards Certified Recyclers. According to MRM, 70% of electronics by weight are recycled by e-Stewards Certified Recyclers.[65]

Some manufacturers that are not part of MRM operate their own collection partnerships. The most well known is the Dell Reconnect program, in partnership with Goodwill. Hewlett Packard works with Staples, offering free collection for any brand device (up to 6 items per day per person), not including televisions, appliances and certain household electronics. Sony's Takeback Recycling program partners with non-profits in New York City such as Per Scholas, the Pencil Program, the Robin Hood Foundation, along with for-profit organizations. With only eleven locations in New York City however, Sony's program is by no means extensive. The company appears to focus primarily on its mail and ship back program.

New York City Initiatives

The city significantly updated the NYCWasteLess website in 2011 with information on electronic waste recycling. The major topics on the electronic waste page are: applicable laws, information for residents, information for agencies and schools, information for business & institutions. The website includes information on how to recycle specific categories of items, including those not covered by the New York State electronic waste law, such as batteries, cell phones, software, and toner cartridges. There is also an FAQ section. Locations for recycling or trade-in of electronics are listed by brand or organization, but not in a map form.

While this information is a step forward by the city, which has no legal obligation for consumer education, electronic waste collection, or recycling, this information still

[65] "About MRM." Electronics Manufacturers Recycling Management Company.

requires the consumer to go through at least five steps in order to recycle an electronic item. They must first navigate to the NYCWasteLess website, locate the right fit for their type of electronic, identify a retailer or organization that will accept their item, and then locate the most convenient location of that retailer or organization. There currently is no map functionality to enable a resident's search for a suitable drop-off location near them. This year, the city also announced five DSNY SAFE (Solvents, Automotive, Flammable, Electronics) Disposal events for the spring of 2012, one in each borough.

However, the largest barrier to action is awareness, which occurs before a resident would navigate to the NYCWasteLess website in the first place. In the New York State electronic waste law, responsibility for public education and awareness is given to producers, but what constitutes public awareness under the legislation is minimal. Furthermore, according to Resa Domino from WeRecycle!,

> In New York, the producers are supposed to do [public education]. I don't think they've done anything significant and it's because [of] the individual responsibility model and the free market model. Everybody has to do it but nobody is responsible for a single state-wide program.[66]

David Hurd from GrowNYC expresses a similar concern. Public education and awareness he says, "has certainly been lacking in terms of what we've seen. I'm not aware of any campaigns that any of the computer manufacturers are doing."[67] He points out however that manufacturers generally do not have an expertise in collection or recycling, and contract out with third parties to "fulfill the compliance requirement of various pieces of legislation,"[68] which includes public education. Recyclers and collectors like WeRecycle! do their part in terms of education but Domino hopes for stronger cooperation between the manufacturers:

[66] Domino, Resa. Personal Interview. 7 February 2012.
[67] Hurd, David. Personal Interview. 7 March 2012.
[68] *ibid.*

> I think one of the things that would be really helpful is if the industry as a whole got together and did an education and outreach campaign I know a lot of advocates have been pushing the Consumers Electronics Association and other trade groups like that to do that sort of thing.[69]

Furthermore, with manufacturers working to procure tonnage predominantly out outside of New York City, awareness here has been particularly lacking. Christine Datz-Romero from the Lower East Side Ecology center says:

> It's cheaper [to work upstate]. A lot of municipalities have town dumps, people have been bringing e-waste already to town dumps. [The towns] used to pay a recycling fee for it and now these recyclers just come in and basically offload it for free or for a little bit of money and they get tonnage in a way that is a lot cheaper than doing an event here in New York City and doing outreach for it, and coordinating all the logistics. We have worked with manufacturers and it's just like no manufacturers have been concentrated down here.[70]

Non-Profit Collection

On the bright side, the activity of non-profit and community groups in electronic waste collection is unique to New York City, even compared nationally. According to Domino:

> I think in New York City [non-profit organizations] are playing a critical role and really form the core of the collection network. If you look at New York, it's mostly non-profit doing the collection there. But if you go to Connecticut, there's very little community-based organization because [collection] is done by the municipalities. I don't know how it's working out in other states but I haven't heard a lot about community-based organizations having a big role outside of New York City.[71]

This thesis will focus on the work of two non-profit organizations, demonstrating the spillover effects community-based electronic waste collection can have on the community, local economic development, and public awareness. In addition the activities highlight the non-profit/for-profit partnerships that provide financing for collection

[69] Domino, Resa. Personal Interview. 7 February 2012.
[70] Datz-Romero, Christine. Personal Interview. 20 January 2012.
[71] Domino, Resa. Personal Interview. 7 February 2012.

events. The first organization is the high-profile Lower East Side Ecology Center, which has operated city-wide collection events since 2003 and opened a permanent collection facility in Gowanus, Brooklyn in February 2012. I will also look at collection events by community organizations in Brooklyn Heights, a particularly active neighborhood in terms of electronic waste collection and public education.

The Lower East Side Ecology Center collection events are predominantly sponsored by corporate companies and run year round. Sponsors have included Panasonic, Toshiba, ConEdison, the Fifth Avenue Business Improvement District, and the New York Community Trust. The collection events in the spring of 2012, with the exception of one event, are sponsored by TekServe, a New York City-based Apple computer reseller and authorized service. TekServe provides additional incentives to consumers by offering recyclers "Green Karma Coupons" worth between $5 and $500 off products and services and entry into a raffle to win products.

I observed a Lower East Side Ecology Center event in April 2011. Location is important for visibility, ease and public awareness. Lower East Side Ecology Center events typically take place in a public space such as a park, with curbside accessibility for those driving in their items. According to Datz-Romero, the organization's most successful recycling event is in Staten Island due to the car culture, which makes it easier to move large items like televisions and old computers.[72] Less well known is that Zipcar provides signup discounts and driving credits using the EWASTE discount code. Christine has noticed a perceptible shift in the types of products being dropped off since the organization started in 2003. Large televisions and computers are becoming less frequent over the last few years, as people have started to dispose of them.

[72] Datz-Romero, Christine. Personal Interview. 17 April 2011.

Logistically, Christine explains how the Lower East Side Ecology Center collection events work:

> We set up the events, organize the back-end, get all the permits together, do outreach and show up at the events, but the recycler unloads the cars, palletizes everything, puts everything in the truck and it goes to the facility.[73]

At the April 2011 event I observed, Lower East Side Ecology Center partnered with WeRecycle! for transportation and recycling. The non-profit has also worked with Sims Recycling as well. The attendees on the whole were grateful that the Lower East Side Ecology Center provided such a service to the community. The public collection events take place on weekends and for spring 2012 the events run from March 24 to May 20, always from 10am to 4pm. This spring, there will be six events in Brooklyn, six events in Manhattan, one in the Bronx, one in Queens and one in Staten Island.

