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Illinois Sustainable Technology Center

Reducing E-Waste Through Purchasing Decisions

Delta Institute
Chicago, IL

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Table of Contents

List of Tables

List of Figures

List of Abbreviations

BMP – Best Management Practice
USEPA – United States Environmental Protection Agency
EPEAT – Electronic Product Environmental Assessment Tool
EPR – Extended Producer Responsibility
EPPRA – Electronics Products Recycling and Reuse Act
E-Steward – Electronics Steward
E-Waste – Electronic Waste
GEC – Green Electronics Council
ICT – Information and Communication Technology
NAID – National Association for Information Destruction
RoHs – Restriction on Hazardous Substances Directive
R2 – Responsible Recycling
SRL – University of Illinois Survey Research Laboratory
TCO – a Swedish certification *Tjänstemännens Centralorganisation*
UIUC – University of Illinois at Urbana-Champaign

Abstract

Purchasing decisions made by companies for electronic office equipment, such as computers, printers, and fax machines, are often not made with the equipment end-of-life disposition in mind. Purchasing agents develop technical specifications for office equipment and make final purchasing decisions based on the needs of their users. The end result is that final disposition of this electronic waste, or e-waste, may sometimes be through the trash or through unchecked third party disposal companies which increases the potential for contaminants to enter the environment.

The Delta Institute, in consultation with the Green Electronics Council (GEC) – the program manager for the EPEAT® program – and the University of Illinois Survey Research Laboratory (SRL), worked on the project, *Reducing E-waste through Purchasing Decisions*, to identify opportunities and barriers for purchasing agents to include end-of-life decisions in the purchasing process and for asset managers to practice responsible recycling. Delta used a survey process, company interviews, and live and videotaped presentations with private companies to identify barriers and test strategies that can be used by private company purchasing agents and asset managers to facilitate recycling of electronic equipment.

Delta concluded that by far the two most prevalent and widespread barriers to using best management practices for purchasing and recycling of electronics were (1) a lack of awareness around electronics purchasing and recycling certifications and registries, and (2) persistent negative perceptions around electronic certifications and registries. Delta beta-tested on company representatives the effectiveness of two delivery methods designed to raise awareness and remove negative perceptions: a live educational presentation and a videotaped webinar. Results from the taped webinar were inconclusive. However, responses from the live presentation suggested that the presentation was successful at raising awareness and dispelling negative perceptions about electronics registrations and certifications to encourage their use. While it is hoped and anticipated that removal of these barriers led to increased recycling of electronics in participating companies, verification was beyond the scope of this study.

Introduction

Electronic waste or "e-waste" is becoming an increasingly larger part of the waste stream because of the proliferation of hand-held devices and virtually constant improvements in technology, causing individuals and businesses to upgrade their equipment on a more regular basis. According to the United States Environmental Protection Agency (USEPA) report, *Electronics Waste Management in the United States Approach 1*, as of 2007 there were approximately 235 million pieces of equipment, including televisions, desktop and laptop computers, and monitors in storage awaiting disposal. With a rate of obsolescence that has doubled from 20 million units per year in 1998 to 40 million in 2008, there are an estimated additional 120 million units in need of disposal. The USEPA estimated in 2007 that more than 3.2 million tons of electronic waste were deposited in United States landfills every year; the figure is highly likely to have increased since then as the per person use of Information and Communication Technology (ICT) devices has grown (USEPA, 2007).

While the large quantities of electronic waste pose a problem, a more profound issue is the fact that electronic products (and thus waste) contain toxic elements and compounds such as antimony, arsenic, beryllium, bismuth, brominated compounds, cadmium, chromium, lead, mercury, nickel, silver, halogenated flame retardants, and other substances of significant concern (High Density Packaging User Group, 2003). Additionally, electronics manufacturing consumes huge quantities of natural resources. For example, the production of a memory chip requires about 600 times its weight in fossil fuels, as opposed to the 1:2 ratio in the production of a car or the 1:4 ratio for the production of aluminum cans (WEEE and Hazardous Waste, 2004). And ICT devices contain many materials such as glass, metals (including precious metals like gold), and plastics that have reuse value and should be recycled as a resource conservation measure (Williams, 2002).

Recycling for electronic products is still relatively low. The EPA estimates electronics recycling rates to be approximately 25% (U.S. Environmental Protection Agency, 2011). The federal government and state governments expect this rate to increase with the passing of legislation, such as the Illinois' Electronic Products Recycling and Reuse Act (EPPRA) which became effective on Jan. 1, 2012, requiring manufacturers and retailers to provide electronics take-back programs. However, take-back programs often do not eliminate the potential for toxics in discarded electronics to enter the environment, particularly as products and components that enter the global waste trade are often disassembled with few or no worker and environmental safeguards. Though some researchers have questioned the reliability of the figures on e-waste off-shoring (Tong and Wang, 2004), widely published estimates suggest that 50-80% of e-waste collected for recycling in the U.S. ultimately gets exported to recycling centers in the developing world (Greenpeace USA, 2014).

The electronics disposal problem in Illinois mirrors the national estimates. In 2005, the State of Illinois estimated that over 2.5 million tons of electronics were awaiting disposal with only 13% of that total being recycled (Illinois General Assembly, 2008). In response to the increasing quantities of electronic waste in Illinois, the Illinois General Assembly passed EPRRA.

Illinois is unique in that the law has provisions for registrations and auditing to ensure electronics are recycled and not sent to other countries for dismantling and/or disposal in using

methodologies which are not protective of human health or the environment. Additionally, the law established a statewide system for recycling and reuse by requiring manufacturers and retailers to participate in responsibly managing electronics at the end of their useful lives, and it provides Illinois residents with access to recycling at no cost (Electronics Recycling Coordination Clearinghouse, 2015). The EPRRA, however, only covers consumer electronics, though businesses and residents alike are prohibited from landfilling electronic products (Illinois Environmental Protection Agency, 2011). Downstream controls, such as effective reuse and recycling programs, are necessary to responsibly manage the toxic and recyclable materials in electronics. But any long-term solution requires upstream controls and incentives to reduce the quantities of toxics used in electronic products and the design factors that make it neither easy nor cost-effective to recover re-useable materials from e-waste. By minimizing the use of toxic and hard-to-recycle materials, such upstream efforts could significantly improve handling and disposal at the end-of-life.

The Delta Institute, in consultation with the Green Electronics Council (GEC) – the program manager for the EPEAT® program – and the University of Illinois Survey Research Laboratory (SRL) worked on the project, *Reducing E-waste through Purchasing Decisions*, to identify opportunities and barriers for purchasing agents to include end-of-life decisions in the purchasing process and asset managers to practice responsible recycling. Delta used a survey process, company interviews, and live and videotaped presentations with private companies to identify barriers and test strategies that can be used by private company purchasing agents and asset managers to facilitate recycling of electronic equipment. The overarching goal of the project was to increase the recycling and reuse rates of e-waste.

The Delta Institute is an Illinois 501(c)(3) not-for-profit organization working on green economy issues in the Great Lakes region. The GEC is a program of the International Sustainable Development Foundation, a 501(c)(3) not-for-profit organization based in Portland Oregon, USA. The GEC's mission is to inspire and support the effective design, manufacture, use, and recovery of electronic products to contribute to a healthy, fair and prosperous world. The University of Illinois Survey Research Laboratory (SRL) is a research and service unit established in 1964. It is a division of the University of Illinois at Chicago's College of Urban Planning and Public Affairs that provides survey research services to the faculty, staff, and students of the University of Illinois at Chicago and Urbana-Champaign; other academic institutions; local, state, and federal agencies; and others working in the public interest.

Methodology

Delta Institute's *Reducing E-waste Through Purchasing Decisions* project used a multi-phased approach to (1) identify business best management practices (BMPs) for purchasing and recycling electronics; (2) identify barriers that private companies face to using BMPs; and (3) create strategies to encourage use of BMPs by private companies in electronics purchasing decisions. The underlying goal of this work is to increase the reuse and recycling rates of electronics that have reached the end of their useful lives. The project was executed in several discrete phases. Prior to starting work, Delta created a multidisciplinary advisory committee and during all subsequent project phases consulted with the advisory committee regarding approaches taken or planned and conclusions obtained. Subsequent project phases in chronological order were as follows:

1. Initial secondary research
2. Design and administration of a survey to private Illinois companies
3. Analysis of survey results
4. Interviewing survey respondents to further explore initial survey observations and preliminary conclusions
5. Identification of barriers
6. Crafting of strategies to break down barriers and beta testing of the strategies
7. Analysis of beta testing results

Each of the above phases is discussed in more detail in the sections that follow.

Advisory Committee

Delta created a nine-person advisory committee consisting of professionals primarily from Illinois companies and whose focus is on electronics purchasing, recycling, or management in either the non-profit, academic, or private company sectors. The organizations represented on the advisory committee are listed in Table 1.

Throughout the approximately one-year time frame of the project, Delta met five times with its advisory committee via conference call. During each meeting Delta discussed with the committee the project approaches and interim results for the various project phases. The committee advised the project team during the initial research phase, survey development and distribution, survey and interview results analysis, and strategy creation. After each meeting, Delta created a set of written meeting minutes documenting points of discussion and consultation with the group. Meeting minutes were e-mailed out to the group within 48 hours of each committee meeting.

Table 1: E-waste Advisory Committee.

Organization Name	Organization Description	Participant Description
BlueCross BlueShield of Illinois	Healthcare insurance provider	Technology Manager
Business Innovation Services – University of Illinois	Consulting organization providing technical services and assistance to Illinois businesses	Executive Director
Center for Neighborhood Technology	Environmental and energy non-profit	Senior Energy Efficiency Consultant
Illinois Sustainable Technology Center – University of Illinois	Environmental and energy research center	Emerging Technologies Resource Specialist
Motorola Mobility	Multi-national telecommunications company	Senior Environmental Engineer
Northeast Recycling Council	Environmental non-profit focused on recycling	Executive Director
Responsible Sourcing Solutions/Underwriters Laboratory Environment	Environmental consulting group focusing on purchasing and marketing – business unit of Underwriters Laboratory working to promote global sustainability, environmental health, and safety	Marketing Development Director
Supply Chain Services, Inc.	IT assets disposal and electronics recycling company	President & CEO
USMe	Electronics recycling company	National Account Manager

Initial Secondary Research

To provide foundational support for the project, Delta conducted research on the strategies linking purchasing and end-of-life impacts as well as strategies for recycling and final disposal options for e-waste that could be implemented by Illinois companies. Upfront research was used to identify electronics purchasing certifications and other BMPs and provide some background on possible barriers to implementation of the BMPS. Areas of focus included:

- high volume electronics purchasers and industry sectors;
- lifecycle issues/benefits associated with electronics recycling;
- e-waste management certifications and costs of implementation;
- barriers to bundling purchasing and disposal opportunities.

Sources of information used for research were in accordance with Delta's Quality Assurance Plan submitted to ISTC for this project and included peer-reviewed journal articles; reputable industry-related publications; published corporate sustainability reports from companies such as Marriott, Nokia, and Wal-Mart; documents published by public governmental agencies (e.g., program results and data from implemented projects); and websites of non-governmental non-profit organizations such as Cal Recycle, Electronics Take Back Coalition, and EPEAT/Green Electronics Council. The team also interviewed Sara O'Connor, Communications Director from the Green Electronics Council EPEAT program, to round out the research efforts. The complete list of references for the secondary research for this project has been provided in Appendix A.

Key observations were drawn from research results in the following three categories and used to identify potential areas that were then explored using the survey.

- Company Awareness/Familiarity Levels with Green Electronics Purchasing/Certifications

  Research indicated the four most reliable certifications and registrations related to purchasing of green electronics were Energy Star, EPEAT (Electronic Product Environmental Assessment Tool), RoHs (Restriction on Hazardous Substances Directive), and TCO (a Swedish certification Tjänstemännens Centralorganisation). However, many company purchasing agents may not be aware of the certifications/registrations, may not understand the differences between them, or may not understand how to use them, particularly if the company does not have in place a sustainability plan or a clearly defined green purchasing policy.

- Company Use of Certifications

  For companies that purchase from suppliers offering electronic product offerings that are certified or registered, negative perceptions may persist on the part of purchasers regarding the certifications/registrations. Negative perceptions were identified in regards to the following areas:

  - reliability/validity/green-washing
  - ease of use (i.e., correlation of product information on EPEAT versus product information from manufacturer)
  - robustness of certified product offerings (too robust, not robust enough)
  - cost and performance of electronic products that are certified
  - limitation of certifications

- Company Purchasing Strategies

  Companies use varying purchasing strategies (beyond using certifications or registrations) when procuring electronics. Strategies may promote e-waste recycling but also may experience challenges or complications that hamper their use. Strategies include straightforward purchasing with intent to recycle, purchasing via take-back programs, and procurement via leasing.

Research results were discussed with the advisory committee in preparation for drafting of the survey. Full research results can be accessed in Appendix A of this report.

Survey

The survey for this project was developed through a phased process that sought input from stakeholders on the scope and content of the survey and from university experts on survey methodology and design.

Content

Using the results from secondary research and guidance provided by the advisory committee, Delta created a first draft of the survey content. The survey structure consisted of an initial group of general questions used to assess the demographics of company respondents. Subsequent questions were then created to route respondents through various question pathways, or threads, depending on respondent's answers. Question threads were designed to further explore answers to allow Delta to better understand barriers to BMPs in the following areas: electronics purchasing; recycling; and reuse, reduce, and refresh cycles. Delta reviewed the draft survey with Sarah O'Connor, EPEAT Director of Communications at the Green Electronics Council, and included her feedback in subsequent drafts. Through an iterative process with Ms. O'Connor, and using additional feedback from advisory committee members, the content of the survey was finalized. A definition section for electronics and e-waste related terms, acronyms, and vocabulary that respondents may not be familiar with was also created and added to the survey.

