

*Report to
The 2005 Oregon Legislature*

*Oregon Advisory Committee on
Electronic Product Stewardship*

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Disclaimer

This report represents the overall perspective of the Oregon Electronic Product Stewardship Advisory Committee and does not necessarily reflect the opinion of any one participant or the project funders.

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Executive Summary

1. Background

In 2003, the Oregon Legislature enacted SB 867, creating an Electronics Product Stewardship Advisory Committee. A diverse group of 18 Committee members, including representatives of local and state government, industry and the non-profit community, met for nearly one year to address the issues of electronic product stewardship in Oregon.

Committee members spent considerable time and effort working together, delving into the details and the barriers and opportunities of reuse and recycling of used electronics in Oregon. This document is the result of stakeholders spending many days in meetings, considerable hours drafting reports language and effort to find common ground. The OECD (or the State of Oregon) is indebted to the Committee members for their giving of time and input into this process.

This Executive Summary provides an overview of the activities and findings of the Committee. The full report provides additional detail on Committee discussions, recommendations, and other findings.

The Electronics Product Stewardship Advisory Committee was tasked with the following:

- Develop recommendations for infrastructure for reuse and recycling of electronics products
- Ensure state efforts are consistent with and supportive of national developments
- Review existing data on the actual impact that used electronic products have on the environment
- Assess existing regulations and recommend any needed changes
- Develop strategies and recommend incentives for business development related to reuse and recycling of electronic products
- Develop recommendations for educating consumers and businesses
- Assess procurement guidelines that might be developed or used in Oregon

As specified in SB 867, “electronic products” included those computers, monitors, large and small computer peripherals generated by residences and small businesses. (e.g., printers, scanners, keyboards and mice) and televisions.

2. Role of Committee and Guiding Principles

The Committee agreed that their primary role was as follows:

Seek to improve opportunities for re-use and recycling of old and unwanted electronic products in Oregon, consistent with product stewardship principles,

with attention to business development, job creation, responsible procurement, outreach and education.

The Committee developed the following guiding principles and key e-waste management program elements:

1. **Consumer Convenience.** Reuse/recycling options are as convenient to consumers as buying a new electronic product.
2. **Shared Responsibility.** Responsibility is shared by participants in the electronics chain of commerce.
3. **Encourage Reuse.** Source reduction/reuse/recycling hierarchy is emphasized; encouraging reuse to the maximum degree that is practical and cost-effective.
4. **Environmentally Sound Management.** End of life product management is environmentally sound.
5. **Equitable.** Equitable to all participants.
6. **Economically Sustainable.** The infrastructure is economically efficient and sustainable.

Key E-Waste Management Program Elements

1. Incentives are provided for:
 - a. Continuous improvement of “design for the environment” (DfE) efforts.
 - b. Enhancement of existing local and regional end markets for recovered materials
 - c. Development of new local and regional end markets for recovered materials.
2. There are system performance measures.
3. Consumer education regarding product end-of-life management is provided.

3. Key Votes, Findings and Recommendations

A. Alternatives for Statewide Oregon Scenarios

The Committee examined several scenarios for operating and financing a statewide system for electronics reuse and recycling. The scenarios included:

1) Government-Run System

- Government finances and operates the system using waste fees

- Collection services provided directly by government or via contractors/grantees
- Recyclers contracted to consolidate, transport and process

2) Advanced Recycling Fee

- A legislated fee is collected on new product sales
- There are two alternatives for management of the fee:
 - a. Fee is remitted to a trust fund, and a not-for-profit organization runs the system
 - b. Fee is remitted to government, which runs the system
- ARF covers costs to collect, transport, and process all products, including orphan and historic
- Government enforces on retailers, ensuring the fee is collected and remitted

3) Partial Producer Responsibility

- Local communities are responsible for collection of products from consumers
- Manufacturers take responsibility for products from consolidation points
- Responsibility for orphan products is distributed by law amongst manufacturers
- Government enforces on manufacturers, ensuring they manage their share of discarded product

The Committee voted on the following question:

Of the three Tier 1 options developed by this Advisory Committee, which one would be your organization's preferred long-term approach in Oregon?