In February 2012, the Lower East Side Ecology Center opened a permanent E-Waste Warehouse in Gowanus, Brooklyn. The center is open Tuesday through Friday and accepts computers, televisions, radios, printers and cell phones but not home appliances and media. Residents, non-profits and small businesses up to 50 employees can drop off electronics free of charge. Some of the items and parts that that can be reused or refurbished are available for sale at affordable prices.[74]

Their recycling partner for this facility is WeRecycle!. The E-Waste Warehouse is a large two-story industrial building that also contains an education center. During the planning phase, Datz-Romero hoped the center would also serve as a job training facility for the community. So far, at the education center visitors can learn about recycling

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[73] *ibid.*
[74] "E-waste Warehouse." *Lower East Side Ecology Center.* http://www.lesecologycenter.org/index.php?option=com_content&view=article&id=237&Itemid=120. Web. 24 March 2012.

techniques and rules, view upcycled trash art and a collection of antique and rare electronics that were saved by warehouse employees.[75] According to *Inhabitat,* the warehouse is "not just as a step in the recycling process, but [acts] as an agent to change general perceptions of waste and resources."[76]

Another active community-organized electronic waste collection effort is spearheaded by Nancy Wolf of the First Unitarian Church, and involves a collective of organizations including the Brooklyn Heights Association, local Brooklyn Heights churches such as the Grace Episcopal Church, Plymouth Church and First Presbyterian Church, and local institutions. At first, the partnerships were forged through necessity in order to share the cost of hiring an electronics waste hauler. Last year, they began to partner with the New Jersey-based non-profit, Urban Renewal Corporation, which delivers medical and social services to the homeless and disadvantaged population in Newark, NJ. Urban Renewal Corporation provides electronic waste pick-up free of charge as long as there are at least 25 computers.

Part of the electronic waste collection from First Unitarian Church goes towards Urban Renewal Corporation's "Development Center," which consists of courses in computer literacy, computer refurbishing, rebuilding and recycling. Each student that graduates from the Development Center receives a computer that they personally rebuilt. Urban Renewal Corporation partners with Sims Recycling to process the remainder of the non-computer electronic waste.[77] First Unitarian Church reached out to the city to add

[75] Ponce, Leonel. "Inhabitat Visits the New LES Ecology Center E-Waste Collection Warehouse in Gowanus." *Inhabitat.* 6 February 2012. http://inhabitat.com/nyc/inhabitat-visits-the-new-les-ecology-centers-e-waste-collection-warehouse-in-gowanus/. 24 March 2012.
[76] *ibid.*
[77] Heller, Maria R. Email. 24 March 2012.

Urban Renewal Corporation to the NYCWasteLess website and according to Nancy Wolf, the organization was approved.[78]

First Unitarian Church only runs the events once a year, on both days of a weekend in May. Participation has been high. Last year, 146 people or groups of people[79] dropped off items at the collection event. Nancy Wolf describes the constant flow of attendees last year:

> There wasn't a time on Saturday that someone wasn't coming in and [they] usually [came in groups] of multiple people…They are thrilled that we are doing this. It's the best community outreach that you could possibly imagine.[80]

With the internet, outreach is easy. Wolf says, "It's very easy. I do the flier, and we send it electronically."[81] Of the attendees, fifty people or groups of people came from Brooklyn Heights Association, which runs an easy to navigate website, twenty-five found out about the event through the Brooklyn Heights blog, but just three found out through the Heights Press, "which shows how electronic is overwhelming print," Wolf contends. But one of the major methods of outreach is amongst the churches and synagogues themselves. "This has been a very easy thing because of course the first line of outreach comes through all the participating churches. And the synagogues help,"[82] says Wolf.

The success of grassroots initiatives such as First Unitarian Church demonstrate the possibility for localized electronic waste collection, as well as the potential for organizations to work collaboratively on such an effort.

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[78] As of 29 March 2012, the organization was not listed yet on NYCWasteless.
[79] If people came together and dropped off items, First Unitarian counted them as one entity.
[80] Wolf, Nancy. Personal Interview. 7 February 2012.
[81] *ibid.*
[82] Wolf, Nancy. Personal Interview. 7 February 2012.

Challenges to the Implementation of the New York State Electronic Waste Law in the City of New York

Via the above research of the New York State electronic waste legislation, its development and its comparison *vis-à-vis* other state legislation, the Maine case study, and the review of current electronic waste players in the New York City area, I have identified the following six major challenges to the implementation of the New York State Electronic Waste Law in the city of New York.

1. There is no legislated role for the municipality in terms of enforcement, public education, or collection
    a. Public education on the disposal ban is the responsibility of "persons engaged in the collection of solid waste for delivery to a solid waste facility"
    b. Public education on electronic waste recycling programs is the responsibility of manufacturers
2. The legislation is targeted for smaller municipalities, the threshold being either a county or municipalities of 10,000 persons or greater, but not suitable for a city the size and complexity of New York City
3. There is no geographical component to the manufacturer quotas
4. The distribution of permanent and free electronic waste drop-off locations is insufficient to serve the "convenience" clause of the legislation
5. The scope of products is comprehensive, but the coverage of business and non-profit entities is narrow.

- There is no legislation at the local, state or national level in regards to the electronic waste recycling industry itself

The next section will provide further elaboration on these five major challenges.

1. There is no legislated role for the municipality in terms of enforcement, public education, or collection

Collection

As we have seen in the analysis of state-by-state electronic waste legislation, most states do not mandate for municipal participation in the collection of electronic waste (with the exception of Connecticut, Maine and New Jersey). States such as Oregon, Rhode Island and Maryland encourage local collection in the legislation but do not directly require the municipality to be involved. Maryland is the only state to provide grants at the county level to encourage electronic waste collection and recycling.

The New York State electronic waste law does not preclude municipal collection of electronic waste, but nor does it mandate it. In a 2009 letter to the New York City Department of Sanitation, Councilman Bill de Blasio urged the city to provide collection, citing that it "would seem logical that New York City should consider whether, for a commercially reasonable fee, it could provide this service to assist manufacturers."[83] But Matthew Lipani, a spokesman for the New York City Department of Sanitation

[83] de Blasio, Bill. "Letter to Hon. John J. Doherty, commissioner New York City Department of Sanitation." 18 June 2009. *Consumer Electronics Association.* http://www.ce.org/PDF/CityCouncilLetter.pdf. Web. 29 March 2012.

responded to the 2009 city electronic waste lawsuit stating that the department "always preferred a state-wide solution for e-waste."[84]

There is no current plan by New York City to provide curbside collection, particularly in light of the prior lawsuit against the original New York City law and the Department of Sanitation position. Furthermore, there is no indication that the states that do not require municipal participation intend to amend their legislation to mandate this. On the whole, states are continuing with the extended producer responsibility model for collection, handling and recycling. However, as we have seen, mandatory municipal collection appears to have less of an impact on per capita collection rates than does the existence of state-run recycling programs.

New York City has taken the initiative to provide the SAFE Disposal Events run by the Department of Sanitation in the spring of 2012, with one collection event for each borough. Sims Recycling will provide electronic equipment acceptance and recycling at the SAFE Disposal events.[85] In terms of city agency waste stream, New York City has contracted out to Veolia ES Technical Solutions, the hazardous waste division of Veolia Environmental Services North America, to remove electronic waste, lighting, mercury and medical sharp waste generated by city agencies across the five boroughs. According to Michael Deutsch from The 4th Bin,

> My understanding from several sources is that Sims does have a contract or is going to be signing a contract with the city to handle the e-waste that [is left out on the curbside]. Which implies that the city is

[84] Lee, Jennifer 8. Electronics Industry Sues to Block Recycling Law. *New York Times.* 24 July 2009. http://cityroom.blogs.nytimes.com/2009/07/24/electronics-industry-sues-to-block-recycling-law/. Web. 29 March 2012.

[85] "Sims Recycling Solutions to Receive, Process New Yorkers' End-Of-Life Electronics from Department of Sanitation's Spring 2012 SAFE Disposal Events." *Sims Recycling Solutions.* 19 March 2012. http://us.simsrecycling.com/news-and-resources/news/dsny-events. Web. 27 March 2012.

> going to be taking stuff from the curb and bringing it back, and Sims at some point will get it.[86]

I was unable to verify this claim yet through publicly available sources since the deal (if extant) is in process. Nonetheless, the success of the first SAFE event in Queens, attended by 4000 people[87], demonstrates the demand for hazardous waste solutions in New York City.