Design

Once the scope and topical content of the survey were established, Delta staff contracted Dr. Sowmya Anand at the University of Illinois at Urbana-Champaign Survey Research Laboratory (SRL) to consult on survey design. Dr. Anand's expertise and guidance were instrumental in developing the survey, which dealt with somewhat technical subject matter but was simultaneously intended for an audience not versed in the technical aspects. The SRL's feedback on the initial draft was comprehensive and many comments, though addressing distinct issues of survey design, were mutually reinforcing. Comments generally fell into one or more of the four categories below:

- Simplification and clarity: Comments that focused primarily on simplifying technical language, eliminating redundancy, replacing mathematical symbols with words, and using easier or more frequently used language in place of more difficult, technical, or less frequently used language.

- Reducing cognitive burden: Comments that focused on writing clear questions that respondents would find easy to understand and answer (thereby reducing time and effort spent by respondents to answer questions). Comments focused on minimizing text (including background information, definitions, and instructions) and rephrasing questions so that they were asked clearly and directly.

- Eliminating bias: Comments that focused on identifying and eliminating phrasing that could create bias for end-users. For example, many questions initially requested "yes/no," "true/false," or "agree/disagree" responses. The project team learned that questions structured as such invite an acquiescence bias where respondents are more inclined to choose the affirmative. This bias is difficult to measure and adjust for in the results, so responses were phrased neutrally along the lines of "agree/do not agree," or "has sustainability plan/does not have sustainability plan."

- Constructing questions effectively: Comments that focused primarily on constructing single-barrel questions (questions that focus on only one element or construct as opposed to more than one) and using unipolar and/or like-type three-point or five-point scales when asking respondents to rank various responses.

The SRL review and recommendations provided a strong base of practical knowledge about survey research conventions that informed several further iterations. A copy of the final survey is provided as Appendix B.

Distribution

Delta uploaded the created survey to an online electronic survey tool Survey Monkey and e-mailed the survey out in November 2012 and again in early December 2012 to a total of approximately 2,600 Illinois businesses. The following e-mail lists were used for distribution (Table 2).

Table 2: E-Waste Survey Distribution Lists

Mailing List/Database	**Number of Companies**	**Entity Sending out Survey**
Delta Institute	400	Delta
Clean Air Counts	1,200	Delta
Department of Commerce and Economic Opportunity	1,000 +	DCEO
International Facility Management Association	50	IFMA
Prudential Plaza Tenants	12	Prudential Plaza Facility Manager
Total	**2,662 +**	

Additionally, as recommended by the SRL, Delta personally contacted by telephone approximately 25 companies from the Delta mailing list to remind and encourage these companies to respond to the survey. By mid-December 2012, Delta had received back 54 completed surveys with almost 90% of respondents providing contact information (name, e-mail, etc.). The robust amount of contact information received helped Delta to conduct follow-up interviews with selected companies that responded.

Interviews

Delta reviewed and analyzed the aggregated results of the survey responses received. Delta's analysis process and results are discussed in the Results and Discussion sections of this report. Based on results from that analysis, the project team determined six survey topic areas where it felt that interviewing respondents could provide additional important insight into the identified purchasing BMPs and/or barriers. There were six subject areas that fell into two categories: purchasing and recycling.

Purchasing

- Area 1 – Ratings: Exploring whether having a sustainability plan and/or a green electronics purchasing policy in place leads to a greater use of green electronics ratings such as EPEAT, TCO, EcoLogo, RoHs or internal criteria.

- Area 2 – Certifications/registration: (a) Exploring whether being aware of certifications/registrations promotes using them and (b) Exploring reasons for negative perceptions around certifications/registrations so that a tool or strategy can be created to debunk the misperception.

- Area 3 – Internal criteria: Exploring what tools or training would be helpful for companies that rely on their own internal criteria for purchasing green electronics.

Recycling

- Area 4 – Contract/policy: Exploring whether having a recycling contract or recycling policy in place leads to positive outcomes that encourage further recycling and promote recycling BMPs.

- Area 5 – Procurement: Exploring whether having the procurement department negotiate the recycling contract and vet the recycler – a possible BMP – leads to increased contracting with R2 or e-steward certified e-waste recyclers and receiving of detailed reports from the recyclers.

- Area 6 – Awareness: Exploring how to increase awareness around certifications/registrations.

Delta contacted nine of the survey respondents by telephone to conduct 10 to 15 minute interviews but, after multiple attempts, was able to communicate with only four of the

companies. A more detailed summary of interviewee responses can be found in the Appendix C and in the Discussion section of this report.

Identification of Barriers and Strategies for Removing Barriers/Promoting BMPs

Based upon analysis and discussion of the survey and interview responses with its advisory committee, Delta concluded that by far the two most prevalent and widespread barriers to using BMPs for purchasing and recycling of electronics were (1) a lack of awareness around electronics purchasing and recycling certifications and registries, and (2) persistent negative perceptions around electronics certifications and registries.

Delta developed two strategies to raise awareness and address misperceptions about these tools and beta-tested those strategies to evaluate the effectiveness of each strategy. The first strategy was to present information on electronics BMP, awareness, etc. in a live presentation. The second strategy was to do so via a video-based webinar.

In the first test group, Delta leveraged its work on the Chicago Green Office Challenge (CGOC), a City of Chicago initiative, to engage local businesses to reduce their environmental impacts around water, waste, and energy. Because June 2013 was "Waste and Recycling Month" for CGOC participants, the project team took the opportunity to deliver a presentation on electronics best practices, focusing on creating awareness and dispelling misperceptions around electronics registries and certifications. The presentation was given on June 18, 2013, at PepsiCo's downtown headquarters to an audience representing approximately 25 participating companies. Each company earned points through CGOC for attending. The presentation informed the companies why it is important to recycle electronics and focused on raising awareness of the EPEAT, R2, E-Stewards, and National Association of Information Destruction (NAID) certifications. The presentation also aimed to dispel four common misperceptions around the registrations and certifications, namely that registered and certified electronics cost more; websites are difficult to use; not enough certified or registered products are available; and electronics certifications and registrations are not reliable.

Delta explained the certification and registration processes for electronics and electronics recyclers and gave a live online website demonstration. The presentation focused on some of the unique features of the EPEAT, R2, E-Stewards, and NAID websites, such as how to locate service providers, how to compare products, and where to find model contract language. Additionally, participants were also challenged to participate in a question and answer contest to further reinforce information presented. Participants were awarded $5 Starbucks gift cards for correct answers to the questions.

The second test group received the same information in a recorded webinar video that was publicly posted to Delta's website (via YouTube) and promoted using an e-blast to the same e-mail lists used to distribute the survey. Additionally, participants at the live version of the presentation were encouraged to refer other companies to view the video on the website in exchange for CGOC bonus points. The number of views of the video was collected for five business days, from June 18 to June 25, 2013. This version of the presentation did not include an interactive question and answer component.

Delta beta tested the effectiveness of each presentation strategy by engaging respective audiences in a text-based poll to determine if information received live and in-person was more effective than information received by viewing a recorded webinar. For each scenario:

Participants were asked to text their responses to the following questions *before the presentation*:

1. Are you familiar with electronics recycler and purchasing certifications and registries? (Y/N)
2. Have you used electronics recycler and purchasing certifications and registries? (Y/N)

Participants were asked to text their responses to the following question *after the presentation*:

1. After seeing this presentation are you:
    a. More likely to use electronics certifications and registries
    b. Less likely
    c. No change

By posing the same questions to two different audiences that participated through two different media, Delta's goal was to beta-test the effectiveness of different presentation strategies in terms of the presenter's relationship to the audience, flexibility of scheduling, and passive versus engaged delivery of information.

Results

Results for this project consisted of identification of electronics BMPs and barriers to the implementation of BMPs for the purchasing and recycling of electronics. The barriers were identified through analysis of survey and interview responses. Delta created a strategy to eliminate the barriers identified and used two methodologies to deliver the selected strategy. The two methodologies were then beta-tested and results regarding effectiveness of the strategies were analyzed to determine which methodology was more successful and why.

Survey Results

Delta analyzed the survey results to characterize the companies that responded, to understand prevalent purchasing and recycling BMPs, and to understand perceptions about these best practices and barriers to their use. Particular focus was paid to registries and certifications for purchasing and recycling electronics. Through this analysis, Delta made some key observations and identified several areas which could benefit from further research. A detailed analysis of the survey results is included in Appendix D. Key observations are summarized as follows:

- Overall, survey respondents were skewed towards smaller companies.

- Overall, survey respondents were employees knowledgeable about how their company manages electronics. This suggested to Delta that responses for each company had a reasonable likelihood of accurately reflecting each company's behavior and experiences.

- Lack of company resources to devote to managing electronics may be a barrier to implementation of best practices. Both formal agreements for electronics purchases and having a sustainability plan are more prevalent among large companies. These variables are associated with purchasing more recyclable electronics and having good experiences with recycling.

- Agreements, contracts, and policies governing the purchase of electronics are associated with the use of EPEAT or similar tools that lead to the purchase of more recyclable electronics.

- Companies that have sustainability plans were more likely to purchase electronics through agreements or contracts, and they were also more likely to use EPEAT or similar tools.

- Lack of awareness about purchasing registrations and negative perceptions about the registries are a barrier to their use.

- There is not a clear link between having recycling contracts or policies and positive outcomes that encourage recycling and promote best recycling practices (e.g., using a certified recycler, confidence in data security, confidence that materials are not shipped to non-OECD countries, or receiving satisfactory documentation about recycled products).

- Having procurement officers manage recycling was not supported by survey results as a best management practice or a practice strongly promoting positive outcomes.

- Lack of awareness about recycling certifications and negative perceptions about the certifications are a barrier to their use.

Interview Results

Based on survey results, Delta contacted certain respondents to gain a deeper understanding about their perceptions of registries and certifications. The purpose of the interviews was to identify specific barriers to more widespread use of best practices. Delta used specific criteria to identify interview subjects.

- We included companies that use their own internal criteria to vet "green" products as opposed to an established rating such as EPEAT, TCO, or Eco-Logo. The purpose was to explore the perceived advantages of developing an internal criteria versus an existing criteria.

- We included companies in which respondents were not aware of registries and certifications prior to the survey and companies that identified reasons for not using certifications or registries. The purpose was to (1) understand whether awareness promotes the use of registries or certifications, and (2) how those tools can overcome negative perceptions to promote more widespread adoption.

- We included companies that identified a need for specific resources to help identify "green" products or practices, such as additional training or model contract language for vendors. The purpose was to identify the tools that would provide the most assistance.

- We included companies that reported positive outcomes with electronics recyclers. This criteria was defined as receiving acceptable documentation in the areas of: data security; no materials shipped to non-OECD countries; chain of custody of downstream electronics processing; and total weight of recycled electronics. The purpose was to identify best practices that may promote use of certified recyclers.

- We included companies in which procurement staff vet recyclers. The purpose was to explore the idea that approaching purchasing and recycling as an integrated task is a best practice that addresses product life cycles.

- We included companies that know their recycler by name but did not know their certification, and companies that contract with recyclers but have concerns about their data security. The purpose was to explore best practices and how to increase awareness around certifications.

Delta selected nine companies that each met two or more criteria and reached out to respondents to explore issues in greater detail. Comprehensive interview results are available in Appendix C.

The success of this phase of the analysis was limited by a lack of interest or time on the part of some selected respondents to participate in an interview. Only four interviews occurred, leading to the following key observations:

- Two respondents who indicated they were unaware of EPEAT prior to the survey both reported that they are likely to explore using it now that they are aware.

- Some respondents may have interpreted questions differently. One respondent identified the fact that EPEAT-registered products cost more than regular products as a barrier to more widespread use. In a follow-up conversation the respondent stated that she knows that is not the case, but was answering from what she thought was the perspective of the general population.

- Three respondents that indicated good outcomes with recyclers (as defined above) were generally satisfied, but generally had little information about how their recyclers operate.

- There was generally very low awareness about recycler and purchasing certifications and registrations.

Based upon analysis and discussion of the survey and interview responses with its advisory committee, Delta concluded that by far the two most prevalent and widespread barriers to using BMPs for purchasing and recycling of electronics were (1) a lack of awareness around electronics purchasing and recycling certifications and registries, and (2) persistent negative perceptions around electronics certifications and registries.

Presentation Results

As discussed previously, Delta beta tested the effectiveness of two strategy delivery methods, live and videotaped webinar, by engaging respective audiences in a text-based polling. The purpose of the polling was to try and determine if information received live and in-person was more effective at changing negative perceptions about electronics registrations and certifications and encouraging use of them than information received by viewing the taped webinar.

Live Presentation

Due to technical difficulties, answers texted during delivery of the presentation were not collected by the on-line system. Consequently, after the presentation attendees were asked to resubmit their responses via email. Of the 25 distinct companies that attended 11, or approximately half, responded to the emailed request. Results are presented in Tables 3 and 4 below.

Table 3: Responses to Live Presentation "Pre" Question.

CGOC E-waste presentation

Prior to the June 18, 2012 CGOC presentation were you familiar with certifications and registries for purchasing and recycling electronics?		
Answer Options	**Response Percent**	**Response Count**
Yes	36.4%	4
No	63.6%	7
answered question		11
skipped question		0

Table 4: Responses to Live Presentation "Post" Question.

CGOC E-waste presentation

After seeing this presentation, are you more or less likely to use certifications and registries when purchasing or recycling electronics?		
Answer Options	**Response Percent**	**Response Count**
More likely	90.9%	10
Less likely	0.0%	0
No impact	9.1%	1
answered question		11
skipped question		0

While the sample size of 11 is small, the comparison of responses from prior to the presentation delivery versus after the presentation delivery suggests that the presentation was successful at raising awareness and dispelling negative perceptions about electronics registrations and certification to encourage their use.