The Committee vote was intended to be used for informational purposes. The vote results do not constitute a recommendation by the Committee. The result of the vote, including some absentee voters, is as follows:

Advisory Committee Votes on Oregon Scenarios	
1) Government-Run System	0 votes
2) Advanced Recycling Fee	7 votes
2a) ARF managed by a TPO	(5 votes)
2b) ARF managed by government	(2 votes)
3) Partial Manufacturer Responsibility	1 vote
4) Maintain status quo, no statewide approach	5 votes
Abstain	4 members
One committee member was absent and did not provide an absentee vote.	

There was agreement among the Committee members that ideally there would be a national solution, and a state solution would not be necessary.

B. Regulations, Permitting and Certification

SB 867 directed the Committee to review current state and federal regulations to determine if they encourage or impede the effective reuse and recycling of electronic products. The Committee found that there are no regulatory barriers to electronics reuse and recycling in Oregon. However, in the case of cathode ray tubes (CRTs) there is currently some ambiguity about their regulatory status. The state is currently operating under a policy rather than a regulation in anticipation of a federal regulation on CRTs' hazardous waste status when being recycled. The Committee also identified some considerations regarding a disposal ban, and options for processor permitting and certification.

Oregon's Interim Policy for Management of CRTs

The state of Oregon Interim Policy provides guidance for generators and recycling facilities who handle non-household computer monitors and TVs for recycling, and does not constitute formal rulemaking. (Details on the Interim Policy (2002-PO-001) for management of cathode ray tubes (CRTs) generated by hazardous waste generators can be found at www.deq.state.or.us/wmc/hw/policy/2002-PO-001.pdf).

The Advisory Committee recommends that Oregon revisit the interim CRT rule and consider formal rule making to strengthen enforcement and provide clarification.

Disposal Bans

Bans on disposal of CRTs have been implemented in several states for different reasons:

- To reduce the amount of toxic substances being disposed in landfills
- To drive product into alternative channels, especially for recycling, thus creating the needed flow of product to make recycling more economical

The Advisory Committee recommends that disposal bans not be viewed in isolation. Generally, Committee members support consideration of a disposal ban as long as a number of prerequisite policy conditions, considered part of a comprehensive e-waste program, are met. These conditions are as follows:

- **Funding source.** Either through an Advance Recycling Fee (ARF) or producer responsibility framework, such funds need to be instituted and available to build up infrastructure for e-scrap collection, transportation, and processing.
- **Markets.** Funds must be dedicated in part to programs emphasizing enhancement of existing and creation of new end markets, as well as the development of new

processing technologies.

- **Standards.** Environmental, health and safety standards must be developed for sound management of collected materials, including reporting and documentation procedures for end-markets.
- **Infrastructure.** Stable and convenient infrastructure for collection, transportation, handling, and processing needs to exist in order to provide an environmentally sound alternative to disposal.

Processor Permitting and/or Certification Programs

The inappropriate processing of electronics can harm the health of workers and cause environmental damage. This is especially the case in under-developed countries where worker safety and the environment are not protected as they are here. A very high percentage of used electronics are shipped overseas because it is far cheaper than domestic processing, and very poor practices have been documented¹. Thus there is desire to prevent these practices by both domestic processors and downstream recyclers through adoption of standards and/or certification programs.

EPA recently issued Guidelines for Materials Management as part of EPA's Plug-In To eCycling Project. These guidelines were developed as a first voluntary step to try and develop national guidance for the management of “end-of-life” electronics. EPA estimates that a national certification program will be available within the next 2 years and a verification process will be included.

After evaluating several alternatives for permitting or certification of processors, the Advisory Committee endorsed adopting EPA’s national certification program once it is implemented (likely within 2 years). In the interim, the Committee recommends that Oregon use EPA’s Plug-In to eCycling Guidelines for Materials Management as voluntary guidelines, available to manufacturers, retailers, governments and others who are directly contracting with recyclers and others for recycling and refurbishment services as an information/screening tool for selection of a recycler.

C. Job Creation and Market Development

The economic development and job creation opportunities related to electronic waste management was one of the considerations specified in SB 867.