Public Education:

In the New York State legislation, municipalities do not have any responsibility for public education, with the entire onus placed on the producer. In New York City in particular, there is the question whether there is enough incentive for manufacturers to do public education, especially given that they were already able to make their quotas by concentrating upstate in the first year of the law. When the producer responsibility law took effect in April 2011, *The New York Times* reported that environmental advocates and New York City officials felt manufacturers had "gotten off to a slow start educating the public and posting information on their Web sites about how consumers should proceed."[88] Nancy Wolf, coordinator of the annual electronic waste collection event at First Unitarian Church in Brooklyn Heights and previous director of the Environmental Action Coalition, contends that education is key to the ultimate success of the law: "It's important to hire people to do public education but it's not something manufacturers know how to do or are interested in doing. If you want to have a meaningful program you

[86] Deutsch, Michael. Personal Interview. 26 March 2012.
[87] Yoneda, Yuka. "Thousands of New Yorkers Recycle Electronics at the City's Safe Disposal Event in Queens." *Inhabitat*. http://inhabitat.com/nyc/thousands-of-new-yorkers-recycle-electronics-at-the-citys-safe-disposal-event-in-queens/ 1 May 2012. Web. 1 May 2012.
[88] Navarro, Mireya. "In New York, E-Waste Recycling Law Takes Effect."

also need to educate about it."[89] By contracting out to collectives and recyclers for the management of electronic waste, manufacturers are let off the hook regarding public education to some extent.

Another explanation for the current dearth of education is that the number of individual state laws has made it increasingly difficult for manufacturers to keep up-to-date with state-by-state requirements, let alone public education. According to David Thompson, director of the corporate environmental department for Panasonic North America, registration and reporting on a state-by-state and brand-by-brand basis is not sustainable in the long term from the producer perspective. [90] However, according the United States Environmental Protection Agency, there is no current consensus on a federal approach even though there have been "numerous attempts to develop a Federal law."[91] In addition, it is believed that a federal law would be weaker than many state laws regulating electronic waste. This thesis has demonstrated the wide variation between existing state legislation. In the foreseeable future, electronic waste legislation will likely continue to be state-driven extended producer responsibility laws.

Fortunately, New York City has a vested interest in electronic waste recycling tangentially through its pledge to reduce the city's solid waste stream. The goal, as put forth in PlaNYC 2030, is to divert 75% of the waste of the city's solid waste stream from landfills. In the April 2011 update to PlaNYC 2030, the city pledged that "Through education and outreach, we will improve the public's awareness and participation in e-

[89] Wolf, Nancy. Personal Interview. 7 February 2012.
[90] Thompson, David. E-Waste Event by Columbia University School of Continuing Education—Sustainability Management. 13 October 2011.
[91] United States Environmental Protection Agency. "Regulations/Standards." http://www.epa.gov/osw/conserve/materials/ecycling/rules.htm. 2 Nov 2011. Web. 22 Nov 2011.

waste recycling programs, diverting these products from landfills."[92] The NYCWasteLess website and the SAFE events are a significant first step. The April 2011 update to PlaNYC includes an initiative on toxic waste stream and specifically calls out the need for greater public education in regards to the state e-waste law.[93] However, the, city has yet to provide a city-wide education campaign targeted specifically for electronic waste recycling.

According to the stakeholders I interviewed, there is still a long way to in terms of electronic waste recycling awareness on the part of both residents and businesses in New York City. According to Michael Deutsch, even some of the city's largest residential building management companies are unaware of the electronic waste legislation:

> Most businesses don't know. I just met a couple weeks ago with (and this is their claim) the largest residential building management company in the city, and that they manage over 400 buildings in New York City. The COO of this company had no idea about the [e-waste] legislation.[94]

While the stakeholders interviewed did not necessarily agree on who should be responsible for education, across the board it was clear that it was a critical element lacking in the electronic waste recycling effort.

Enforcement:

There are differing opinions on the impact of the New York State residential disposal ban portion of the legislation. In a meeting with the Mayor's Office of Long Term Planning and Sustainability on March 9, 2010, Emily Rubenstein, senior policy

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[92] "Solid Waste." *PlaNYC 2030 April 2011 Update.* http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf. p 144. Web. 27 March 2012.
[93] *ibid*.
[94] Deutsch, Michael. Personal Interview. 26 March 2012.

official, acknowledged the difficulty of supporting a state law at the local level and was very interested in proposals and research in the area.[95] On the other hand, Resa Domino of We Recycle! believes that the residential disposal ban is a "backstop," and states that a residential ban is already *de facto* in place since January 2012 as "private haulers are not supposed to pick up electronics for recycling even though technically residents can put it out."[96] David Hurd of GrowNYC, a non-profit dedicated to improving New York City's quality of life through environmental programs, agrees with Domino. "If a truck shows up at a disposal facility with covered electronic equipment," he says, "and they actually dump it a facility they are subject to a fine."[97] However, he additionally highlights the difficulty in regulating a state law at the city level:

> Unfortunately the problem with the state law is that New York City has no enforcement jurisdiction. You know at some point, the city may seek some jurisdictional power under the state guidelines. Right now it's up to the state to enforce [the law] and quite frankly, the DEC doesn't have enough enforcement agents for all of the things they have to enforce let alone the e-waste law.[98]

Michael Deutsch of The 4th Bin also expresses a similar opinion, but goes further to describe the difficulties of enforcement:

> The legislation that's on the books is not enforceable by New York City. So it's not up to Department of Sanitation to be the enforcer if someone puts something out on the curb. It's really up to the DEC. DEC doesn't have the manpower to do it [and] there's no way that they can cover the entire state anyway. In most cases, are you going to get the actual Department of Sanitation workers not to take that stuff? To know not to take that stuff? To be able to classify what they can and can't take? I think it's a challenge. [99]

Deutsch believes that the city could do more in terms of public education, to "take a stronger stance in the education department, getting out there and educating, and not just

[95] Rubenstein, Emily. Meeting with New York City Mayor's Office of Long Term Planning and Sustainability as part of a previous class with Columbia University GSAPP.
[96] Domino, Resa. Personal Interview. 7 February 2012.
[97] Hurd, David. Personal Interview. 7 March 2012.
[98] *ibid.*
[99] Deutsch, Michael. Personal Interview. 26 March 2012.

educating the consumer but educating businesses about what they should and shouldn't be doing."[100] He also believes that it is important not only to talk about but also to address the hazards from the materials in the equipment and the data stored within.

2. The legislation is targeted for smaller municipalities and is not suitable for a city the size and complexity of New York City

Compounding the enforcement issue is the fact that the legislation is written for smaller municipalities within the state of New York. The law states that "at minimum, the manufacturer shall ensure that all counties of the state, and all municipalities which have a population of ten thousand or greater, have at least one method of acceptance that is available within such county or municipality." [101] The US Census estimate as of July 1, 2009 for the population of New York City is 8,391,881 persons.[102] At 839x the size of the threshold population within the legislation, it is clear that New York City is an outlier. Yet, it contains nearly 43% of the population of the state. According to Deutsch,

> The state legislation that's on the books now doesn't address anything within the city. It's really geared for the smaller towns...[Even] Albany is small compared to New York City. And so is Buffalo…So when you're talking about anything over a population of 10,000 people, they have to have certain things. What do you do with a population of eight million?[103]

Since the year 2000, New York City has accounted for 68% of the growth in New York State as a whole, and the city is unique in that it "continues to grow at a substantial rate" [104] while most older cities in the Northeast and Midwest have lost

[100] Deutsch, Michael. Personal Interview. 26 March 2012.
[101] New York State Department of Environmental Protection. *Environmental Conservation Law Article 27 Title 26: Electronic Equipment Recycling and Reuse*.
[102] "Population, Current Population Estimates." http://www.nyc.gov/html/dcp/html/census/popcur.shtml. *NYC.gov.* Web. 27 March 2012.
[103] Deutsch, Michael. Personal Interview. 26 March 2012.
[104] "Population, Current Population Estimates." *NYC.gov.*

population. With New York City's strategic decision to encourage the tech business in "Silicon Alley," and the forthcoming Cornell campus on Roosevelt Island dedicated as a science and technical graduate school, electronic waste will only become a more intrinsic part of the city's solid waste stream.