Recorded Presentation/Webinar

According to on-line tracking collected by YouTube, there were 38 views of the taped webinar. (Also, two attendees of the live presentation E-mailed Delta staff to receive points for referring colleagues to the video.) However, Delta discovered that YouTube on-line tracking counts as a "view" any access to the video including initial uploading and testing by Delta staff. Consequently, independent views by outside parties is likely to have been less than the 38 views listed. Additionally, Delta did not receive any text responses from viewers of the video making it impossible to analyze effectiveness of the video or to compare effectiveness of the live presentation to effectiveness of the videotape at raising awareness and dispelling negative perceptions about electronics

certifications and registrations. (Delta did confirm that the texting functionality for the video-taped presentation was working correctly.) In retrospect, using a service such as GoToWebinar could have allowed for more effective capture of content information of those who viewed the webinar so that subsequent follow-up with viewers could have been attempted.

Discussion

Survey Analysis

The survey observations that Delta obtained through this project are the result of several additional phases of analysis discussed below.

After circulating the survey, the project team recognized that one of the distribution lists included both private enterprises and public agencies. In total, Delta received 54 responses, 34 of which were from the private sector and 20 from public agencies. After an initial review of the aggregate responses and subsequent review of each subset of responses, the project team observed key differences between the two groups that are likely attributable to organizational missions, resources, objectives, and management strategies. As a result, the public sector responses were separated out so that the scope of this analysis is limited to private sector respondents. (The scope of this project was defined as private companies.)

The design of the survey was fairly complex in that it relied in many places on conditional formatting that routed respondents through the survey non-sequentially depending on their responses. Additionally, there were several questions that requested respondents to "select all that apply" in order to, for example, identify various perceptions about registries and certifications and the different barriers to using them. Consequently, although the initial dataset was comprised of 34 private sector responses, several questions had a sample size of just a few responses. The impact to the analysis was that Delta decided to analyze the results for *substantive* differences among respondents, rather than *statistically significant* differences. Delta consulted with Sowyma Anand at (UIUC-SRL) to discuss analysis of the survey results (given the limited number of responses for some questions) prior to making this decision.

Additionally, after an initial preliminary review of the results, Delta elected not to include in its analysis responses to some questions related to reuse, reduce, and refresh cycles in the overall analysis. For example, questions 18a and 19a dealt with the electronics reduction and reuse practices that respondents use in their companies. Although somewhat out of the original scope for this project of exploring BMPs and barriers to BMPs for purchasing and recycling of electronics, Delta chose to include questions for these three areas for completeness because they are relevant to the original scope. However, given the complexity and time required to effectively analyze the survey results from just the purchasing and recycling sections (due to the conditional questions creating various question threads), Delta decided to eliminate responses from the reuse, reduce, and refresh cycles from the analysis.

Ultimately, the purpose of the survey was to explore perceptions about various electronics purchasing and recycling best management practices, as well as to identify specific barriers to their widespread use. However, survey results showed that very few respondents were even aware of such practices, most notably use of electronics registrations and certifications such as EPEAT, R2, E-Stewards and NAID, so little data was obtained about barriers to more sophisticated BMPs such as using internal criteria to vet electronics.

Figure 1 below depicts the responses of 29 respondents identifying reasons they do not use registries and certifications for green electronics purchasing. The frequency of responses was analyzed because respondents were asked to select all that apply. Also, five of the 34 respondents routed past the question based on a previous conditional question. Figure 2 shows the numeric breakdown of all 34 private sector respondents, including the five that skipped the question. The emerging theme is that most respondents were not aware of registries and certifications, and those that were aware have persisting negative perceptions.

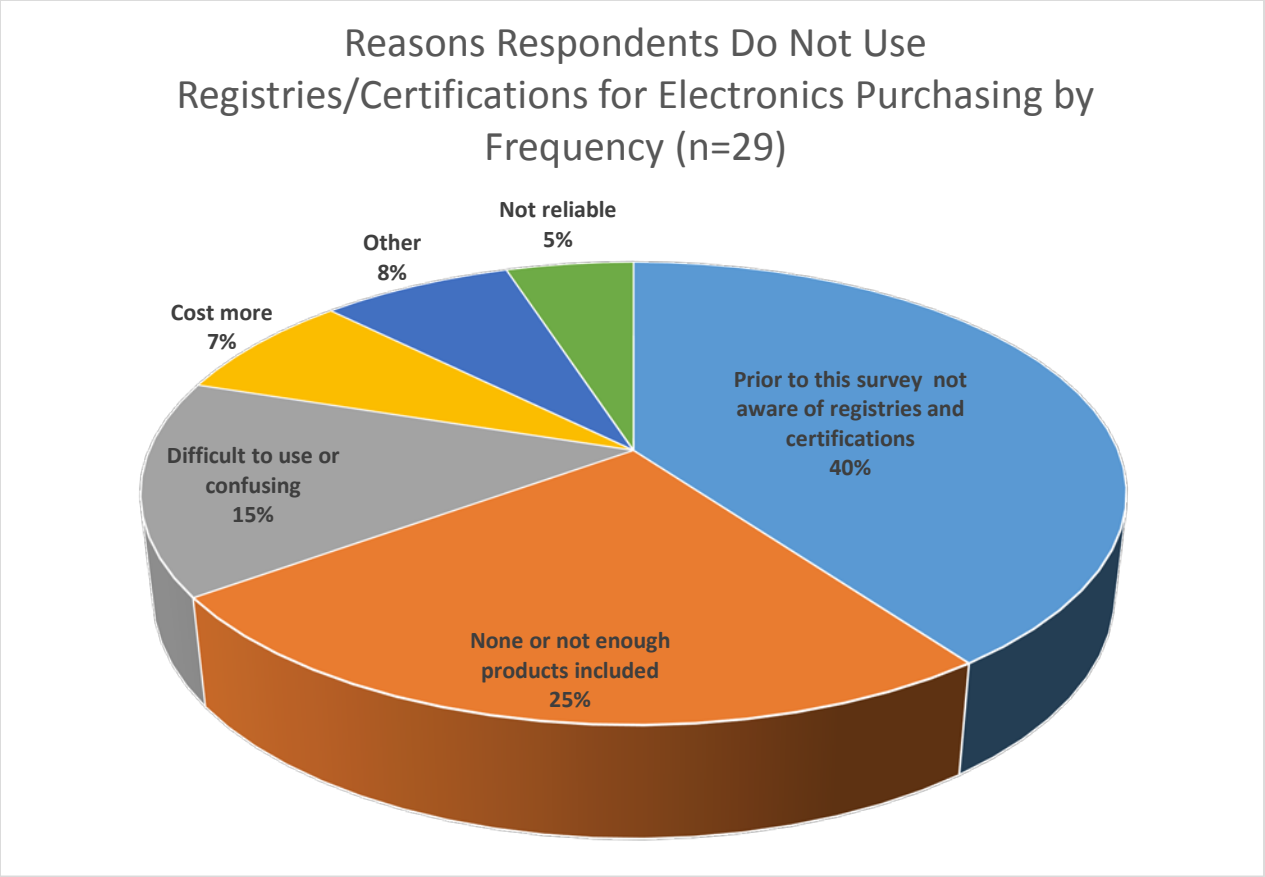

Figure 1: Reasons Respondents Do Not Use Green Registries/Certifications for Green Electronics Purchasing by Frequency.

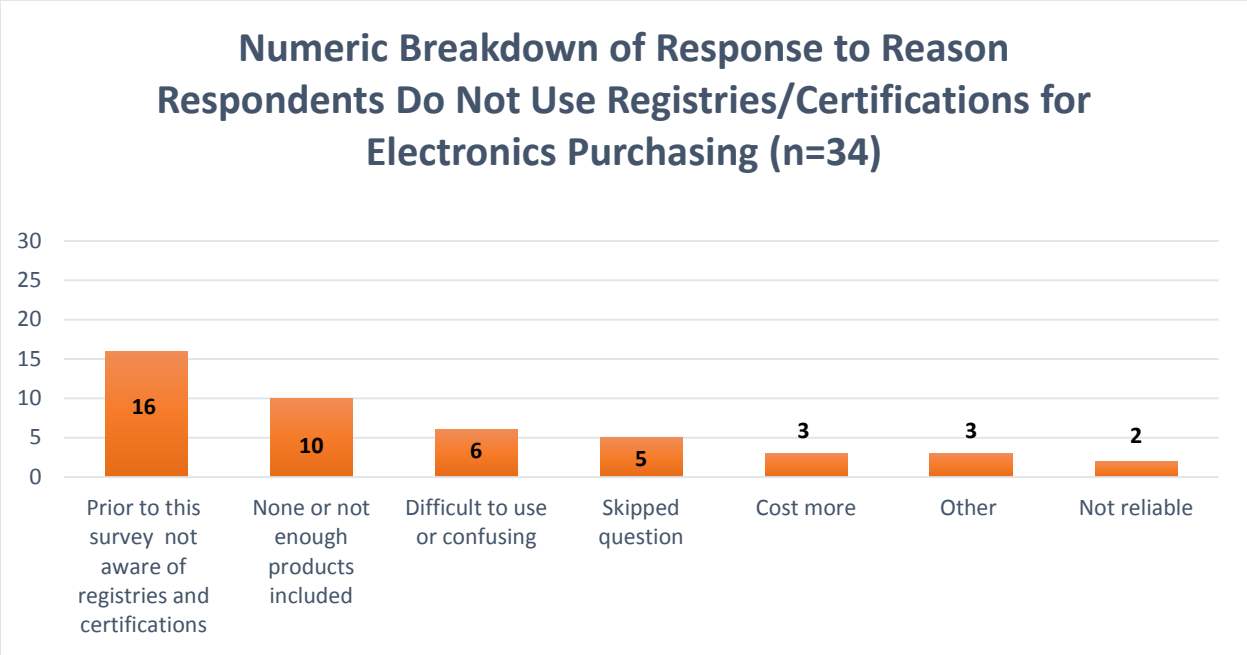

Figure 2: Numeric Breakdown of Response to Reason Respondents Do Not Use Registries/Certifications for Electronics Purchasing.

Presentation Analysis

In the videotaped version of the presentation, Delta told viewers that it was monitoring texted responses to the pre- and post-presentation questions and would greatly appreciate participation. In the live presentation, the Delta presenters physically stood in front of attendees and asked them to text their responses. The email to repeat the request was sent out immediately after the presentation. There was no more or less incentive to cooperate in either scenario. In both cases, Delta merely requested that attendees or viewers provide personal feedback.

The difference in the receipt of responses may be due to peer effect (and perhaps later carry-over of peer effect) of an individual wanting to be in good standing with someone making eye contact with him or her, versus less concern on the part of an individual when a request to share information is made anonymously. Delta has surmised that observation may relate to the Hawthorne Effect, whereby knowledge that one is being directly observed or studied can cause a change in behavior that is being measured (Hindle, 2008). Viewed this way, there may be a compelling case for why generating information and distributing it widely over the Internet may be less effective than actually providing live support to a smaller group to affect changes in behavior. However, further exploration of this hypothesis is beyond the scope of this project.

Conclusions

Based on survey results, follow-up interviews, and results from the presentation and video, several observations came to light about electronics BMPs. Particular attention was given to electronics and electronics recycler registrations and certifications and perceptions related to these.

First, awareness of electronics registrations and certifications among private companies is generally low. Despite the existence of e-waste landfill bans and regulations regarding take back in Illinois, few companies have institutional awareness of EPEAT, and even fewer regularly use it for electronics purchasing. This lack of use is attributable to many factors, but most notably due to a lack of awareness or negative perceptions about electronics registries and certifications. For example, some respondents reported that they believe that registries and certifications are not reliable or do not meet all claims, are difficult to use or confusing, cost more than non-registered/certified counterparts, or do not offer enough products.

Awareness is also particularly low about recycler certifications. These include R2 and E-Stewards, which certify that for a certified recycler, certain standards are met with regard to the environment, labor and ethical practices, and data security. Additionally, NAID certification, which indicates best practices for data destruction, is often used alongside the R2 or E-Stewards certifications. That so few companies rely on certifications to advance data security while sometimes using R2 and E-Steward certified recyclers to improve environmental and other outcomes is a missed opportunity because many respondents indicated some level of concern around data security issues.

Lastly, there is growing body of knowledge around electronic waste, its associated environmental and social impacts, and economic opportunities. However, there are limited opportunities to leverage this knowledge for the benefit of institutional purchasing behavior, particularly for the private sector. Identifying opportunities to impact decision-makers can build awareness and shift behavior toward intentional purchasing and recycling efforts that deliver environmental, social, and economic benefits.

Recommendations

Delta offers the following recommendations based on the work it has done on the project *Reducing E-Waste Through Purchasing Decisions:*

- **Identify strategic communication opportunities.**

  There is a significant need for more awareness around how certified recyclers can improve environmental and social outcomes while reducing liabilities for their clients. Outreach and education targeting private sector decision-makers can be an important driver of behavior. Targeted communication efforts should focus on the benefits of using certified recyclers with a particular emphasis on data security standards and reduced reputational liabilities. These efforts should also emphasize how strategic purchasing decisions using the EPEAT registration can support recycling efforts. Results from the beta-testing conducted during this project were inconclusive but suggest live (in-person) communication may be more effective than electronic forms of communication based solely on the higher level of engagement by live attendees (text/email responses received) versus video viewers (no text responses received.)

- **Develop cross-promotional strategies for best practices.**

  Lack of awareness around electronics best management practices, particularly use of purchasing and recycler certifications and registration, is a significant piece of the e-waste problem. Engaging decision-makers about best practices should emphasize a life-cycle approach to electronics management. This can be framed as retiring and replacing electronic products or as strategic purchasing with end-of-life consideration. However, target audiences have limited awareness of electronics issues, so branding and messaging should integrate both purchasing and recycling considerations. Through the course of this project, the Delta project team observed several missed opportunities in this regard. For example, EPEAT does not cross promote either or both recycling certifications, nor do either of the recycling certifications highlight EPEAT purchasing as a viable strategy for improving end-of-life outcomes. While there are likely viable reasons for vendors limiting the scopes of advertised services, identifying cross-promotional opportunities are critical to linking purchasing and recycling in the public view. This strategy is a necessary first step towards a life-cycle approach to electronics management that translates the best practices of today into the baseline of tomorrow.