The Advisory Committee found that specific opportunities that may encourage job creation and market development include:

- Encouraging ongoing public/private dialogue to address the uncertainties currently discouraging development of infrastructure

¹ “Exporting Harm: The High Tech Trashing of Asia”, Basel Action Network, www.ban.org.

- Exploring opportunities for market development to provide stronger incentives for infrastructure development
- Investing in education and outreach to ensure the public knows where to take used equipment for reuse and recycling
- Exploring certification options to discourage dumping and level the playing field for processors

D. Education and Outreach

The Advisory Committee was specifically tasked by the enabling legislation with developing recommendations for educating consumers and businesses in the area of electronics product reuse and recycling.

The Committee concluded that a variety of methods will be needed to provide education and outreach throughout Oregon. Two high priority outreach methods were identified for educating consumers and businesses:

- Websites
- Statewide call center

The call center should be a one-stop, one phone number “brand” for where to get information in Oregon about electronics recycling options.

Other high priority recommended next steps included:

- Assess what educational efforts are already in use and their effectiveness
- Evaluate the need for and effectiveness of using template materials (e.g., ads, flyers, brochures, articles), develop materials and provide to local governments, as others, as appropriate
- Conduct a survey in rural areas of the state that have not been represented in discussions to date

E. Reuse Organizations

The Advisory Committee explored the role of electronics reuse entities in Oregon and the opportunities and barriers for creation of additional reuse entities, particularly outside of urban areas.

The Committee finds that organizations that reuse and refurbish electronic equipment play a critical role in energy and material conservation by diverting this equipment from premature disposal. These organizations often also have an important social role in providing refurbished equipment to lower income groups and individuals, as well as providing job training. At present, these organizations play a role which is not viable for for-profit businesses, due to the cost of labor and the still-evolving markets for reused and recycled equipment.

F. Public and Institutional Procurement of Environmentally Preferable Electronic Products

The Committee finds that the Oregon Department of Administrative Services (DAS), State Procurement Office (SPO), continues to make progress in the effort of sustainable purchasing and the promotion of electronic products that produce less waste in their manufacture, consume fewer resources in their operation, and are equally environmentally friendly at the end of their useful lives. A few examples of DAS efforts include:

- Participation on the development team of the Electronic Product Environmental Assessment Tool (EPEAT)
- Participation on development of environmental criteria in two key procurement projects in 2004 (the Western States Contracting Alliance (WSCA) and the State of Oregon "Smart Buy" project)
- Development of new procurement rules for state agencies (subject to DAS authority) to support environmentally responsible procurement in compliance with the Governor's Executive Order No. EO 03-03 to create "A sustainable Oregon for the 21st Century".
- Development of new rules for state agencies' Disposal of Surplus Electronic Equipment and Property Containing Cathode Ray Tubes (CRT).

Several other efforts have been undertaken by the Center for a New American Dream, the Product Stewardship Institute and the Silicon Valley Toxics Coalition to promote environmental purchasing of electronic products and to develop valuable information resources.

4. Status of the National Electronic Product Stewardship Initiative (NEPSI)

As SB 867 directed the committee to ensure that state efforts are consistent with and supportive of national developments, the ongoing developments in the National Electronic Product Stewardship Initiative (NEPSI) process were tracked and reported on at each Committee meeting. NEPSI, which has been underway for the past four years, is a multi stakeholder dialogue with representation from federal, state and local governments, electronics manufacturers, retailers, recyclers and environmental groups.

In February 2004, stakeholders endorsed a resolution that called on manufacturers to develop a compromise on the financing element for a national recycling program. The current model, as of November 2004, under discussion proposes the following:

- Visible fee at the point of sale with flexibility in how the collected funds are managed
- Individual companies would have the authority to manage the funds collected on the sale of their branded products and be responsible for recycling that company's share of returned products.
- The overall collection goal would be set in legislation and would determine the responsibility for manufacturer stewardship plans and the third party organization (TPO) plan.

This solution was adopted in a final Resolution by a vote of the NEPSI stakeholders. As of November 2004, issues still under active discussion by industry include the specific details of the funding mechanism (point of sale fee or other approach); the inclusion of consumer vs. business products in the proposed system, and the political viability of a fee system run by a private, third party organization.