3. There is no geographical component to the manufacturer quotas

In the first year of the legislation, manufacturers were able to make their quotas by collecting upstate where collection is cheaper and easier. Michael Deutsch explains the difficulties of collecting in a city such as New York:

> It's expensive to truck in New York City. It's hard to do it if you don't understand the city. Large companies have tried and failed, companies like WM (Waste Management) tried for a while to truck, not necessarily just for e-waste but for other stuff as well….They failed and have since pulled out and don't really have a presence. WM is a multi-billion dollar company. It was too hard and too challenging for them to figure out how to effectively truck in New York City. And one of the reasons that [The 4th Bin is] successful at it is because we know the city. We know the layout of the city, we know the demographics.

Manufacturers may have more incentive for public education as the quota increases in stringency over the next few years and as less of the older, heavier items (projection television sets, CRT computer monitors) become available for recycling. This may compel the manufacturers to seek new markets for electronic waste collection.

David Hurd of GrowNYC believes that the city may seek assistance for electronic waste recycling, especially because some existing programs are aligned with the law:

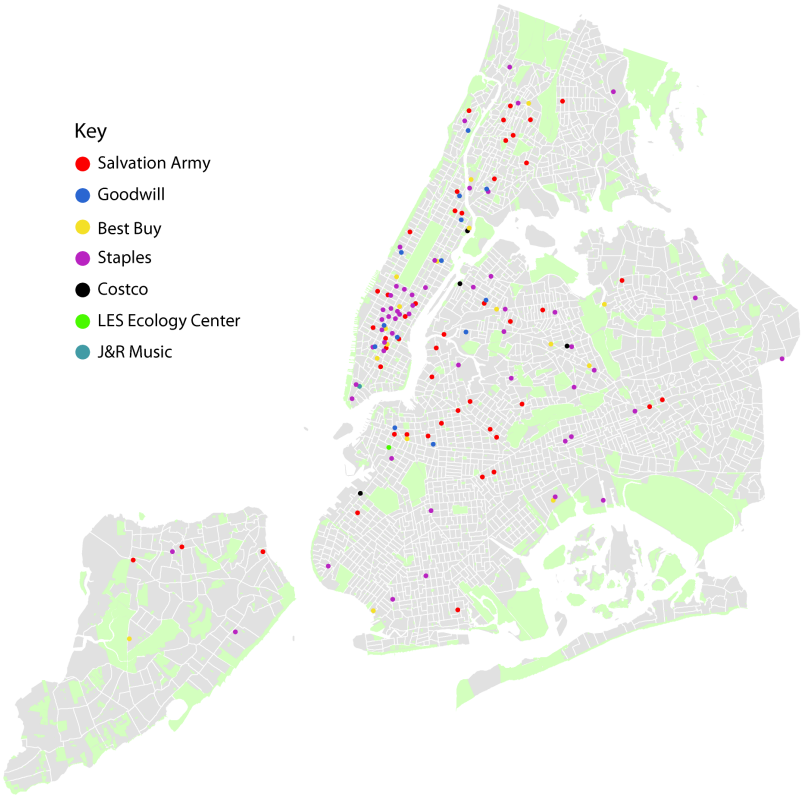
> If the city is dissatisfied with the service it is getting, it will likely go and start negotiation with DEC to improve performance in New York City. There are other regulations in place in New York City that are coincident. For example all city agencies are required by city law to recycle any computer equipment that they generate, irrespective of what the state law says.[105]

[105] Hurd, David. Personal Interview. 7 March 2012.

This is possible under the legislative clause that states: "The department [of environmental protection] may establish additional requirements to ensure convenient collection from consumers."[106] As we have seen, the city has made its own arrangements to handle collection for both its agencies and for residents, although the latter is thus far restricted to public collection events.

4. The distribution of permanent and free electronic waste drop-off locations is insufficient to serve the "convenience" clause of the legislation

Permanent and Free Electronic Waste Drop-Off Locations in New York City as per WastelessNYC website



Data sources: WastelessNYC, Google Maps, websites of Salvation Army, Goodwill, Best Buy, Staples, Costco, LES Ecology Center, J&R Music

Figure 4

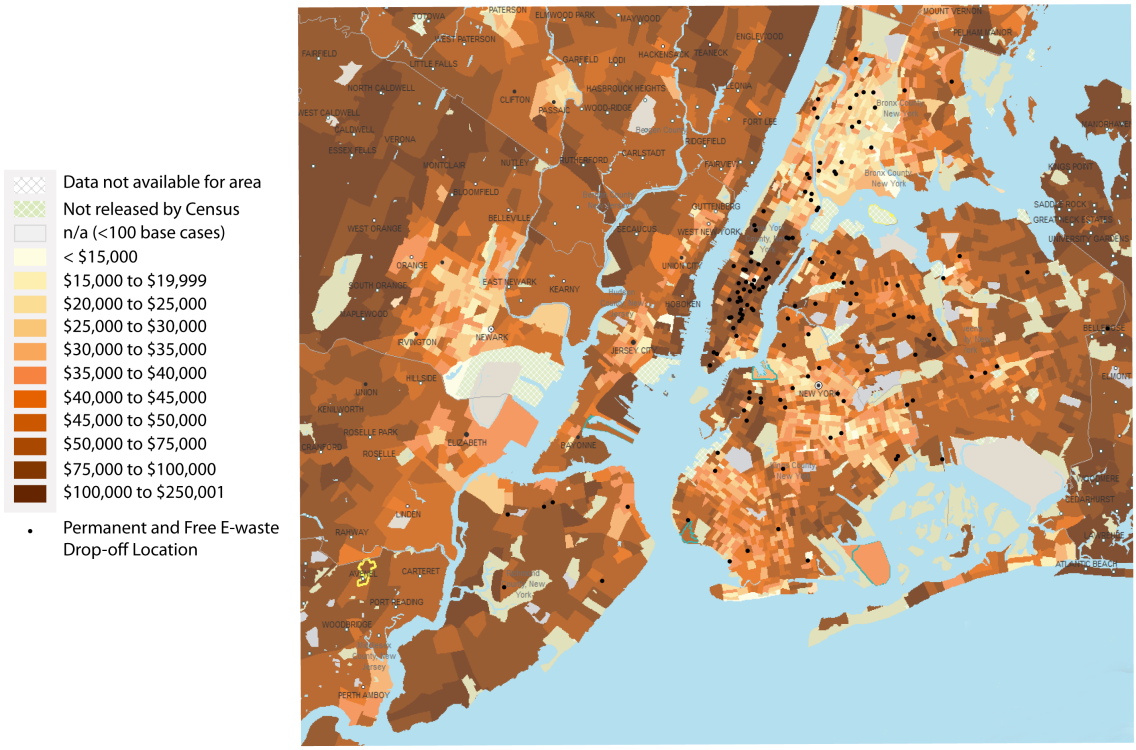
[106] New York State Department of Environmental Protection. *Environmental Conservation Law Article 27 Title 26: Electronic Equipment Recycling and Reuse*.