- **Identify opportunities to link best practices to incentives.**

  While building awareness is a critical first step to driving behavior changes, offering incentives can also serve as a driver for another segment of the population. The Leadership in Energy and Environmental Design (LEED) certification system presents an opportunity to align incentives for best practices while leveraging a broader audience. For example, LEED could offer additional points for using certified electronics recyclers or purchasing EPEAT products.

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Appendix A

Reducing E-waste Through Purchasing Decisions Delta Preliminary Observations Regarding Identification of Barriers

Summary

I. Company Awareness/Familiarity Levels with Green Electronics Purchasing/Certifications:

The established green certifications specifically for electronics as a whole are laid out in Table A-1.

Table A-1: Green Certifications for Electronics.*

Organization	Certification	Domicile	Focus Area
Green Electronics Council	EPEAT (Electronic Product Environmental Assessment Tool)	U.S.	23 criteria related to environmentally sensitive materials, material selection, design for end-of-life, product longevity, energy conservation, end-of-life management, corporate performance, packaging
National Measurement Office	RoHs (Restriction on Hazardous Substances Directive)	U.K./E.U.	Reduction in use of hazardous substances in electrical and electronic equipment
USEPA/U.S. Dept. of Energy	Energy Star	U.S.	Energy reduction/energy efficiency
TCO Development	TCO Certification	Swedish with U.S. presence	Manufacturing, use and recycling of IT products are carried out with regard to environmental, social and economic responsibility

* Green Guard certifies electronics but primarily in regards to indoor air quality only, thus it is not included in the table. Additionally, the UL ISR 110 standard relates only to mobile phones.

Observation: Purchasing agents may or may not be aware of all of the above certifications and/or may not understand the differences between them or how to use them particularly if the company does not have a sustainability plan and/or a clearly defined green purchasing policy.

Preliminary Potential Survey Area: We identified company size; organizational structure; and identity of the person answering survey and their role in purchasing (i.e., senior management vs. purchasing officer).

Potential Survey Area: We established a baseline on purchasing function for local Illinois private companies regarding green purchasing of electronics by identifying the existence of the following:

- a sustainability plan
- a green purchasing plan
- green purchasing goals for electronics, what they were (i.e., recyclability, energy conservation), and how they were communicated

We also

- looked at the importance of green electronics goals in comparison to traditional purchasing metrics (performance, availability, durability, purchase price);
- identified who sets green purchasing plan or goals – parent company (U.S. or foreign-domiciled) vs. subsidiaries;
- evaluated self-classification of purchasing function as having or not having a green focus in regards to electronics;
- established company familiarity with four certifications and their understanding of the differences between them; and
- determined whether certifications have been used in the purchasing function.

II. Company Use of Certifications

Observation: When a company uses suppliers with product offerings that are certified for recyclability (via EPEAT, RoHs, TCO), perceptions may persist regarding the certifications.

Potential Survey Area: We identified current perceptions regarding the three green electronics certifications in regards to:

- reliability/validity/green-washing;
- ease of use (i.e., correlation of product on EPEAT versus via manufacturer information);
- robustness of certified product offerings (too robust, not robust enough);
- cost and performance of electronic products that are certified; and
- limitations of certifications.

Note: Energy Star relates only to purchasing not recycling so it is not included here.

Observation: When a company uses suppliers who are *not* certified (i.e., small local/regional suppliers), challenges to clearly identify and compare electronic products with desirable recyclability characteristics may persist.

Potential Survey Area: We identified challenges to purchasing recyclable electronics when certifications cannot be used/are not available. In these cases, purchasing representatives must consider

- the sufficiency of internal resources needed to conduct research;
- the reliability of information from manufacturers/suppliers;
- their need for clear specifications/model contract language (i.e., types of paints/plastics allowed, assembly characteristics, labeling of plastic types etc.); and
- the tools available for product/vendor comparison, training, and contract language.

III. Company Purchasing Strategies

Observation: Different purchasing strategies exist in regards to electronics. These strategies may promote e-waste recycling but also may experience challenges or complications (other than in regards to the use of the certifications) that hamper their use.

Strategies include straightforward purchasing with intent to recycle; purchasing via take-back programs (recycling contracted); and procurement via leasing (recycling assumed).

Potential Survey Area: We have identified/clarified perceptions and possible limitations, challenges, complications and/or barriers for each strategy beyond certification issues.

(1) Straightforward purchasing of recyclable electronics (no use of take-back programs or leasing)

- Traditional purchasing challenges apply, i.e., difficulty of switching suppliers/length of purchasing contracts/purchasing cycles.

- Needs *related* to purchasing function include
  - the ability to track final disposition, receive documentation, and use certified recyclers (E-Steward, R2) to meet corporate goals (this may relate to the effectiveness of the feedback loop and communication between the purchaser of electronic products and the purchaser of recycling service contracts); and
  - the ability to keep stored data confidential (e.g., wiping vs. shredding of hard drives).

(2) Take-back programs

- Concerns exist regarding contract features and the ability to compare contracts between suppliers. These include price; language and terms; asset recovery; business trade-ins; bundling of services (i.e., take-back bundled with data removal

or installation of new equipment); EPEAT certified programs vs. non-EPEAT certified programs; and partial return of take back fee (i.e., for refurbishments).
- Concerns exist over transparency of recyclers used in take-back programs, availability of supplier's recycling standards, and the results of audits (internal and external).
- Concerns exist regarding documentation and proper tracking (e.g., volumes by category and final disposition (i.e., recycled, refurbished, reused)).
- Concerns exist regarding data security/mitigation of risk.

(3) Leasing

- Companies experience difficulty in having recycling goals met (i.e., refurbished/recycled) and have identified a need to write goals into the lease.
- Companies find it difficult to track/receive documentation on final disposition of products.
- Companies are concerned about data security.

Supporting Research

Current Business Management Strategies for E-Waste

Several different strategies are identified in corporations for the management of electronic office equipment disposal. Companies more than likely employ either (1) a strategy with the end-of-life in mind; (2) strategies that handle electronics at the end-of-life but do not consider the whole life cycle of the product; or (3) they lack strategy for handling e-waste. Delta found very few documented corporate purchasing strategies that specifically indicate how companies purchase and dispose of their electronics. The majority of those that do document this information and make it public are companies that have a sustainability plan in place. These plans are usually found on the company website and are available for download.

A few articles are available that indicate how companies dispose of their waste. The best article was not from corporate America but rather from a university study (Babbit et al., 2011). Delta found academia and government post their practices on websites or in environmental reports whereas very few corporations make this information public.

Delta did not find any information specifically naming companies that dispose of e-waste unethically. Rather there is a lack of information on corporate websites and in academic articles on how most companies handle electronics at the end-of-life; therefore, a study to investigate this information would be helpful. There are regulations that corporations are concerned with when disposing of old computers or devices where information is stored, such as HIPPA, the Graham-Leach-Bliley Act, and the Sarbanes-Oxley Act of 2002 (all three to some extent protect individual privacy and confidential data). Companies also may have some practice to dispose of these products through a vendor that will erase or shred items containing data (as indicated

availability of these services). In addition to privacy and sensitive information regulations, 25 states have enacted e-waste regulations of various degrees (Electronics TakeBack Coalition, 2013).

A Closer Look at Strategies

Companies who purchase with the end-of-life in mind usually have a sustainability plan in place. The strategy has several different methods. Companies use the Electronic Product Environmental Assessment Tool (EPEAT), the Restriction of the Use of Certain Hazardous Substances (RoHS), Energy Star guidelines, or have general sustainability plans in place that include general purchasing policies. Listed below are examples and issues with some of these methods.

EPEAT

Kaiser Permanente, a health maintenance organization, purchases approximately 5,000 computers per month that meet the EPEAT criteria. Kaiser was attracted to EPEAT's requirements to be Energy Star and will look to purchase EPEAT copiers and printers (stated by Dean Edwards, VP and chief procurement office, Kaiser). They have reduced energy costs associated with their computers by 20% (Thibodeau, 2008).

Babbit, et al. (2011) looked at university electronic equipment purchasing. The researchers found through doing a case study of Arizona State University (ASU) and a small survey of larger universities that the universities use multiple means for disposing of end-of-life electronic equipment. Practices in place at surveyed institutions include donation to local organizations (19%), sales through public auction (29%), direct sales to individuals (38%), contracted e-waste recycling (90%), and OEM technology renewal program (10%). Most institutions employed several mechanisms in their end-of-life management of computers. ASU purchased EPEAT products expecting that recycling would be easier, disassembly would be easier, and the products would be more likely upgradable. Using EPEAT was recognized as an additional important strategy to address the e-waste problems of the organization.

An example from government is the General Services Administration (GSA) which states that "[it] will apply energy efficiency and environmental performance standards to the IT purchasing contracts used by federal agencies and weed out products that don't stack up. GSA will specifically only include products that meet Energy Star or EPEAT standards" (Bardelline, 2011).

Another large company, Nokia, requires energy efficiency to be taken into account when purchasing IT equipment. All IT hardware must be either Energy Star certified or have the EPEAT gold or silver rating. It seems they are driven to reduce their energy consumption especially in their data centers. They are also concerned about the use of hazardous materials in these data centers and seek to reduce the amounts (Nokia Sustainability Report, 2011).

RoHS

Restriction on Hazardous Substances (RoHS) is a UK regulation that came into force July 2006. These regulations implement the RoHS Directive which bans the placing on the EU market of

new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants (http://www.bis.gov.uk/nmo/enforcement/rohs-home.) The RoHS regulation applies to producers in the UK, importers of waste electrical and electronic equipment (WEEE) from outside Europe and rebadged electronic products.

Wal-Mart needs to follow RoHS in order to sell electronics in the European markets and has adopted this standard in the purchases of electronics as of the end of 2007. They have also extended the purchase of RoHS-compliant products to the U.S. market. Wal-Mart is trying to manage the whole life cycle of products purchased. They worked with suppliers to make sure all personal computers and large electronics were certified RoHS-compliant by the end of 2007 (Wal-Mart Sustainability Report 2010). In doing this, Wal-Mart committed to Toshiba to buy 12 weeks' worth of computers as opposed to the typical four-week contract (Supply Chain Management Review, 2007).

Nokia has decided to manufacture all its products worldwide to the RoHS standard, despite its designation as the European Union standard (Bask and Kuula, 2011). Again, Nokia has a sustainability report on their website, which provided this information. Another note, Nokia has over 6,000 take back sites around the world for their electronics to be recycled. They are a founding member of "solving the E-waste Problem (StEP)" initiative.

Sustainable Purchasing Policies

This strategy is by far the easiest one to identify. Kohl's has a sustainable purchasing policy that takes sustainability factors into consideration when purchasing products and awarding bids to vendors. Cost and environmental consideration are taken into account. Kohl's purchases Energy Star certified electronic items for use in stores and corporate facilities (kohls.com)

A government entity, King County, WA, has a purchasing policy that is structured to give all departments ways to best meet their purchasing needs but they must consider environmentally friendly products and those with recycled content. King County has a specific policy for end-of-life of electronics. The county has a stated policy for environmentally responsible procurement including purchasing recycled products and following federal guidelines. The policy also states in section 18.20.050 that the county will follow the Basel Action Network e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment or comparable standard (http://www.kingcounty.gov/operations/procurement/Services/Environmental_Purchasing/Policies.aspx).

Marriott has a sustainability plan but does not specifically indicate EPEAT. Marriott does have Energy Star initiatives. They are members of Green Grid and are following sustainability reporting guidelines according to the Global Reporting Initiative (GRI). They also state in their 2010 update to their sustainability report that they diverted 93,097 pounds of e-waste from landfills since 2006. However, they only say they recycle this waste through several "asset disposal companies worldwide." They do not state whether these recyclers are certified or not. They were ranked in the top 12 Green IT companies by Computerworld form 2008-2010.

Nike has an extensive sustainability policy that has sustainable supply chain initiatives in place. Nike seeks to reduce energy use among other things in their facilities and factories. They are currently putting more emphasis into reducing the footprint of their IT facilities (at least 18 worldwide). This new focus includes ensuring the reduction of energy use by equipment and the recovery of IT assets or disposal of these in a manner that is environmentally friendly. The current methods stated are to refurbish and resell usable computer equipment, de-manufacture and recycle/dispose of the equipment through third-party companies. They are, in the next two years, to establish standards for computer purchases (http://www.nikebiz.com/crreport/content/environment/4-3-6-facilities-and-travel.php?cat=climate-and-energy).

Other Tools That Purchasers May Use

Greenpeace Electronic Company Rating System

http://www.greenpeace.org/international/en/campaigns/climate-change/cool-it/Campaign-analysis/Guide-to-Greener-Electronics/

A ranking of "leading mobile phone, TV and PC manufacturers on policies and practices to reduce their impact on the climate, produce greener products and make their operations more sustainable."

Green Grid

www.thegreengrid.org

Green Grid, whose mission is "to become the global authority on resource efficient data centers and business computing ecosystems," provides a place where organizations come together to address reduction in energy use in data centers. They also provide tools and information papers to help data center managers reduce energy use among other things.

Climate Savers Computing Initiative

http://www.causewaynow.com/

Climate Savers' mission is to "reduce greenhouse gas emissions by 54 million tons by 2010" through more efficient PCs, servers, and use of power management. The site started by the World Wildlife Fund (WWF), commits "participant computer and component manufacturers to produce power efficient computers and components and has corporate participants commit to purchasing power efficient computing products."

StEP

http://www.step-initiative.org

StEP is a UN initiative consisting of a steering committee, a Secretariat, and five Task Forces that are made up of members and observers to help solve the e-waste problems. StEP's mission is accomplished through research and projects (EPEAT was mentioned as a past project). It is a collaboration organization. The Nokia Director of Environmental Affairs states the reason for

being involved was for the "opportunity to share information and develop best practices with others that have the same vision."

UN Global Compact

http://www.unglobalcompact.org/AboutTheGC/TheTenPrinciples/index.html

Dow Chemical is a signatory member. Ten principles are required for participants to work towards undertaking initiatives to promote greater environmental responsibility and encourage the development and diffusion of environmentally friendly technologies.