Chapter 1

Introduction

This chapter provides an overview of the Oregon Electronic Product Stewardship Advisory Committee process and membership, its guiding principles, and background information on the National Electronic Product Stewardship Initiative.

1.1 Creation of the Advisory Committee

In 2003, the Oregon Legislature enacted SB 867, creating an Electronics Product Stewardship Advisory Committee with the following objectives:

- Develop recommendations for infrastructure for reuse and recycling of electronics products
- Ensure state efforts are consistent with and supportive of national developments
- Review existing data on the actual impact that used electronic products have on the environment
- Assess existing regulations and recommend any needed changes
- Develop strategies and recommend incentives for business development related to reuse and recycling of electronic products
- Develop recommendations for educating consumers and businesses
- Assess procurement guidelines that might be developed or used in Oregon

As specified in SB 867, “electronic products” for the purpose of this document, means those computers, monitors, large and small computer peripherals generated by residences and small businesses (e.g., printers, scanners, keyboards and mice) and televisions.

Given that the national stakeholder process (National Electronics Product Stewardship Initiative – NEPSI) focuses on residential and small business generated electronics and that there is clear evidence that these generators do not have easy access to collection, recycling and reuse options, the Advisory Committee focused on residential and small business generated electronics.

1.2 Committee Role

At their first meeting on February 12, 2004, the Committee agreed that the following description captured their primary role:

The Committee will seek to improve opportunities for re-use and recycling of old and unwanted electronic products in Oregon, consistent with product stewardship principles, with attention to business development, job creation, responsible procurement, outreach and education.

The definition of product stewardship which the Committee agreed to was that included in the legislation – responsibility shared among manufacturers, retailers, consumers,

recyclers and governments for providing convenient and effective opportunities to reuse and recycle scrap monitors, personal computers, computer peripherals and televisions.

Other issues that the Committee felt were central to their work included a focus on environmentally sound management practices for recycling, and cost effectiveness, and consideration of a life-cycle approach.

1.3 Committee Members and Organizers

Oregon Economic & Community Development Department (OECDD) appointed a diverse group of 18 stakeholders to the Committee, including representatives of local and state government, industry and the non-profit community. The Committee members included the following:

List of Committee Members

Representative Jackie Dingfelder, Ex-Officio
Heidi Sickert, Oregon Environmental Council, Ex-Officio

Heather Bowman/Jason Linnell, Electronic Industries Alliance
Julie Brandis, Associated Oregon Industries
Jim Craven, American Electronics Association
Julie Daniel, BRING Recycling
John Hire, Sanipac, Inc
Diane Lancaster, Oregon Department of Administrative Services
Meg Lynch, Oregon Recycling Market Development Corporation
Frank Marella, Sharp Electronics
Oso Martin, Free Geek
Janet Matthews, Metro
Kevin McCarthy, Waste Management/Recycle America Alliance
Betty Patton, Environmental Practices
Wayne Rifer, Rifer Environmental
Greg Sampson, Earth Protection Services
Larry King/Renee St. Denis, Hewlett-Packard
Tim Shestek, American Chemistry Council
Jan Whitworth, Oregon Department of Environmental Quality
Jonathan Williams, Intel Corporation

OECDD hired a team to organize and facilitate the Committee, comprised of Dr. Jennifer Allen, Portland State University and Pamela Brody-Heine, Brody-Heine Consulting. Thomas Osdoba, E4 Partners, and Kathy Kiwala (attrib) also contributed to the facilitation process.

1.4 Funding

Funding and in-kind services for the Oregon Electronic Product Stewardship Advisory Committee were generously provided from the following diverse group of supporters:

Oregon Recycling Markets Development Corporation
Oregon Economic and Community Development Department
U.S. Environment Protection Agency
Earth Protection Services, Inc.
Sharp Electronics
Matsushita Electronic Corporation of America (Panasonic)
JVC Americas Corporation
Sony Electronics
Thomson, Inc.
Philips Consumer Electronics North America
Hitachi America, Ltd.
Portland State University
Rifer Environmental
Metro

Additionally, the following organizations generously provided lunch and refreshments during Advisory Committee meetings:

Associated Oregon Industries
Oregon Refuse and Recycling Association
Sharp Electronics
Hewlett Packard
Waste Management/Recycle America Alliance
Matsushita Electronic Corporation of America (Panasonic)