Figure 4 is a map of permanent electronic waste drop-off locations based upon the organizations and retailers listed on the NYCWasteLess website that provide free and permanent collection. This does not include one-day recycling events. Also not included are two charitable foundations listed on the NYCWasteLess website because they focus on a fluctuating list of equipment for donation. Their facilities cannot be thus considered a consistent and permanent location. For example, the National Christina Foundation partners with local non-profits to list equipment they would like donated, but the list for each non-profit is different and changes as needs are fulfilled.

Because the collections partners are primarily retailers, the distribution of drop-off locations tends to cluster in major business corridors, such as Midtown Manhattan or Downtown Brooklyn. Of the 136 total locations in New York City's five boroughs, 28 locations or 21% of the locations are located between 14th Street and 59th Street in Manhattan. Manhattan, with 52 locations (40%), also has a disproportionate total number of collection locations compared to the other boroughs. Large portions of Brooklyn, Queens, Upper Manhattan and Staten Island are left without a drop-off location within walking distance.

Although the locations are not necessarily correlated with income status (Figure 5), the distribution of locations does disproportionally impact low-income communities in certain communities in Upper Manhattan, the Bronx and Brooklyn. High-income neighborhoods are also underserved, such as the Upper East Side and neighborhoods in Queens, due to their more residential makeup. Partnerships with the Salvation Army somewhat alleviate the situation but overall the distribution of permanent and free electronic waste collection sites is by no means comprehensive or strategic.

Drop-Off Locations in Relation to Median Household Income



Data Source: ACS 2006-2010 Census Tract, NYCWasteless, Google Maps, websites of Salvation Army, Goodwill, Best Buy, Staples, Costco, LES Ecology Center, J&R Music

Figure 5

Michael Deutsch contends that that although the legislation offers five methods that are considered "reasonably convenient," the options are in effect, similar:

> If you read through the types of collection methods, it's all the same thing. I call them all drop-off locations. [They're] worded a little differently, with different players behind the scenes, but essentially for the consumer it's the same thing, other than the mail-back program, which one could argue [still] has the consumer doing something. Bringing their stuff somewhere because they have to box it. You could call UPS to have them come pick it up or you can take it to a UPS store, which then becomes you taking it somewhere. It's all the same thing. It's all a drop-off location, whether you are taking it to an event, to a retail store, to a local community event, however they want to phrase it in the legislation.[107]

The city thus has an opportunity to encourage greater distribution of drop-off locations and greater diversity in collection methods.

[107] New York State Department of Environmental Protection. *Environmental Conservation Law Article 27 Title 26: Electronic Equipment Recycling and Reuse*.

5. The scope of covered electronic products is comprehensive, but the coverage of business and non-profit entities is limited

The New York State electronic waste law only applies to consumers, businesses with fifty or more employees, or non-profits with seventy-five or more employees. However, according to a 2008 estimate by the U.S. Census Bureau, 95.4% of businesses in New York State have less than 50 employees.[108] 87.9% of businesses employ fewer than 20 employees.[109]

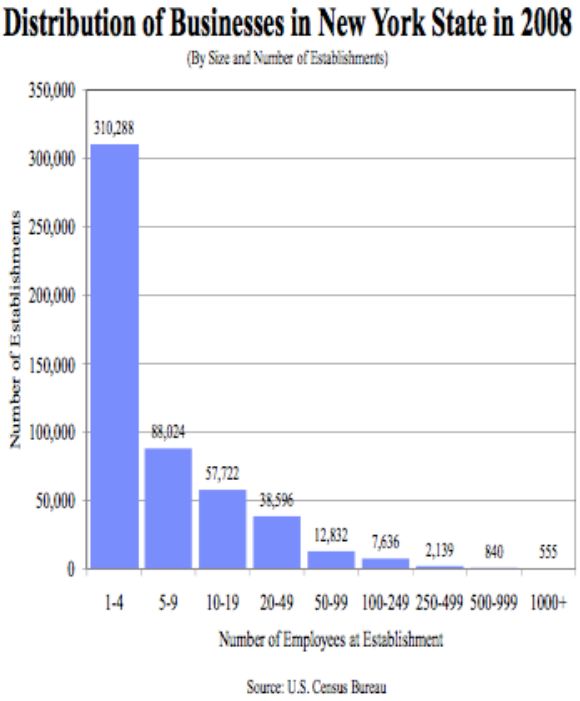


Figure 6

New York City's small business figures are even more exaggerated, with Mayor Bloomberg's encouragement of small business, including his strategy for "Silicon Alley" and city investment into numerous small business incubators like The Varick Street

[108] Office of the State Comptroller. *The Role of Small Business in New York State's Economy.* http://www.osc.state.ny.us/reports/other/smallbusinessreport091510.pdf . Web. 28 March 2012.
[109] *ibid.*

Incubator.[110] Proposed state tax credits for small businesses could additionally tip the figures.[111]

6. There is no legislation at the local, state or national level in regards to the electronic waste recycling industry itself

While the New York State electronic waste law provides some level of regulation regarding manufacturer responsibility for the end-of-life cycle of electronic products, the legislation is not very strenuous when it is applied to electronic waste collectors, consolidators or recyclers. For these parties, requirements are that they:

- Register with the Department of Environmental Conservation, including name and contact information of the owners and operators and the waste site(s).
- Annual reports including information about:
    - Quantity by weight, per location of where electronic waste was sent
    - Contact information of where the electronic waste was sent
    - Weight collected on behalf or in agreement with each manufacturer
    - Distinction between waste collected that was generated in-state vs. out-of-state
- Manage electronic waste in a manner that "complies with all applicable laws, rules and regulations."
- Store electronic waste in a fully enclosed building or secure container

[110] Furman. Phyllis. "NYC pushing M.B.A. courses for small business owners; deadline for minority program is nearing." *New York Daily News.* 27 March 2012. http://www.nydailynews.com/news/money/nyc-pushing-mini-m-b-a-courses-small-business-owners-deadline-minority-program-nearing-article-1.1051154?localLinksEnabled=false. 27 March 2012.
[111] Klopott, Freeman. "New York State Republicans Seek Tax Cut for Small Businesses in Job Plan." *Bloomberg*. 7 March 2012. http://www.bloomberg.com/news/2012-03-07/new-york-senate-republicans-seek-tax-cut-for-small-businesses-in-jobs-plan.html. Web. 27 March 2012.

- Remove electronic waste within one year from arrival at facility

Consolidators must additionally supply certification that the facility or facilities have complied with all laws, rules and regulations and be open to audit. They also have additional safety measurers, such as controlled entry to active portions of facilities, informing employees on proper handling of materials and emergency procedures. A consolidator cannot recycle unless the firm is separately approved as a recycler.