Basel Action Network

http://e-stewards.org/

The Basel Action Network (BAN) works to stop the global injustice and economic inefficiency of toxic trade and its impacts on the poorest societies on the planet.

BAN has an e-Stewards Program that certifies electronics recyclers and provides information about these recyclers to the public. E-Steward Enterprises are companies that are committed to using e-Steward Recyclers for the disposal of electronics. "The e-Stewards certification program for electronics recyclers is designed to provide market incentives that drive the certification of the entire recycling chain that is managing the toxic materials."

Articles Addressing Trends, Drivers, Barriers/Challenges to Purchasing and E-waste Recycling

According to Ongondo et al. (2011), problems with e-waste handling in the U.S. are due to a lack of federal regulation (although noted that states are getting on board in regulating) and a lack of regulation comprehensiveness.

Hansa GCR, a marketing research company, which is part of RK Swamy/Hansa Group of India, did a survey of 600 public and private companies (published in 2008) to benchmark green technology purchases (Hansa GCR, 2008). It found that cost-related factors were the most important factor in determining computer and electronic equipment purchases. The drivers in purchasing green IT were cost savings from "energy usage and reduced use of other resources." Another driver found in the survey was that purchasers were committed to environmental and social stewardship. The paper then took a closer look at this last driver because it is an area where marketers could find opportunity in marketing their "green" electronics.

The study addressed several top barriers to purchasing that limit "growth of greener IT," which include the following issues:

- It is too difficult to determine which claims of "green" are real (fear of green washing).
- The cost difference is too great (purchasers worried that the products won't perform or have the needed functionality).
- There is no means of evaluating claims (purchasers are not confident they can evaluate environmental claims and benefits).
- Current offerings are insufficient.

- Green purchasing is not a part of official company evaluation process.
- There are too many environmental considerations.
- The environmental benefits seem too small.

The survey indicated that 36% stated that a "neutral third party certification like EPA's Energy Star or EPEAT would be helpful in their evaluation of greener IT products." Those with a sustainability plan in place put more importance on this than those who purchased green products but had no plan and those considered "everyone else" by the study.

The study is a very good one for this e-waste project. However, the paper available is only a summary. Since the company who did the study is a marketing research firm, there is a substantial cost to obtaining the full report, so that was not done for this project.

In a second important article, "Sustainability Purchasing Trends and Drivers," by the Sustainability Purchasing Network (2007), electronics and office equipment were some of the top products identified in sustainable purchasing programs across industry, government, universities, and Non-Governmental Organizations (NGOs). This paper reviewed "global and Canadian sustainability purchasing trends and drivers and the regulatory context influencing the direction and pace of sustainability purchasing in practice."

These trends were identified in purchasing and are taken directly from the paper (Sustainability Purchasing Network, 2007):

- Organizations with sustainability purchasing programs in place are growing. Once the organization has a sustainability plan in place, they then begin to look at the supply chain.
- Environmental and social considerations are ranked reasonably high behind cost, durability and performance. Social consideration was behind environmental consideration.
- Most organizations prioritize sustainable purchasing criteria putting paper and paper products highest but followed by other purchases including electronics.
- Greening the supply chain is perceived to be the biggest supply chain issue in 2007.
- Green procurement in the U.S. rose from 2004-2007. The percentage of surveyed government departments with a green procurement policy was 64%, private companies 57% and non-profits were 55% (Terra Choice, 2007).
- An AT Kearney study showed 38% of Fortune 100 companies had a green purchasing policy.
- Collaboration and partnerships are becoming more prevalent in greening the supply chain and ensuring the ethical and social goals are met. These collaborations take many forms including NGO-Corp, Purchaser-Supplier, and Industry partnerships.
- Certifications will become more prevalent and important including the mention of EPEAT (p 29 of the article).
- Purchasers surveyed stated they are looking for trusted information and eco-labels are considered useful. Energy Star was the most trusted label in North America followed by EcoLogo and GreenSeal.

Identified drivers of sustainability purchasing from the article (Sustainability Purchasing Network, 2007) are:

- risk management
- compliance
- brand recognition
- cost
- innovation
- increasing focus on CSR from public
- globalization and offshoring
- large purchaser ripple effect (e.g., Wal-Mart requiring RoHS products)
- regulatory developments, for example, to reduce lifecycle impacts of goods and services such as extended producer responsibility programs in managing e-waste or RoHS, etc.
- multilateral developments such as international agreements

In the "EcoMarkets Summary Report" done by TerraChoice Environmental Marketing Inc. (2009), 36% of surveyed companies consider "green" electronics to cost the same as others and 48% consider "green" electronics will perform the same. Twenty-five percent think electronics will be more expensive and 6% think they will perform worse than conventional electronics. This study concludes that energy efficiency "can be considered a key differentiator for 'green' electronics." According to this study, purchasers rated performance, price, energy efficiency and take back or recycling program availability from manufacturer as the most important factors in purchasing.

The article (TerraChoice Environmental Marketing, 2009) also had several other insights that are considered to be of importance:

- Approximately 78.4% of organizations with a sustainability policy (formal or informal) also have a green purchasing policy.
- 27.1% of organizations without a sustainability policy have a green purchasing policy and 37.8% plan to implement one.
- Although most surveyed participants agreed that the economy is either in a short-term or long-term recession, most agreed their green purchases would continue to increase.
- The majority of purchasers surveyed (76.3%) believe the Obama administration will have a positive impact on green purchasing.
  The most trusted sources for information on the environmental impact of products are (in order): university/academia, purchasing organization, ecolabelling organizations, government, environmental groups, industry/business, and manufacturers.

Identified Problems with Purchasing Green in General and IT

- The Sustainability Purchasing Network (2007) stated that just because a company has a sustainable policy in purchasing does not mean that it translates into green purchases.
- There is some concern regarding purchasing products that make false or misleading green claims – one of the biggest problems was that energy efficient electronics had the hidden trade-off of containing hazardous materials (Young, 2007).

- There is a concern about higher costs associated with purchasing green products, although this was shown to be not as significant with electronics according to the EcoMarket study (TerraChoice Environmental Marketing, 2009).

Finding the problems associated with green electronics purchasing and e-waste management was somewhat difficult. Aside from the huge problems of toxic materials and the sheer volume of e-waste, there is not much written on how companies are changing what they are doing, unless they have developed a sustainability plan and it is published.

Some questions that Delta posed include:

(1) How frequently and how well are strategies applied?

(2) Is there a general lack of awareness or biases?

(3) How do human resource capacity, structure and control over purchasing decisions affect e-waste recycling?

These questions could not be answered with the Internet and academic journal research. However, some assumptions can be made after doing the research; for example, governmental regulations will cause corporations to develop an e-waste plan or store their end-of-life electronics.

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Other Resources for Business Management of E-Waste

Buy Smart Network (formally the Sustainability Purchasing Network): a useful website for purchasers in Canada, with some information on North America as a whole.
http://www.buysmartbc.com/

Electronics Take Back Coalition
http://www.electronicstakeback.com/home/

Commission for Environmental Cooperation: a partnership between Canada, U.S., and Mexico set up by the North American Agreement on Environmental Cooperation (NAAEC). The commission/website provides resources and tools for greening the economy in North America. The website has projects including a electronic waste experts group.
http://www.cec.org/

Professional Records and Information Management (PRIM): website includes information on data protection.
http://www.primpr.com/regulatory_compliance/

Take-Back Programs: Use and Issues

Types and Cost Issues

According to the organization Clean Production Action[1], there are two types of take back strategies.

(1) In Individual Producer Responsibility (IPR), the manufacturer of the electronic product is responsible for taking back their own products, either through business to business (such as Dell's program) or through a process where products are identified and separated out by manufacturer once collected from consumers at locations sponsored by municipalities or retailers.
(2) In Collective Responsibility, the industry as a whole is responsible for the financial cost of collecting and recycling of electronics.

Clean Production Action states that the downside of the collective responsibility take-back program is there is no incentive to design products for reuse and recyclability because the cost of collection and recycling is shared. In IPR, on the other hand, each manufacturer is financially responsible for their own products, so they will seek to reduce these costs through better design.

These observations were echoed in a paper by Atasu and Wassenhove (2011). The authors found for collective responsibility systems, the incentive to design for recyclability is low, whereas IPR systems tend to promote design for recyclability because the producer is directly responsible for the take back or recycling of their own products. Producers will seek to reduce this cost by designing their products for durability and easier recycling. The authors point out that take back laws which put responsibility on the producer based on product sales or market share may discourage producers to remanufacture products. The product, if remanufactured, would then be counted twice towards the amount the producer needs to take back.

Programs such as fee-upon-sale include extended producer responsibility (EPR), as the costs associated with this are ultimately built into the retail price. Plambeck and Wang (2009) concluded this system eventually reduces the quantity of electronics produced and disposed of by reducing the amount of new products introduced. They also concluded that a fee-upon-sale of electronics to the end consumer for recycling will increase the manufacturer's profits as they will introduce fewer products less frequently that are of better quality and higher in price.

It seems that producers in the U.S. lean towards IPR. Dell has an IPR program in place and urges other producers to initiate this type of take-back program. Their position is to support legislation that is in line with their current policies (http://content.dell.com/us/en/gen/d/corp-

[1] Clean Production Action, an organization dedicated to designing and delivering "strategic solutions for green chemical, sustainable materials and environmentally preferable products." Information gathered from the website and the white paper "Responsibility for Product Take Back Can Promote Eco Design." www.cleanproduction.org

comm/individual-producer-policy). Other manufacturers that employ IPR are Xerox, Lenovo, and HP. Lenovo took back 38 million pounds in 2007 and states they reused or recycled 93% of this waste (DiRamio, 2008).

Benefits – Case Studies

The state of New York implemented an EPR law starting in April 2011. At the one-year mark, the Product Stewardship Initiative (www.productstewardship.us) studied the effects this law had on electronic recycling. They reported several interesting facts:

- Collection options for residents increased 77% after the law went into effect.
- In 2010, Westchester County spent $924,760 for collecting e-waste. In 2011, the cost was $85,283. The majority of this was for the first three months before the law went into effect.
- The law has created a competitive marketplace and is expanding convenient, free opportunities for recycling.
- Implementation in New York City was not very successful due to high transportation and infrastructure costs.
- Collected material needs to be monitored better to ensure it is handled in an environmentally sound manner.
- Data collection needs to be more comprehensive.

Another report outlining the state of Washington's e-waste law (implemented in 2009), notes a savings to Snohomish County of $380,000 in vendor costs, now paid for by electronic manufacturers. In addition, an income of $170,000 was realized through a rate charge to collect e-waste on a per pound basis (http://www.electronicstakeback.com/home/).

EPEAT Computer Comparisons

This was somewhat hard to compare since there are so many computers and options on the market. However, Delta did do a comparison of several laptops. These can be custom designed so several different 14" laptops with approximately the same RAM, power, and speed were compared. The cost differences between EPEAT and non-EPEAT models were not large, if there were any differences at all. There are non-EPEAT products offered by large manufacturers as well as EPEAT products. Whether a laptop was EPEAT-certified was not always obvious on the manufacturer website or retail website. Both Tiger.com and Amazon.com were searched to compare these types of laptops. Some computers are not found at those retail sites; Lenovo, for example. Delta also searched on manufacturer websites for the EPEAT symbol and found it was usually on the spec sheets. Delta considered it hard to find the EPEAT symbol via the manufacturer websites. The sheer volume of computers offered by one manufacturer makes it tedious to research which computers are EPEAT-certified and which are not from a consumer point of view. This may be different for a purchaser dealing with a manufacturer representative or a distributor who could provide that information.

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Appendix B

Survey

ISTC E-waste Purchasing Study

Introduction *(To be included in body of E-mail delivering the survey)*

Purchasing decisions for electronic office equipment, such as computers, printers, and fax machines, are often made without considering the disposal of the equipment at the end of its life. The Delta Institute (Delta) and the Green Electronics Council (GEC), two Illinois non -profit organizations, are working together to identify opportunities and barriers for purchasing agents to include decisions about final disposal (end-of-life) in the electronics purchasing process. The ultimate goal of this research is to increase the recycling and re-use rates of electronic waste (e-waste.)

By answering this survey you can win a new iPAD and your company may become eligible to be selected for FREE technical assistance.

Participant Information *(To be included in the survey itself)*

Who Should Answer This Survey?
Someone who has knowledge about purchasing practices or recycling practices used for electronics in your company. Please confirm the accuracy of responses with others in your company as needed.

How Long will the Survey Take?
Approximately 15 minutes.

How This Survey Benefits Your Company
By answering this survey:

- You become eligible to be selected among respondent companies to receive an Apple new iPAD.
- You have an opportunity to provide feedback that can inform strategies to break down barriers to electronics recycling.
- *You will NOT be solicited to purchase any services or products.*

By answering this survey and self-identifying:

- **Your company also becomes eligible to be selected by Delta and GEC for FREE technical assistance with electronic purchasing and end-of-life strategies.**
- Recognition for your participation in this survey is available.
- You may be contacted by GEC and Delta to provide more in depth responses to survey questions.
- *You will NOT be solicited to purchase any services or products.*

How This Information will be Shared:

Delta and GEC will share aggregated results of this survey through meetings, conferences, websites and networks. The goal of this information sharing is to promote the recycling and reuse of electronics.

Definitions: *(Accessed via pop up dialog boxes within the survey questions)*

Asset Recovery Firm: A firm that provides secure disposal solutions for used electronics, including re-marketing or re-sale, data sanitization and recycling. An asset recovery firm also manages the security and legal risks and environmental impact associated with disposal of electronics.

Asset Management Firm: Similar to an asset recovery firm, but also consults with companies and provides services regarding life cycle aspects of the company's assets (electronics) beyond just disposal.

Eco-Logo CCD-035: A certification for printers, copiers, faxes and mailing machines requiring that such machines: a) not contain or use certain restricted hazardous substances; b) be designed for extended life, re-use and recycling; and c) conserve use of energy and paper.