1.5 Meeting Process and Working Groups

The Advisory Committee met seven times between February 2004 and November 2004. Additionally, the Committee created four work groups that conducted additional meetings and conference calls. The four work groups included:

- Education and Outreach Work Group
- Job Creation and Market Development Work Group
- Incremental (Near-Term) Strategies
- Oregon Policy Scenarios

The work product generated from each work group, plus research provided by DEQ, DAS, and Metro is provided in this report. The process for Committee approval of information for inclusion in the final report was as follows:

- Work group presents a draft product to the Committee for discussion
- Committee provides input to the work group
- Work group finalizes product (or generates a second draft), taking Committee input into consideration
- Work group presents final (or second draft) product to the Committee at the next meeting
- Committee discusses the work, and if the majority approves, include the product in the report, with a minority report, as appropriate

Although many Advisory Committee actions were decided by consensus, the decision process, as specified in SB867 was that “(o)fficial action by the advisory committee requires the approval of a majority of the members...”

Committee meeting agendas, summaries and presentation information has been posted on the OECD website (www.econ.state.or.us) and the Sustainable Oregon website (www.sustainableoregon.net).

1.6 Guiding Principles and Key Program Elements

The Committee developed the following guiding principles and key e-waste management program elements:

Guiding Principles

1. **Consumer Convenience.** Reuse/recycling options are as convenient to consumers as buying a new electronic product.
2. **Shared Responsibility.** Responsibility is shared by participants in the electronics chain of commerce.
3. **Encourage Reuse.** Source reduction/reuse/recycling hierarchy is emphasized; encouraging reuse to the maximum degree that is practical and cost-effective.
4. **Environmentally Sound Management.** End of life product management is environmentally sound.
5. **Equitable.** Equitable to all participants.
6. **Economically Sustainable.** The infrastructure is economically efficient and sustainable.

Key E-Waste Management Program Elements

1. Incentives are provided for:
 - d. Continuous improvement of “design for the environment” (DfE) efforts.

- e. Enhancement of existing local and regional end markets for recovered materials
 - f. Development of new local and regional end markets for recovered materials.
2. There are system performance measures.
 3. Consumer education regarding product end-of-life management is provided.

1.7 Status of the National Electronic Product Stewardship Initiative (NEPSI)

For the past four years, the National Electronic Product Stewardship Initiative (NEPSI) has been underway. NEPSI is a multi stakeholder dialogue with representation from federal, state and local governments, electronics manufacturers, retailers, recyclers and environmental groups. The group's main goal for the dialogue is "the development of a system, which includes a viable financing mechanism, to maximize the collection, reuse, and recycling of used electronics, while considering appropriate incentives to design products that facilitate source reduction, reuse, recycling; reduce toxicity; and increase recycled content." This dialogue focused on a national solution. As SB 867 directed the committee to ensure that state efforts are consistent with and supportive of national developments, the ongoing developments in the NEPSI process were tracked and reported on at each Committee meeting.

The NEPSI process addressed a variety of issues, including:

- How to finance end-of-life management
- How to organize the collection, transportation, processing infrastructure
- How to assure high environmental standards for recyclers
- What performance standards should be expected
- What steps are necessary to transition to the future system
- How the system could evolve after historic product is managed

Amongst the stakeholders there grew an agreement that the system should be financed by revenues generated at the front-end of the system – that is, from the sale of products – rather than by either government funds or fees charged to the last user for recycling. The stakeholders were concerned that if the last user pays that would be a significant disincentive to properly recycle products.

Most of these items were addressed in working documents; however the final, and contentious, details of the financing system were not resolved. During the last NEPSI meeting in February 2004, in Portland, stakeholders endorsed a resolution that called on manufacturers to develop a compromise on the financing element for a national recycling program. Since the February meeting, manufacturers have been working together through the Electronic Industries Alliance (EIA) to develop this compromise to bring

back to the full NEPSI group for consideration that NEPSI will then recommend to Congress. The current model represents countless hours of work within the industry, and demonstrates commitment to crafting a feasible solution to the recycling challenge. In overview, as of November 2004, the current model under discussion proposes the following:

- Visible fee at the point of sale with flexibility in how the collected funds are managed
- Individual companies would have the authority to manage the funds collected on the sale of their branded products and be responsible for recycling that company's share of returned products.
- The overall collection goal would be set in legislation and would determine the responsibility for manufacturer stewardship plans and the third party organization (TPO) plan.