Most significantly, the law makes no mention of industry standards or certifications that collectors, consolidators or recyclers should adhere to. In the electronic waste recycling industry, the two common standards are e-Stewards and R2. One of the key differences between the two standards is the approach to exportation outside of the United States and the use of prison labor. According to the Electronics Takeback Coalition, R2 standards allow international exportation, including non-working hazardous equipment. In terms of worker health and safety, R2 does not define the hazards but allows individual recyclers to develop their own health and safety management plan, the requirements of which are reportedly "very general" [112] and give recyclers much leeway in determining "what's appropriate."[113]

Of the firms covered in this thesis, only WeRecycle! is an e-Stewards certified while Sims Recycling Solutions is R2 certified. For electronic waste management, New York City has partnered with Sims and Veolia, the latter of which does not currently have either R2 or e-Stewards certification. According to Michael Deutsch:

[112] Electronics Takeback Coalition. "Electronics Recycling Standards Compared: R2 and e-Stewards." 12 April 2010. p. 1-2. http://e-stewards.org/wp-content/uploads/2010/03/Chart_Comparing_R2_-eStewardsv9.pdf. Web. 27 March 2012.
[113] *ibid.*

> The industry is a self-policing industry, there's no legislation on the books about how you handle the stuff. There is some about collection and recycling from a consumer standpoint, [but] there's nothing on the books for the industry itself to say, this is the standard of recycling, [to say] this is what happens—no export, or export according to these standards. There is legislation that has been proposed for that, but it's in the process now, we'll see what actually happens with it.[114]

There has also been critique regarding the city's bidding, or lack of bidding process, for the recent electronic waste contracts. Deutsch says:

> Many of the companies that do business like The 4th Bin in the city didn't know it was out for bidding, which has angered companies. Not just The 4th Bin but other companies as well because we are local companies. You can't get more local than The 4th Bin, we all live and work [here] and only The 4th Bin itself is exclusive to New York City. All of our facilities are here, even our warehouse is in East Harlem.[115]

Conclusion and Recommendations

In sum, there remain significant challenges to the implementation of the New York State electronic waste recycling law at the local level, particularly in reference to the city of New York. From a legislation standpoint, there is no proscribed role for the municipality in terms of enforcement, public education, or collection—these responsibilities are tasked to primarily to manufacturers, with solid waste collection firms responsible for enforcement of the landfill ban. For smaller municipalities, this may be sufficient. But as the threshold of the legislation is for municipalities 10,000 persons or greater, the policy is not suitable for a city the size and complexity of New York City, which is 839 times greater than the threshold. Furthermore, there is no geographical component to the manufacturer quotas, which has made New York City undeserved by collection as a whole in the first year of implementation.

[114] Deutsch, Michael. Personal Interview. 26 March 2012.
[115] *ibid.*

Within the city, the distribution of permanent and free electronic waste drop-off locations is by no means comprehensive or strategically planned. Existing manufacturer partnerships with retailers and national non-profit organizations has resulted in the clustering of drop-off locations in retail corridors. This distribution of locations disproportionally impacts certain low-income communities in Upper Manhattan, the Bronx and Brooklyn, while high-income neighborhoods are also underserved, such as the Upper East Side and various neighborhoods in Queens. Finally, while the scope of covered products is comprehensive under the New York state legislation, the coverage of business and non-profit entities is narrow, particularly given the large number of small businesses with under fifty employees in New York State and New York City.

Given the challenges to the implementation of the New York State electronic waste recycling law in a city the size of New York City, cooperation between the already extant stakeholders in the electronic waste recycling space can be harnessed to provide a more comprehensive plan for collection, consolidation and recycling that can mutually benefit residents, small businesses, non-profits, and the city itself. The success of the Lower East Side Ecology Center and First Unitarian Church demonstrate the possibility for localized electronic waste collection, as well as the potential for organizations to collaborate on the process. In the following section, recommendations to both the state and city levels will be enumerated.

Recommendations for the State of New York

Review and amend the New York State electronic waste legislation to address larger cities, encourage more equitable collection, review efficacy of state recycling/collection goals, and increase the scope of businesses and organizations covered under the law.

I. *Amend legislation to address municipalities 10,000 persons or greater to facilitate collection and recycling activities in larger cities.*

   a. Institute an additional threshold with more stringent requirements, including requiring permanent collection facilities. A threshold for cities 50,000 persons or greater would impact the top 18 municipalities by population in New York State. Alternatively or in addition, a threshold at 100,000 persons or greater would benefit the top 5 municipalities by population in New York State.

   b. Increase density requirements for collection, 3 per county as per the Vermont legislation and require at least one type of collection beyond mail back program

   c. Provide further clarification on the "premium services," clause*:* Evaluate whether this clause can be further appropriated to support large item recycling either supported financially by manufacturers or via grants from the state environmental protection fund to existing local pick-up companies, such as The 4th Bin.

II. *Provide weight bonuses to encourage more equitable distribution of collection activities by manufacturers and manufacturer collectives:*

a. While municipal curbside collection is likely infeasible for New York City given the prior lawsuit against the New York City electronic waste law and the position of the New York City Sanitation Department, an amendment to the legislation to include weight collection bonuses in undeserved neighborhoods is recommended, a statute which has precedent in the Illinois law.

b. Additionally, provide a weight bonus for manufacturers and collectives that:

    i. Contract collection to non-profits that benefit at-risk populations

    ii. Provide permanent collection sites in low-income neighborhoods, or provide collection by non-profit organizations that serve at-risk populations. This has precedent in the Illinois law as well, with a weight bonus given or collection by non-profits that hire 75% developmentally-disabled employees.

    iii. Reuse and donate electronics to benefit at-risk populations

c. Allocate a portion of the state environmental protection fund, as derived from manufacturer registration fees, to provide funding, grants or in-kind grants to community groups and non-profit organizations who are engaged, or become engaged, with electronic waste recycling activities. This would address the trade-offs that may arise as a result of collection bonuses.

III. *Explore options for geographic quotas should additional thresholds and weight bonuses be insufficient.*

IV. *Review the efficacy of the base-weight calculation for manufacturer quota*: In Illinois, whose state electronic waste recycling goals and manufacturer quotas strongly influenced the phrasing of the New York legislation, it was concluded that the return-share model encouraged manufacturers to aim low in the first year of collection. It is recommended that the New York State Department of Environmental Protection review collection results and evaluate whether market share quotas would be more effective.

V. *Expand the legislation to include collection from schools, business under 50 employees and non-profits over under 75 employees:* With 95.4% of businesses in New York State having less than 50 employees,[116] it is recommended that the New York State electronic waste legislation be expanded to offer greater coverage in terms of businesses and non-profits. In addition, extension of coverage to schools and institutions is recommended.

VI. *Establish clear and stringent standards for collection, consolidation and recycling companies to benefit those that adhere to the higher industry standards*

VII. *Raise the minimum requirements for manufacturer public education and mandate municipality involvement in public education*

Recommendations for the City of New York

I. *Partner with non-profit and community organizations to increase collection of electronic waste across the five boroughs:* Due to the size and complexity of

[116] Office of the State Comptroller. *The Role of Small Business in New York State's Economy.* http://www.osc.state.ny.us/reports/other/smallbusinessreport091510.pdf . Web. 28 March 2012.

New York City, it is recommended that the city, manufacturers, or manufacturer's collectives partner with local non-profit and community organizations with existing electronic waste activities to expand services to currently undeserved neighborhoods. This would be in addition to the already existing manufacturer partnerships with national non-profits, such as Goodwill and the Salvation Army.

II. *Provide incentives for community organizations with existing activities to expand their programs in terms of frequency and geographic coverage, or to encourage those not yet active in electronic waste recycling to create programs.* Examples of organizations to be targeted include: Business Improvement Districts (BIDs), community boards, schools and non-profits.

a. Incentives could range from funding and grants for community projects or an in-kind exchange, such as assistance with green initiatives (i.e. planting trees via the MillionTreesNYC initiative, maintaining or creating community gardens), environmental upgrades (i.e. stormwater management, area maintenance using the Economic Development Corporation's Area Maintenance Program or its Graffiti-Free NYC Program) and skills training and equipment lending (with a precedent in GrowNYC's Grow Truck program). This recommendation is particularly important if the state decides against allocating environmental protection fund money towards encouraging local collection.

b. Communicate the benefits of becoming involved in the electronic waste recycling process. As demonstrated by the case of Urban Renewal

Corporation, which collects the electronic waste from the First Unitarian Church/Brooklyn Heights events, non-profits can benefit from the reuse of equipment, job-training using the equipment collected, and electronic waste collection and recycling activities can be an engine for job creation.