Electronics *(for the purpose of this survey):* *C*omputers, laptops, computer screens (CRT and LED) and Imaging Equipment as defined by ENERGY STAR, including copiers, digital duplicators, fax machines, multifunction devices, printers, mailing machines, and scanners.

E-waste: Electronics at the end of their useful lives and/or being disposed of. Also known as E-scrap.

EPEAT Registration: Demonstrates that an electronic *product* meets stringent criteria that ensures that the product: (a) has, in its production, reduced use of materials that can be harmful to the environment and human health; (b) is made from materials that can be recycled; and (c) is designed to be easily recycled; is energy efficient and/or has an extended useful life. For more information go to: www.EPEAT.net

E-steward Certification: Certifies that a *recycler* has demonstrated through audits and other means that it continually meets specific high environmental standards and safely manages used electronics. For more information go to: www.e-stewards.org

Green Electronics: Electronics manufactured with recycled materials and/or materials that can be recycled, with sustainable or environmentally friendly characteristics such as: increased useful life; upgradeability; ease of disassembly (to promote recycling); reduced use of hazardous materials; and energy efficiency.

Manufacturer Take-Back Program: Program whereby a manufacturer will contractually and for a fee accept used electronic products back from its customers and will recycle, reuse, or dispose of the product properly.

NAID Certification: Establishes standards to ensure that information on computer hard drives is permanently destroyed (wiped clean).

R2 Certification: Certifies that a *recycler* has demonstrated through audits and other means that it continually meets specific high environmental standards and safely manages used electronics.

Electronics Reduction: Reducing or minimizing the quantity of electronics purchased.

Electronics Reuse: Purchasing used and refurbished electronics or allowing used electronics designated for disposal to be re-used.

Electronics Refresh Cycle: A pre-determined time period (i.e. every 2 or 3 years) when electronics are automatically replaced.

Electronics Re-Market/Resale Program: Recycler refurbishes and resells a company's used electronics sharing a portion of the proceeds with the company.

RoHs: A directive issued by the European Union, restricting the use of six chemical substances in electrical and electronic products. As of July 2006, it has become illegal to sell products containing these six substances in the EU.

Sustainability Plan: Defines a company's goals and objectives related to conservation of resources and protection of the environment and human health. Includes practices and strategies for achieving the goals i.e. promoting recycling, promoting energy efficiency, not using hazardous materials in products being manufactured or purchased, reducing packaging and reusing purchased materials.

TCO Certification: A sustainability certification for IT products. All TCO Certified products meet strict criteria for social responsibility at the facilities where products are manufactured, user safety, ergonomic design, and minimal environmental impact for both the products and their production during their whole life cycle.

ISTC E-waste Purchasing Questionnaire

1. Company Name (Optional) - In the box below, please enter your organization's name, your name, and either your telephone number or E-mail.

Providing identification is not required but will qualify your company to be selected for FREE technical assistance from the Green Electronics Council. Self-identification is <u>not</u> required to be entered into the iPAD drawing.

Company Name	
Your Name	
Email	
Telephone Number (*ex: 123-456-7890)*	

2. Which of the following best describes your company's organizational and ownership structure? (Please select all that apply.)

Solely Owned Company _____
Partnership _____
Corporate Parent _____
Subsidiary of a Corporation _____
Domestically Owned Company _____
Foreign Owned Company _____

3. Which of the following in your company has the authority for making recommendations about electronics purchasing?

Corporate Management receives global guidelines outside our local office _____
Chief Information Officer (CIO) _____
Senior Management not CIO _____
Information Technology _____
Procurement _____
Individual Departments _____
Company does not purchase or use electronics _____ ***→ End of Survey***

4. Which one of the following best describes the <u>function</u> you perform in regards to electronics purchasing.

Procurement	_____
Sustainable Operations	_____
Information Technology	_____
Waste Management or Recycling	_____
Environmental Health and Safety	_____
Other *(please specify)*	

5. Which one of the following best describes your <u>level</u> within your department or unit?

Senior Management	_____
Other Management	_____
Non-management	_____
Administrative	_____
Other *(please specify)*	

6. What is your company's industry?

Agriculture, Forestry and Fishing	_____
Mining	_____
Construction	_____
Manufacturing	_____
Transportation, Communications, Electric, Gas and Sanitary Services	_____
Wholesale Trade	_____
Retail Trade	_____
Finance Insurance and Real Estate	_____
Services (i.e. health, business, education, repair, engineering, hospitality, legal, social, arts)	_____
Public Administration	_____

7. To the best of your knowledge, how many people does your company employ?

1 to 19	_____
20 to 49	_____
50 to 99	_____
100 to 499	_____
500 to 999	_____
1,000 or more	_____

8. Which of the following dollar amounts best describes the total electronics procurement budget for your company?

Less than $25 thousand	_____
About $25 thousand to $50 thousand	_____
About $50 thousand to $250 thousand	_____
About $250 thousand to $500 thousand	_____
About $500 thousand to $2 million	_____
About $2 million to $10 million	_____
More than $10 million	_____

9. In which of the following ways does your company purchase electronics?

In bulk via bulk purchase contract	_____
Governing agreement in place with purchases made as needed	_____
No agreement in place with individuals making own choices	_____

10. Does your company have an overall sustainability plan in place, or does it not?

Has plan in place	_____
Does not have plan in place	_____

11. Does your company or department have any policies, directives, or practices for green electronics or does it not?

	Does Have	**Does Not Have**	**Don't Know**
Purchasing:	_____	_____	_____
Recycling:	_____	_____	_____
Reduce	_____	_____	_____
Re-Use	_____	_____	_____
Re-Fresh Cycle	_____	_____	_____

If all answers to 11 are "Don't Know" Go to 13a

12. How formalized are the practices your company has governing green electronics? (Please select all that apply.)

Company-wide policy or practices	_____
Department or facility only policies or practices	_____
Some consideration but no formal policies	_____

13.

a. <u>How important</u> are each of the following factors in your company's electronics purchasing decisions?

	Extremely Important	Very Important	Moderately Important	Slightly Important	Not Important
Green requirements (i.e. energy efficient, recycle friendly etc)	_____	____	_____	_____	____
Supplier relationships	_____	____	_____	_____	____
Equipment price	_____	____	_____	_____	____
Equipment warranties	_____	____	_____	_____	____
Equipment features/technology	_____	____	_____	_____	____

b. Does your company use the Energy Star program in purchasing decisions?

Use Energy Star _____
Do not use Energy Star _____

c. Which of the following "green electronics" ratings <u>that promotes recycling</u> does your company use in its electronics purchasing decisions?

EPEAT Registration	_____	
TCO (third party certification)	_____	
EcoLogo CCD-035 (third party certification)	_____	
RoHs	_____	
OTHER certification (Please Specify)	_____	→ **Go to 15e**
Company's own green criteria	_____	→ **Go to 15a**
Do not use any kind of green rating	_____	→ **Go to 15e**

14.

a. Approximately, for what percentage of electronics purchases in the last 24 months has your company used the *green electronics ratings you identified in Question 13c.*in purchasing decisions?

	EPEAT	TCO	EcoLogo CCD-035	RoHs
All purchases	_____	_____	_____	_____
About 75 percent of purchases	_____	_____	_____	_____
About half of purchases	_____	_____	_____	_____
About 25 percent of purchases	_____	_____	_____	_____
No purchases	_____	_____	_____	_____

b. What is your opinion on the *green electronics rating that you use* meeting its claims? In general, would you say that registered or certified products:

	EPEAT	TCO	EcoLogo CCD-035	RoHs
Meet all the criteria that the registration claims	_____	_____	_____	_____
Meet some of the criteria	_____	_____	_____	_____
Do not meet any of the criteria	_____	_____	_____	_____

c. In general, how difficult is it to use the website or other guidance for the green electronics rating that you use?

	EPEAT	TCO	EcoLogo CCD-035	RoHs
Not at all difficult	_____	_____	_____	_____
Slightly difficult	_____	_____	_____	_____
Somewhat difficult	_____	_____	_____	_____
Very difficult	_____	_____	_____	_____
Extremely difficult	_____	_____	_____	_____

d. Considering the number of product offerings that hold the green electronics rating that you use, do you think there are:

	EPEAT	TCO	EcoLogo CCD-035	RoHs
Too many products	_____	_____	_____	_____
Not enough products	_____	_____	_____	_____
The right number of products	_____	_____	_____	_____

e. Do you think that electronics with the green electronics rating that you use cost:

	EPEAT	TCO	EcoLogo CCD-035	RoHs
Less than electronics without this registration	_____	_____	_____	_____
More than electronics without this registration	_____	_____	_____	_____
The same as electronics without this registration	_____	_____	_____	_____

→ Go to 16a

15.

a. Approximately, for what percent of electronics that your company purchases does your company use green purchasing criteria?

All purchases _____
About 75 percent of purchases _____
About half of purchases _____
About 25 percent of purchases _____
No purchases _____

b. Which green electronics product characteristics do you promote with your company's internal criteria? (Please select all that apply)

Recycle Friendly _____
Extended Useful Life or Upgradeability _____
Ease of Disassembly for recycling _____
Reduced Use of Hazardous Materials _____
Energy Efficiency _____

c. Does your company have a need for each of the following, or does it not:

	Has a need	Does not have a need
Clear specifications to identify green product attributes	_____	_____
Model language to use in procurement contracts	_____	_____
Tools or training to assist internal staff for comparing products	_____	_____
Training on using EPEAT	_____	_____
Other (Please Identify)		

d. In the last 12 months when you have requested product information from your electronics suppliers for vetting purposes:

i. How cooperative would you say your suppliers have been in providing information:

Extremely cooperative _____
Very cooperative _____
Somewhat cooperative _____
Slightly cooperative _____
Not cooperative at all _____

ii. How often was the information complete? (Complete information is defined as information that adequately answers your vetting questions.)

Information was always complete _____
Information was frequently complete _____
Information was sometimes complete _____
Information was rarely complete _____
Information was never complete _____

iii. How much product information did you feel could be trusted?

All of it _____
About 75 percent _____
About half of it _____
About 25 percent _____
None of it _____

iv. How difficult is it to understand the information?

Extremely difficult _____
Very difficult _____
Somewhat difficult _____
Slightly difficult _____
Not at all difficult _____

e. Why does your company not use green registration or certification systems EPEAT, TCO, Eco-Logo CCD-035, or RoHs in purchasing decisions? (Please select all that apply.)

Prior to this survey company not aware of existence of certifications and registrations _____
Certifications and registrations are not reliable _____
Certifications and registrations are difficult to use or confusing _____
Certified and registered products cost more _____
None or not enough of the products we need to purchase are certified and registered _____
The company does not allow use of certifications and registrations _____
Other Please Specify

16.

a. Does your company have any type of contract or other arrangement in place for recycling your electronics, or does it not?

Does _____
Does not _____ **→Go to 17a**

b. What is the duration of the contract?

Less than or equal to 1 year _____
More than one year but less than or equal to 3 years _____
More than 3 years _____
No Contract _____

c. Which one of the following best describes the function of the person in the company who negotiates the contract to recycle electronics?

Procurement _____
Sustainable Operations _____
Information Technology _____
Waste Management or Recycling _____
Environmental Health and Safety _____
Other *(please specify)* [ ]

d. And, what is this person's level?

Senior Management _____
Other Management _____
Non Management _____
Administrative _____
Other *(please specify)* [ ]

e. How does your company currently manage the disposal of its electronics?

EPEAT assessed Manufacturer Take-Back Program associated with procurement	_____	
Manufacturer Take-Back Program associated with procurement	_____	
3rd party Asset Recovery firm	_____	→Go to 16g
3rd party Asset Management firm	_____	→Go to 16g
Leasing contract	_____	→ Go to 16g
Property Management Firm that manages the building the company leases space from	_____	→ Go to 16g
Company itself contracts with recycler	_____	→ Go to 16g

f. Which of the following statements best describes your opinion of the Contract Price of your Manufacturer Take-Back Program?

Contract price is very high for the service provided	_____
The contract price somewhat high for the service provided	_____
Contract is reasonably priced for the service provided	_____

g. Do you know the name of the recycling company that is recycling your electronics, or do you not?

Know	_____	
Do not know	_____	→ Go to 16i

h. Which certification does the primary (upfront) recycler hold? (Please select all that apply.)

ISO 14001	_____
ISO 9000	_____
R2	_____
R2-RIOS	_____
E-Steward	_____
NAID	_____
Recycler is not certified	_____
Do not know Recycler's certification	_____

i. For the following categories, indicate if you think that you receive acceptable documentation from your recycler or do not receive acceptable documentation from your recycler.

	Receive Acceptable Information	Do Not Receive Acceptable Information
Data security being guaranteed such as indicated by NAID certification	_____	_____
Statement that no materials will be shipped to non-OECD (developing) countries	_____	_____
Auditing or reporting of Chain of Custody of downstream processing of your electronics	_____	_____
Total volume or weight of recycled electronics in total or by category	_____	_____

j. Do you participate in a re-market or re-sale program?

Yes _____
No _____ **→Go to16l**

k. Are you satisfied with the financial return from your re-market or re-sale program?

I am satisfied _____
I am not satisfied _____

l. Which of the following statements best describes your opinion of the level of security your recycler is providing in regards to data on computer hard drives sent for recycling?

I feel confident that data is being thoroughly wiped, deleted or otherwise destroyed _____
I sometimes question whether data is being thoroughly destroyed _____
I am concerned that data is not being thoroughly destroyed _____

→Go to 18a

17.

a. To the best of your knowledge, why do you think your company does not contract for electronics recycling? (Please select all that apply.)

My company disposes of electronics without recycling _____
My company recycles on an as needed basis without a contract _____
The building in which my company leases space manages our electronics recycling _____
My company is concerned about data security of hard drives sent for recycling _____
My company is concerned about recycling methods used by available recyclers _____

18.

a. Following is a list of Electronic Reduction practices. Please select all practices that your company currently follows.

My Company:

Reduces printers by replacing individual printers with shared office printers	_____	**→Go to 19a**
Only allows individual printers in locations where confidentiality is required	_____	**→Go to 19a**
Provides employees with mobile computers (i.e. laptop with office docking station)	_____	**→Go to 19a**
Reduces inventory of electronics	_____	**→Go to 19a**
Does not engage in any reduction practices	_____	

b. Which of the following outcomes might result from your company reducing the quantity of electronic equipment for your organization? (Please select all that apply.)

c.

Reduction in productivity _____
Inconvenience to employees _____
Creates negative perception among employees _____
Time consuming or difficult to change current practices _____

19.

a. Select all Electronics Reuse Practices that your company engages in. (Please select all that apply.)

My Company:

Purchases refurbished electronics when possible	_____	**→Go to 20a**
Employs a system to manage internal re-distribution of electronics	_____	**→Go to 20a**
Donates electronics to organizations outside of company	_____	**→Go to 20a**
Allows employees to purchase electronics slated for disposal	_____	**→Go to 20a**
Allows employees to personally own business computers	_____	**→Go to 20a**
Does not engage in any Reuse Practices	_____	

b. Why does your company currently not purchase refurbished computers? (Please select all that apply.)

They have a shorter useful life than new computers _____
They experience more operating problems than new computers _____
They are not business grade quality _____
They employ outdated technology/company prefers to use the newest products _____
They lack warranties _____
Use of refurbished computers has not been discussed _____
Do not know _____

20.

a. Which of the following tools do you use to manage your electronics Refresh Cycle? (Please select all that apply.)

3rd party eco-rating programs (i.e. EPEAT) that assure product has longer useful life or can be upgraded _____
Criteria in Procurement contract _____
Third party asset management _____
Extended financial depreciation cycle _____
Don't know _____

b. In what time interval does your company specify electronic equipment be replaced according to your rolling refresh cycle?

1.

For CPUs, laptops, and monitors?

Less than 2 years _____
Every 2 years _____
Every 3 years _____
Every 4 years or more _____
Don't know/not applicable _____

2.

For printers and servers?

Less than 2 years _____
Every 2 years _____
Every 3 years _____
Every 4 years or more _____
Don't know/not applicable _____

21.

a. Is your company willing to consider extending the refresh cycle of its electronic products, or is it not willing to do so?

Willing _____ → **Go to22**
Not willing _____

b. Following are some reasons that extending the refresh cycle of your electronics may be undesirable for companies such as yours. Please read each statement and check those that apply to your company.

Useful life of electronics cannot be extended or extended life products are not available _____
Using electronics for longer periods of time makes electronics technologically obsolete _____
Upgrading software and electronic components is expensive _____
Upgrading software and components is difficult or time consuming _____
Electronics that allow for upgrades cost more _____
Other (Please specify) [ ]

22. Through grant funding for this project, the Delta Institute and the Green Electronics council are able to offer FREE technical assistance to selected companies who self-identify on this survey. The goal of the assistance is to promote the use of electronics best management practices among Illinois companies to help companies comply with the Illinois Landfill Ban and overall to increase the rate of electronics recycled.

Technical assistance can be provided to assist companies with the use of best management practices for any of the below:

Developing a green electronics policy
Using the EPEAT registration to purchase recycle-friendly electronics
Executing a take-back program contract at the time of purchase
Drafting model green electronics language for procurement contracts
Creating clear procurement specifications to identify green product attributes
Providing tools or training to assist internal staff with product vetting
Employing strategies to reduce the purchase of electronics i.e. by increasing the refresh cycle
Employing strategies to reuse electronics or purchase refurbished electronics
Recycling electronics

By agreeing to accept technical assistance your company will NOT be solicited to purchase any services or products.

a. Is your company interested in FREE Technical assistance regarding green electronics initiatives and policies, or is it not?

Interested _____
Not Interested _____ → ***End of Survey***

b. If you already provided your company information in Question 1 click here ____ ***End of Survey***

Otherwise, please provide company name and your contact information.

Company Name	
Your Name	
Email	
Telephone Number (*ex: 123-456-7890)*	

End of Survey

Research Benefits: *(Accessible via a pop up box)*

The purpose of the study is to identify among Illinois companies factors affecting the successful use of electronic procurement strategies that:

1) Promote the purchase of electronics that are recycle friendly;
2) Reduce the quantity of electronics requiring end-of-life management; and
3) Increase the quantity of electronics that are recycled in a secure and responsible manner.

Your survey answers will help develop strategies to remove or reduce barriers to effective end-of-life management. These strategies can ultimately be used by businesses to increase electronics recycling and reuse. Recycling of electronics creates sustainable jobs, preserves natural resources, keeps harmful contaminants out of the environment and in Illinois is required by law.

Appendix C

Interview Questions and Responses

Area 1: Purchasing

Justification and inclusion criteria

Use interview to explore and identify possible best management practices.

Our study suggests that having either a sustainability plan and or a green electronics purchasing policy in place leads to a greater use of green electronics ratings like EPEAT, TCO, EcoLogo, RoHs or internal criteria most likely because of increased use of purchasing electronics inside of contracts or agreements.

For respondents where company has policies, directives or practices in place that govern green electronics purchasing AND the company purchases electronics inside of contracts or agreements AND uses a green electronics rating (external or internal).

Interview question

Can you tell us a bit more about your company's green electronics purchasing practices? For example, does your company's green electronics contract or policy directly require that a purchased electronic be registered by [EPEAT?]. Are requirements more in the form of general guidelines or suggestions i.e., the purchasing department is encouraged to use green registrations and certifications that are available. In other words, what led you to using EPEAT?

Notes on responses from interviewees

Company A (4/17/2013): Has policy in place for purchasing electronics but policy mostly just relates to energy efficiency. Policy specifies that energy efficiency equipment should be purchased but it doesn't specify what brands to purchase. Energy Star is focused on for large appliances, copiers, printers and small electronics. Company A is interested in recyclable electronics but currently does not specify this characteristic.

Company B (4/26/2013): Just put green criteria because they are committed to doing things green. Doesn't really know anything about they're IT practices. Referred me to IT person.

Area 2: Purchasing - Other Purchasing Observations: Companies Who DO NOT use Green Purchasing Ratings and Companies Who DO Use Green Purchasing Ratings

Justification

Use interview to:

1) understand if awareness promotes use of registrations/certifications, and

2) understand the reason for a negative perception so that a tool or strategy can be created to debunk the perception.

Inclusion criteria for question 2A and interview question

2A. For 16 respondents who were unaware of green electronics ratings: Since you have responded to the E-waste survey, you now know (are aware) that green electronics ratings such as EPEAT exist. Do you feel like you will now try to use green electronics ratings when purchasing electronics?

Notes on responses to question 2A from interviewees

Company A (4/17/2013): Yes, I am more likely to explore using EPEAT now. After taking the survey, I googled EPEAT. To learn about EPEAT a short (5 minute) webinar is always good. Also receiving something in writing is always good for future reference.

Company C (4/26/2013): Yes, more likely to explore using EPEAT as needs arise. For receiving new information emails are good when they appear to be from a trusted source. If things look like spam I won't read them. Followed up by sending fact sheet on EPEAT.

Inclusion criteria for question 2B and interview questions

2B. For respondents who do not AND who do use registrations:

Why do you feel that products with green electronics ratings like EPEAT cost more?

Can you tell us why you feel like green electronics purchasing registrations like EPEAT:

a) Are not reliable/do not meet all claims? (2 + 1 respondents)
b) Are difficult to use? (6 respondents)
c) Do not have enough product offerings? (10 respondents)
d) Have too many product offerings? (2 respondents) (i.e., was uniqueness of products not clear?)

Notes on responses to question 2B from interviewees

Company D (4/22/2013) (Doesn't use ratings but think they cost more): I do not purchase electronics myself – our New York IT office does most of the purchasing. However, I did answer that products with registrations cost more even though I use other types of certifications and know that this is not true. I guess I was answering more from just a general perception.

Company B (4/26/2013): Does not recall.

Area 3: Purchasing - Companies That Rely on Internal Criteria for Purchasing Green Electronics

Justification

Use interview to explore what tools would provide the most assistance.

Interview questions

For the 5 respondents: you indicated a need for clear specifications to identify green product attributes. What does "green electronics" mean to you? What attributes do you think might be included? (Trying to establish a baseline.) Where do you experience difficulty?

You indicated a need for model contract language to use in procurement documents. If provided, do you think this language could be easily inserted/incorporated? Where do you experience difficulty with crafting language?

You indicated a need for tools or training to assist internal staff for comparing products. What form of training would work best i.e. in person, a written manual, a webinar? What information would be needed i.e. how to interpret a spec sheet, questions to ask a vendor? Where are you experiencing difficulty?

You did NOT indicate a need for training using EPEAT. Were you aware that using an EPEAT registered product is one way to eliminate some of the above needs? If yes, can you explain perhaps why EPEAT is not used by your purchasing department? If no, do you see yourself going to the EPEAT website to explore using EPEAT registrations?

Notes on responses from interviewees

Company A (4/17/2013): Currently we do not use any kind of specifications, model language or have any resources for tools and training. These do not exist at all in our company but could be useful.
Company B (4/26/2013): They are interested in being as green as possible. Does not specifically recall her responses because is not very familiar with how things are actually purchased. She gave contact for best person, and they are interested in any information on best practices that we can provide.

Area 4: Recycling – Does having a recycling contract or policy in place lead to positive outcomes that encourage further recycling and promote proper recycling (for example, using a certified recycler, confidence in data security, confidence that materials are not shipped to OECD countries, or receiving satisfactory documentation about recycled products).

Justification and inclusion criteria

Use interview to explore and identify possible best management practices.

For those companies with good outcomes.

Interview questions

What factors do you think allowed you to get good documentation, feel comfortable about security, feel comfortable about final disposition? i.e., do you rely on the fact that your recycler is certified? Do you ask your recycler questions? Do you request documentation?

Notes on responses from interviewees

Company A (4/17/2013): Doesn't know recycler's certification and has not heard about R2 or E-Steward or NAID. Has received information from recycler as to how it erases hard drives. However, never quite sure that recycler is doing what it says it is doing. Delta described the NAID certification and contact stated that having the extra security of their recycler being NAID certified would give her an extra level of confidence.

Company D (4/22/2013): We receive documentation on total weight by product type only. We have to ask for it and sometimes have to follow up several times to actually get it. As regards data security, our recycler just verbally explained to us how their data erasing process works. We don't get anything on the back end in regards to documentation that hard drives were erased. However, we would like to. MR let Company D know that they can request this data. The interviewee didn't realize this and indicated that he may request this documentation now. (For the most part he is 99% sure that data is being erased but he would like to have proof to show his clients.)

Company C (4/26/2013): She doesn't think there are any factors that result in a good outcome. They are a really small company that have IT consultants come in an wipe things clean, but do not receive any documentation whatsoever. (She mentioned something about allowing employees to reuse equipment but that is not indicated on the survey.)

Area 5: Recycling – Does having the procurement department negotiate the recycling contract and vet the recycler – a possible BMP – lead to more positive outcomes?

Justification and inclusion criteria

Use interview to explore the hypothesis that bundling purchasing and recycling of electronics is a BMP/encourages proper recycling. Explore using an open ended conversation.

For the 4 respondents where the procurement department negotiates the recycling contract or vets the recycler.

Interview questions

Do you feel that having procurement also involved in recycling of electronics leads to more positive outcomes (confidence in data security, confidence that materials are not shipped to OECD countries, or receiving satisfactory documentation about recycled products)?

It has been suggested that bundling purchasing and recycling of electronics encourages proper recycling. How do you feel about this statement – agree, disagree, neutral – and why?

Notes on responses from interviewees

Company A (4/17/2013): Company A manages the office of the building. Having a policy in writing is important. At Company A different members of the same team/department handle

purchasing vs. recycling. Having the same department manage both processes is useful. They try to recycle as much as they can. They list out the types of electronics that can be recycled – cords, PDA old cameras, accessories.

Area 6: Recycling – Observations

Justification and inclusion criteria

Use interview to explore best practices and how to increase awareness around certifications.

Inclusion criteria for question 6A and interview question

6A. Of the 5 of 8 companies who knew the name of their recycler but did not know the recycler's certification: Have you heard of R2 and E-Steward? Do you know what these certifications try to ensure? Would you like to find out more about these certifications and if so, how so, how? e-blast? Short webinar?

Inclusion criteria for question 6B and interview question

6B. Of the 12 companies who contract with a recycler and are concerned about data security or question it: Do you know about the NAID certification and what it ensures? How would you like to find out about NAID: e-blast? Short webinar? Do you ask your recycler how your data is wiped or do you receive information from your recycler explaining how your data is wiped?

Notes on responses from interviewees

Company A (4/17/2013): Doesn't know recycler's certification and has not heard about R2 or E-Steward or NAID. Has received information from recycler as to how it erases hard drives. However, never quite sure that recycler is doing what it says it is doing. Delta described the NAID certification and contact stated that having the extra security of their recycler being NAID certified would give her an extra level of confidence.

Company D (4/22/2013): Doesn't know recycler's certification. Has heard of R2 and E-Steward but doesn't know what they certify. Has never heard of NAID. To learn about R2, E-Steward, and NAID he would look at a short video but prefers something in writing. E-mail is preferred as the delivery method. Indicated that we would send the interviewee the Certifications fact sheet and the link for Delta's E-waste website. Interviewee indicated that if this material was sent to him he would look at it and let me know his thoughts.

Company C (4/26/2013): Not familiar with recycler certifications. Interested in learning more about certifications and what they indicate about end-of-life management. Email is good only when it appears to be from trusted source. Followed up by sending fact sheet on recycler certification and data security.

Appendix D

Survey Results

CHARACTERIZATION OF 34 PRIVATE COMPANY RESPONDENTS

Note: due to limited sample size, proportionate results are rounded to the nearest whole number. Also, not all categories add up to 100% because some questions allow for more than one response.

- Of the respondents, 62% solely owned companies or partnerships (21 of 34), 24% corporations (8 of 34), 18% other (6 of 34) [Q2].