III. *Provide grants or partner with local collection companies to handle collection from businesses/non-profits that fall out of the scope of legislation, thereby addressing the service gap for small businesses under 50 employees and non-profits under 75 employees.*

a. Utilize approved local companies such as The 4th Bin to facilitate pickup of larger electronic waste items or support partnerships with rental car companies, building upon the existing Zipcar promotion for electronic waste, could assist the recycling of larger items that are obsolete but difficult to drop-off.

IV. *Increase public education and awareness via direct campaigns and leveraging existing person-to-person connections and active neighborhood websites for public education*

a. Upgrade NYCWasteLess: The NYCWasteLess website should be upgraded to better serve residents and businesses.

    i. Include Map of Drop-off Locations: The NYCWasteLess website does not yet have a map of current drop-off locations to allow residents to find where to recycle near them.

ii. Feature electronic waste recycling more prominently: Currently electronic waste can be found only after clicking "Recycle More in NYC" in the left column navigation and scrolling to "Also see."

iii. Improve SEO and landing page design*:* The landing page on a website is the most important from both a user-end and search engine optimization (SEO) and should directly address the information people are searching for.

b. Upgrade NYCrecycles smartphone application: The NYCrecycles app is currently simply a game to help users identify the category of commonly discarded trash. Electronic waste is included in the items but not as a separate category—the main categories currently are "Mixed paper & cardboard," "Beverage cartons, bottles, cans, metal & foil," "Trash" and "Other." Map functionality and other relevant information should be incorporated into a smartphone application.

c. Activate a social media campaign and direct mail campaign focusing solely on electronic waste, instead of bundling the topic with hazardous materials.

d. Increase education on electronic waste recycling for businesses, non-profits and residential management companies on the consequences of the legislation, particularly the residential ban.

e. Leverage existing person-to-person connections formed by community organizations: As demonstrated in the First Unitarian Church/Brooklyn Heights Association electronic waste events, grassroots organization

utilizing existing person-to-person connections and their active use of the internet (websites, emails, message boards) yields strong turnouts for events, which have proven to serve a significant need in the neighborhood.

V. *Hire Local*

Job creation via electronic waste recycling activities is not limited to non-profit organizations. According to the Illinois electronic waste legislation update, "The 2010 Recycling Economic Information Study Update for Illinois estimates that the total economic impact of recycling and reusing obsolete electronic products resulted in the creation of nearly 8,000 jobs and $622 million in annual receipts."[117] It is recommended that the city:

a. Contract with local companies, such as WeRecycle! and The 4th Bin. This has the potential to yield economic benefits for the New York City region as a whole. In addition, local companies are also more familiar with the logistics and demographics of New York City, and can potentially provide more comprehensive and knowledgeable service and public education.

b. Assess the permanent collection facility in Brooklyn by Lower East Side Ecology Center for viability and potential expansion to other boroughs and undeserved neighborhoods. These facilities also have potential as educational and job-creating locations.

VI. *Encourage Residential Buildings to Provide Separated E-Waste Collection*

a. Provide zoning and/or financial incentives for developers that provide electronic waste recycling collection facilities and/or partner with

[117] State of Illinois. *Illinois Electronics Products Recycling and Reuse Act.*

approved collectors and recyclers. The use of zoning and financial incentives for community services has precedent in encouraging inclusionary housing in NYC and at the community level with FRESH (Food Retail Expansion tot Support Health) plan, an initiative of Mayor Bloomberg's Five-Borough Economic Plan to promote the establishment and retention of neighborhood grocery stores in underserved communities.[118]

VII. *Create an easier landscape for collection, consolidation and recycling*

a. There is opportunity for the city to encourage manufacturers to better serve New York, either though incentives or by creating an easier landscape for collection, consolidation and recycling, while also benefiting the local economy. The rumored deal between Sims Recycling and the city is not public yet, but there is a possibility that this is a step in this direction.

b. Establish clear and stringent standards for collection, consolidation and recycling companies to benefit those that adhere to the highest industry standards.

This thesis has provided recommendations to amend the New York State electronic waste legislation to better serve larger municipalities and include weight bonuses to incentivize collection by manufacturers in undeserved neighborhoods and collection by non-profit organizations. In addition, recommendations were made to

[118] New York City Economic Development Corporation. "Food Retail Expansion tot Support Health (FRESH)" http://www.nycedc.com/program/food-retail-expansion-support-health-fresh. Web. 28 April 2012.

increase the scope of the legislation to cover small businesses, non-profits and institutions. However, there also exists a significant opportunity for the city of New York to engage in the process as well, while simultaneously reducing its solid waste output. The city can leverage New York's active non-profit and community organizations to support public education, increase collection of electronic waste and more equitably distribute electronic waste drop-off opportunities. The city can also encourage non-profit and community organizations not yet active in electronic waste activities via grants, partnerships or in-kind exchange to get involved in an income generating activity that may have spillover impact into the community and the local economy. There is also an opportunity to involve the activities of existing local for-profit companies, such as The 4th Bin, to assist collection and pickups to the businesses and non-profits left out of the scope of the legislation.

Public education should be increased not just to residents but also to businesses, with a specific focus on electronic waste recycling in light of the recent legislation. The NYCWasteLess website and NYCrecycles smartphone application could be improved to provide more direct access to users about electronic waste recycling locations and one-day collection events. In light of the recent legislation and the failure of manufacturers to fulfill their public education role for the city of New York, a social media campaign targeted specifically for electronic waste recycling could be an affordable and impactful alternative.

In sum, an electronic waste recycling plan that is developed and empowered by the city has the potential to not only provide more comprehensive coverage to more New York City residents, but would also counterbalance many of the shortcomings of the New

York State legislation while generating employment and spurring small business development for New York City.

Works Cited

4th Bin homepage. http://www.4thbin.com/ Web. 24 March 2012.

76th Oregon Legislative Assembly. *Senate Bill 82*. http://www.leg.state.or.us/11reg/measpdf/sb0001.dir/sb0082.en.pdf. Web. 19 March 2012.

"About Electronics Recyclers International." *Electronics Recyclers International.* http://electronicsrecyclers.com/about_eri.aspx. Web. 16 March 2012.

"About MRM." *Electronics Manufacturers Recycling Management Company*. http://www.mrmrecycling.com/aboutmrm.htm. Web 16 March 2012.

Associated Press. "Another State Passes Tough E-Waste Law." *CBSNews.* 7 June 2010. http://www.cbsnews.com/stories/2010/06/07/tech/main6556885.shtml.

The City of New York, Mayor Michael R. Bloomberg. "Solid Waste," *PlaNYC Update April 2011 A Greater Greener New York,* 144.

"Consumer Recycling." MRM Electronic Manufacturers Recycling Management Company. http://www.mrmrecycling.com/collection_map.htm. Web. 24 March 2011.

Datz-Romero, Christine. Email with the author. 16 March 2011.

Datz-Romero, Christine. Personal Interview. 30 January 2012.

de Blasio, Bill. "Letter to Hon. John J. Doherty, commissioner New York City Department of Sanitation." 18 June 2009. *Consumer Electronics Association.* http://www.ce.org/PDF/CityCouncilLetter.pdf. Web. 29 March 2012.

Deutsch, Michael. Personal Interview. 26 March 2012.

Domino, Resa. Personal Interview. 7 February 2012.

"Drop Off Locations for Residential Electronics. *Connecticut Department of Energy and Environmental Protection*. http://www.ct.gov/dep/cwp/view.asp?a=2714&q=463108&depNav_GID=1645. Web. 18 March 2012.

Electronics Takeback Coalition. "Electronics Recycling Standards Compared: R2 and e-Stewards." 12 April 2010. p. 1-2. http://e-stewards.org/wp-content/uploads/2010/03/Chart_Comparing_R2_-eStewardsv9.pdf. Web. 27 March 2012.