- About ¾ of respondents can be considered small companies and ¼ could be considered large companies based upon number of employees and electronics purchasing budgets.
    - 71%, or 24 of 34 respondents, had ≤ 99 employees, while 29%, or 10 of 34 respondents, had ≥ 100 employees [Q7].
    - 85%, or 29 of 34 respondents, had budgets < $250,000, while 15%, or 5 of 34 respondents, had budgets > $250,000 [Q8].

- For at least 90% of the respondents the person answering the survey seemed to be a person knowledgeable about how their company manages electronics. This suggests that responses for each company have a reasonable likelihood of accurately reflecting each company's behavior and experiences.
    - 88%, or 31 of 34 respondents, work in a management position [Q5].
    - 100%, or 34 of 34 respondents, work in a department that has a connection to electronics purchasing or recycling (13 procurement, 5 sustainable operations, 8 IT, 7 waste management/recycling, or 1 environmental health and safety) [Q4].

- Eighteen of 34 respondents indicated that they were from the service sector with the remainder being split primarily between the finance and manufacturing sectors with 6 respondents from each [Q6].

PURCHASING

Questions Survey Used to Answer:

Question 1

Is not having substantial resources to devote to management of electronics (i.e. being a small company) a barrier to using electronics best management practices?

Strategy: Compared large and small company results based on number of employees [Q7].

Answer: Possibly (see below)

The majority of large companies, or 9 of 10 respondents (90%), make electronics purchasing decisions within formal agreements. This is compared to 33% of small companies, or 8 of 24 respondents [Q9].

More than half of large companies, or 6 of 10 respondents (60%), report having a sustainability plan in place. This is compared to 21% of small companies, or 5 of 24 respondents [Q10].

Both formal agreements for electronics purchases and having a sustainability plan are more prevalent among large companies. These variables are associated with purchasing more recyclable electronics and having good experiences with recycling. See below.

INTERVIEW – NO

Question 2

Does having governing agreements or contracts in place for the purchase of electronics improve use of EPEAT and other purchasing registrations to purchase recyclable electronics? [Q9]

Answer: Yes

The 41%, or 7 of 17 respondents, that purchase electronics through agreements or contracts use green electronics ratings such as EPEAT in purchasing decisions (also note this includes a company's own green criteria). This is compared to only 12%, or 2 of 17 respondents that purchase outside of agreements or contacts and use ratings [Q13c].

Interestingly, reliance on governing agreements or contracts for electronics purchasing is not a strong indicator of awareness about EPEAT or other or other electronics ratings. Just over half of the respondents, or 7 of 12 (58%), that rely on purchasing agreements or contracts were unaware of such ratings or certifications prior to this survey. This is compared to 53%, or 9 of 17 respondents, that purchase electronics outside of agreements or contracts that were unaware of such ratings or certifications prior to this survey [Q15e].

Respondents that purchase electronics through agreements or contracts tend to promote multiple green products criteria in their purchasing decisions (Recycle Friendly, Extended Useful Life or Upgradeability, Ease of Disassembly, Reduction of Hazardous Materials and Energy Efficiency). However, individual purchasers tend to promote fewer criteria, including Recycle Friendly, Extended Useful Life, and Energy Efficiency [Q15b] (see Table D-1).

Table D-1: Response rates for purchasing question 2.

	Purchase through Agreements		Individual Purchasers	
Recycle Friendly	100.0%	3	50.0%	1
Extended Useful Life or Upgradeability	66.7%	2	50.0%	1
Ease of Disassembly for recycling	33.3%	1	0.0%	0
Reduced Use of Hazardous Materials	66.7%	2	0.0%	0
Energy Efficiency	100.0%	3	100.0%	2
Answered question		3		2
Skipped question		14		15

The use of purchasing contracts/agreements are associated with increased use of registrations and specifications that lead to the purchase of more recyclable electronics.

INTERVIEW - YES

Question 3

Does having either of the following impact use of EPEAT or other purchasing registries/certifications?

A. A sustainability plan; or
B. A purchasing policy or policies

Answer: Yes

A. Sustainability plan [Q10]
   - A majority of respondents, or 8 of 11 (73%), from companies with sustainability plans reported purchasing electronics inside of contracts or agreements. This is compared to 39%, or 9 of 23, respondents from companies with no sustainability plans [Q9].
   - Of companies with sustainability plans, 55% (6 of 11) of respondents use a green electronics rating including EPEAT, TCO, EcoLogo, RoHs or internal criteria. This is compared to 13%, or 3 of 23, respondents from companies with no sustainability plans (Q13c).

B. A purchasing policy or policies [Q11]
   - Of companies with policies, directives, or practices that govern green electronics purchasing, 60%, or 6 of 10, reported purchasing electronics inside of contracts or agreements. This is compared to 45%, or 10 of 22 respondents from companies with no policies, directives, or practices that govern green electronics [Q9].
   - Again, of companies with policies, directives, or practices that govern green electronics purchasing, 60%, or 6 of 10, use a green electronics rating including EPEAT, TCO, EcoLogo, RoHs or internal criteria. This is compared to 9%, or 1 of 22, respondents from companies with no policies, directives, or practices that govern green electronics (Q13c).

May want to promote sustainability plans and policies that promote the use of purchasing contracts.

INTERVIEW - NO

Question 4

Do purchasing priorities and perceptions about EPEAT affect use of EPEAT or other purchasing registrations?

Answer: Possibly

Price of electronic products was ranked as the #1 consideration in purchasing electronics among all private sector respondents [Q13a]. However, 50%, or 1 of 2 respondents indicated that they felt that EPEAT registered products cost more [Q14d].

Equipment and technological features of electronic products was ranked as the #2 consideration in purchasing electronics [Q13a]. However, 50%, or 1 of 2 respondents indicated that they felt that not enough products are registered on EPEAT.

May want to confirm that higher prices and less variety of products are NOT characteristics of EPEAT and then dispel this perception.

INTERVIEW - YES

Other Purchasing Observations

Companies Who DO NOT use Green Purchasing Ratings

- A majority of private companies, or 25 of 34 (74%), do not use green ratings in purchasing electronics [Q13c].
    - Just over half of respondents, or 16 of 29 (55%), stated that they were unaware of such ratings prior to answering this survey; 35%, or 10 of 29 respondents stated that not enough of the products they need to use are registered; 21%, or 6 of 29 respondents felt that registries were difficult to use; 10%, or 3 of 29 respondents stated that registered products cost more; and 7%, or 2 of 29 felt that registrations were not reliable. Note that respondents were allowed to identify all applicable reasons [Q15e] (see Figure D-1).

A lack of awareness of electronic purchasing registrations and negative perceptions about the registries are clear barriers to use. We will interview to explore these barriers more. May need to raise awareness and dispel perceptions.

INTERVIEW – YES

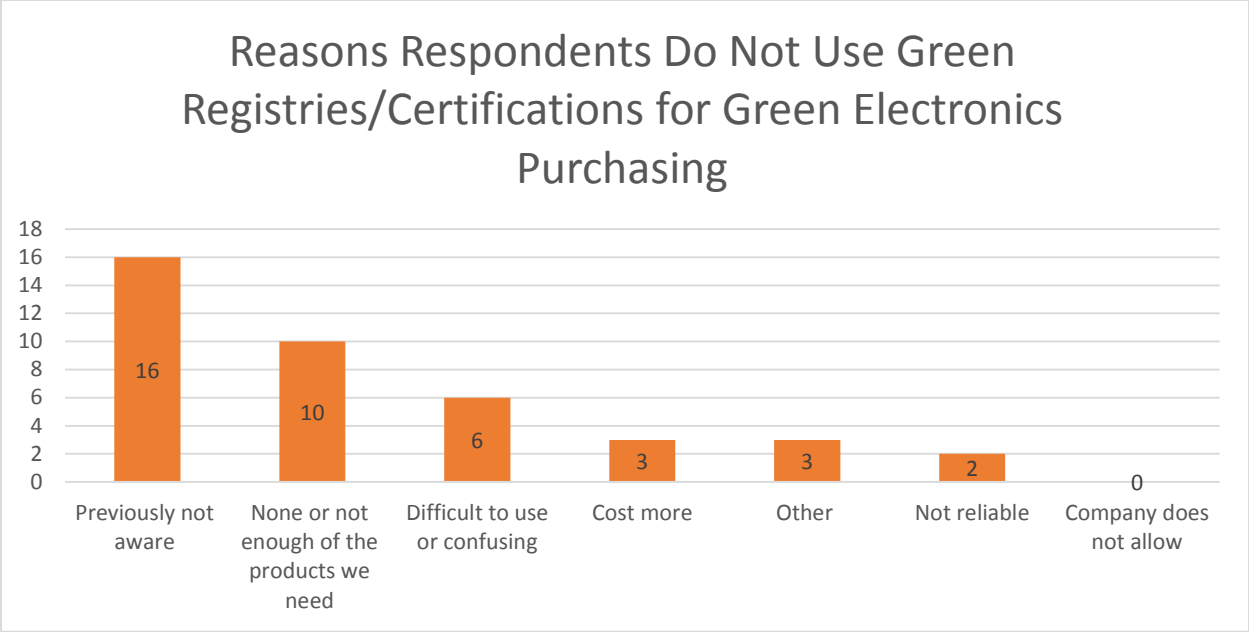

Figure D-1: Reasons Respondents Do Not Use Green Registries/Certifications for Green Electronics Purchasing.

Companies Who DO Use Green Purchasing Ratings

- Three companies surveyed use ratings:
  - One of 2 respondents indicated that EPEAT and TCO registrations are not used for all purchases, and 1 of 3 respondents indicated that TCO does not meet all of its claims [Q14A]. *We will interview these companies to find out why and identify if a barrier exists.*
  - None of the 3 found the registries difficult to use [Q14c] and both indicated that there were too many products on the registry [Q14d].
  - Both users of TCO felt that TCO registered products cost more. One EPEAT user felt that EPEAT registered products cost more, but the other user felt that they cost the same as unregistered products [Q14e]. *We will interview these companies to explore this perception of higher price.*

INTERVIEW - YES

Companies That Rely on Internal Criteria for Purchasing Green Electronics

Of the 5 companies who use internal green electronics criteria:

- two did not use internal criteria for all purchases [Q15a] – *we will interview to find out why*

- three expressed a need for clear specifications to identify green product attributes
- two expressed a need for model contract language to use in procurement contracts
- three expressed a need for tools or training to assist internal staff for comparing products
- one expressed a need for training on using EPEAT [Q15c]

We will interview to understand needs better and to inquire why companies using internal green ratings do not satisfy needs by using EPEAT. May want to provide tools to address needs.

- All five indicated that suppliers were cooperative with providing complete and easy to understand information for vetting [Q15c1]. However, three indicated that some information was not always complete [Q15c2]. We *will interview to explore this trustworthy issue more.*

INTERVIEW - YES

RECYCLING

Questions to Answer:

Question 1

Does having a recycling contract or policy in place lead to positive outcomes that encourage further recycling and promote proper recycling (for example, using a certified recycler, confidence in data security, confidence that materials are not shipped to OECD countries, or receiving satisfactory documentation about recycled produces)?

Answer: Not likely

The majority of the companies, or 9 of 17 respondents that have a recycling contract or policy did not know the name of the recycler [Q16g] and 5 of 8 respondents did not know the recycler's certification [16h]. Ten of 15 respondents did not receive acceptable documentation about data security, 11 of 16 respondents did not receive acceptable documentation about materials shipped to non-OECD countries, and 10 of 15 did not receive acceptable documentation about or downstream processing of electronics [Q16i].

These observations suggest that the formalized approach of a contractual agreement or a policy does not necessarily lead to conscientious use of a certified recycler or a recycler that provides sound documentation and security. We will interview companies that had positive experience with certification, data documentation, data security to discover how they vetted their recyclers. It is also possible that companies must request documentation in order to receive it. We will interview companies to confirm or refute this hypothesis.

INTERVIEW - YES

Question 2

Does having the procurement department negotiate the recycling contract and vet the recycler, a possible Best Management Practice (BMP), lead to more positive outcomes?

Answer: Results do not suggest this to be true.

In 76%, or 13 of 17 companies that contract with a recycler, the contracts are negotiated by an employee in a department other than procurement. In only 24% of companies, or 4 of 17, associates of the procurement department negotiate/vet the recycler [Q16c]. Two of these 4 companies did not know their recycler's name [Q16g], and both of those respondents who knew the name did not know if the recycler was certified [Q16h]. All 4 had some dissatisfaction with data documentation [Q16i] and all 4 expressed that they sometimes felt concern over whether data was being destroyed [Q16l].

Having procurement manage recycling does not appear to be a best management practice/lead to positive outcomes.

INTERVIEW - NO

Observations

- Over half (9 of 17, or 53%) of companies who contract with a recycler do so through a 3rd party asset recovery firm; 35%, or 6 of 17, contract with the recycler directly; and 12%, or 2 of 17, recycle through their building's property management company. None of the respondents used manufacturer take-back programs [Q16e].
- Of companies that use third party asset recovery firms, 44%, or 4 of 9, did not know their recycler [Q16g] or have any noteworthy level of positive outcomes.
- Of companies who knew the name of their recycler, 62.5%, or 5 of 8, did not know the recycler's certification [Q16e]. *May need to raise awareness around recycler R2/E-steward registrations and promote the importance of these.*
- Of the 17 companies who contract with a recycler, 10 of 15 did not receive acceptable documentation regarding data security; 11 of 16 did not receive acceptable documentation that guaranteed that no electronics were sent to non-OECD countries; and 10 of 15 did not receive acceptable documentation regarding chain of custody. However, a majority, or 9 of 16 respondents received acceptable documentation regarding volumes and weight of recyclables. *We may need to promote the benefits of recycler R2/E-Steward certifications.* [A16i]
- Of companies who contract with a recycler, 71%, or 12 of 17, are either concerned about their data security or question it [A16l]. *We may need to promote the benefits of recycler NAID certifications.*

INTERVIEW - YES