"ERI Locations." *Electronics Recyclers International.* http://electronicsrecyclers.com/eri-locations.aspx. Web. 16 March 2012.

"E-waste Warehouse." *Lower East Side Ecology Center.* http://www.lesecologycenter.org/index.php?option=com_content&view=article&id=237&Itemid=120. Web. 24 March 2012.

"Federal Judge Dismisses Industry Lawsuit against NYC e-waste law." *Earth911.* 28 June 2010. http://earth911.com/news/2010/06/28/federal-judge-dismisses-industry-lawsuit-against-nyc-e-waste-law/

Furman. Phyllis. "NYC pushing M.B.A. courses for small business owners; deadline for minority program is nearing." *New York Daily News.* 27 March 2012. http://www.nydailynews.com/news/money/nyc-pushing-mini-m-b-a-courses-small-business-owners-deadline-minority-program-nearing-article-1.1051154?localLinksEnabled=false. 27 March 2012.

Heller, Maria R. Email. 24 March 2012.

Hurd, David. Personal Interview. 7 March 2012.

Klopott, Freeman. "New York State Republicans Seek Tax Cut for Small Businesses in Job Plan." *Bloomberg*. 7 March 2012. http://www.bloomberg.com/news/2012-03-07/new-york-senate-republicans-seek-tax-cut-for-small-businesses-in-jobs-plan.html. Web. 27 March 2012.

Lee, Jennifer 8. Electronics Industry Sues to Block Recycling Law. *New York Times.* 24 July 2009. http://cityroom.blogs.nytimes.com/2009/07/24/electronics-industry-sues-to-block-recycling-law/. Web. 29 March 2012.

Navarro, Mireya. "In New York, E-Waste Recycling Law Takes Effect." *New York Times. 2* April 2011. http://www.nytimes.com/2011/04/02/science/earth/02ewaste.html. Web. 29 March 2011.

New York City Economic Development Corporation. "Food Retail Expansion tot Support Health (FRESH)" http://www.nycedc.com/program/food-retail-expansion-support-health-fresh. Web. 28 March 2012.

New York State Department of Environmental Conservation. *Environmental Conservation Law Article 27 Title 26: Electronic Equipment Recycling and Reuse*. http://www.dec.ny.gov/docs/materials_minerals_pdf/ewastelaw2.pdf. Web. 29 March 2011.

"New York State Electronic Equipment Recycling and Reuse Act. Registered Covered Electronic Equipment (CEE) Manufacturers and Their Brand(s)." *New York State Department of Environmental Conservation.* http://www.dec.ny.gov/docs/materials_minerals_pdf/regceemfrs.pdf. 15 September 2011. Web. 5 November 2011/27 March 2012.

MacCurdy, Meline. “Electronics Manufacturers Challenge New York E-Waste Law.” *Marten Law PLLC.* http://www.martenlaw.com/newsletter/20090812-nyc-e-waste-law-challenged. Web. Accessed 27 March 2011.
Maine Department of Environmental Protection. *Report on Maine’s Household E-Waste Recycling Program.* January 15, 2010. Web. 5 Nov 2011.

Murphy, Michael G. and Megan R. Brillault for Beveridge and Diamond, P.C. “Complaint. Consumer Electronics Association, Information Technology Council, and ITAC Systems, Inc. v. City of New York, Michael R. Bloomberg, et al.” 24 July 2009.

Office of the State Comptroller. *The Role of Small Business in New York State’s Economy.* http://www.osc.state.ny.us/reports/other/smallbusinessreport091510.pdf . Web. 28 March 2012.

Ponce, Leonel. “Inhabitat Visits the New LES Ecology Center E-Waste Collection Warehouse in Gowanus.” *Inhabitat.* 6 February 2012. http://inhabitat.com/nyc/inhabitat-visits-the-new-les-ecology-centers-e-waste-collection-warehouse-in-gowanus/. 24 March 2012.

“Population, Current Population Estimates.” http://www.nyc.gov/html/dcp/html/census/popcur.shtml. *NYC.gov.* Web. 27 March 2012.

Quimby, Beth. “Maine may dump e-waste statute.” *Maine Sunday Telegram.* 8 Feburary 2011. http://www.pressherald.com/news/maine-may-dump-e-waste-statute_2011-02-06.html. 5 Nov 2011.
“The Solution.” *The 4th Bin*. https://www.4thbin.com/the-solution/ Web. 24 March 2012.

Rubenstein, Emily. Meeting with New York City Mayor’s Office of Long Term Planning and Sustainability as part of a previous class with Columbia University GSAPP.

“Sims Recycling Solutions to Receive, Process New Yorkers’ End-Of-Life Electronics from Department of Sanitation’s Spring 2012 SAFE Disposal Events.” *Sims Recycling Solutions.* 19 March 2012. http://us.simsrecycling.com/news-and-resources/news/dsny-events. Web. 27 March 2012.

Sindig, Kate. “NYS Passes Cutting Edge E-Waste Law.” *National Resources Defense Council Switchboard*. 29 May 2010. http://switchboard.nrdc.org/blogs/ksinding/nys_passes_cutting_edge_e-wast.html. Web. 29 March 2011.

Sindig, Kate. “NYC e-waste lawsuit officially dismissed.” *National Resources Defense Council Switchboard*. 28 June 2010. http://switchboard.nrdc.org/blogs/ksinding/nyc_e-waste_lawsuit_officially.html. Web. 29 March 2011.

"Solid Waste." *PlaNYC 2030 April 2011 Update.* http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf. p 144. Web. 27 March 2012.

"State by State E-Waste Law Summary. E-Waste Laws Passed and Legislation Being Considered in 2011. *Electronics Takeback Coalition*. http://www.electronicstakeback.com/wp-content/uploads/States_Summary_2011.pdf. 11 April 2011. Web. 29 March 2011.

State of Connecticut. *Public Act No. 07-189, An Act Concerning the Collection and Recycling of Covered Electronics*. http://www.cga.ct.gov/2007/ACT/Pa/pdf/2007PA-00189-R00HB-07249-PA.pdf. Web. 18 March 2012.

State of Illinois. *Illinois Electronics Products Recycling and Reuse Act.* Public Act 097-0287. Section 5 The Electronic Products. http://www.ilga.gov/legislation/publicacts/97/PDF/097-0287.pdf. Web. 19 March 2012.

State of Maine. *Maine Revised Statute Title 38 §1610 – Electronic Waste*. http://www.mainelegislature.org/legis/statutes/38/title38sec1610.html. Web. 14 March 2012.

State of Maryland. *Maryland House Bill 488*. http://www.mde.state.md.us/assets/document/HB488_Third_Reader.pdf. Web 19 March 2012.
Thompson, David. E-Waste Event by Columbia University School of Continuing Education—Sustainability Management. 13 October 2011.

United States Environmental Protection Agency. "Regulations/Standards." http://www.epa.gov/osw/conserve/materials/ecycling/rules.htm. 2 Nov 2011. Web. 22 Nov 2011.

Wolf, Nancy. Personal Interview. 7 February 2012.

"What You Need to Know About E-Waste and New York City's Intro. 104-A, the Electronics Collection, Recycling, and Reuse Act." *Natural Resources Defense Council*. February 2008. http://www.nrdc.org/cities/recycling/ny104A.pdf. Web. 29 March 2011.

Yoneda, Yuka. "Thousands of New Yorkers Recycle Electronics at the City's Safe Disposal Event in Queens." *Inhabitat*. http://inhabitat.com/nyc/thousands-of-new-yorkers-recycle-electronics-at-the-citys-safe-disposal-event-in-queens/ 1 May 2012. Web. 1 May 2012.