While not all the specific issues have been resolved, this model represents important progress within the industry. When NEPSI began there was little agreement amongst the stakeholders about what system was best. Generally speaking, industry advocated that government, or the last user of the product, accept full financial responsibility for the end-of-life management. While governmental representatives and environmental organizations generally wanted industry to fully absorb the costs. It took over two years, and a lot of collaborative effort on compromises and hard work on detailed issues to arrive at the well balanced final solution. This solution was adopted in a final Resolution by a consensus² vote of the NEPSI stakeholders.

The progress made by NEPSI was significant. The participating stakeholders made substantial accommodation for the concerns and interests of others, compromised their own most-desired outcomes, and agreed upon a very detailed compromise. A small minority stood outside the consensus agreement, and out of respect to them, further compromises have been, unsuccessfully, sought. The nature of the debate has transformed radically due to NEPSI. Starting as a battle where environmental interests were trying to force industry to change, now industry and environmental interests are actively debating amongst and between themselves about contrasting environmental philosophies. The issue is no longer how to force industry to be environmentally responsible, but rather to decide which is the better of two different ways to be environmentally responsible. Environmental organizations are allied with industry on both sides of this debate.

Open issues that are still under active discussion by industry include:

² *The NEPSI definition of consensus.* In NEPSI consensus has not meant unanimity. From the beginning NEPSI was based on the principle that no single stakeholder could stand in the way of a solution that had the support of the great majority. "Consensus" was further defined, in the final meeting and before the vote on the Resolution, "that no few people can stand in the way of the decision", and that an "80% majority" would affirm a vote. Counting the participants present at the February meeting showed that five people would need to be opposed to stop a vote.

1. Funding Mechanism. On the funding issue, most industry members involved in the recycling dialogue support the current draft model, which involves a visible fee placed on a defined set of covered products at the point-of-sale. There are some companies that do not support a point-of-sale fee and would instead like to continue to explore alternatives that do not involve placing a fee on the sale of their products.
2. Consumer vs. Business Products. The group has reexamined this issue within their discussions due to the difficulty in distinguishing between household and business products on both the front end and in the waste stream. Some companies do not see a reasonable mechanism to limit the products so that businesses do not take advantage of the system in place for household products. The counterargument to including all sales is that many businesses are currently obligated to recycle their used electronics due to state or federal waste laws, and many vendors currently offer take-back services as part of the purchasing contract. The industry group is currently examining ways to exempt business-to-business transactions from the fee if the seller guarantees the takeback and recycling of products at end-of-life.
3. Political Viability. As the group continues to explore the possible compromise, one issue that all companies would agree needs to be explored in more detail is the political viability of the idea of a fee system run by a private, third party organization. Currently, though such systems are being implemented widely in Canada and Europe, no clear precedent can be pointed to in the United States that mirrors this approach. Traditionally, in the United States such responsibilities are assigned to government. Finding new, private and more flexible solutions to these environmental issues will be a challenge.

The industry group is continuing to work towards achieving industry consensus on these open items. It is important to remember that this is a draft proposal that is still under active discussion and review and is intended solely for discussion as a federal solution.

Chapter 2 Background

This chapter describes why addressing electronic waste issues is important, what some of the barriers to addressing e-waste effectively are, and the status of existing infrastructure in Oregon to address this issue.

2.1 Why is Addressing Electronic Waste Important?

Households and small businesses in Oregon are generating a growing stream of used and obsolete electronic products. Technological advances that provide new and higher performing –and lower priced – products, feed that stream. Although reuse and recycling opportunities are available in some portions of the state, many consumers of electronics products in Oregon appear to be simply stockpiling products in garages, basements or other storage areas. In addition, some consumers simply dispose of e-waste in the trash.³

Developing ways to increase reuse and recycling opportunities for electronic products in Oregon is important for several reasons:

- **Production of electronic products requires significant amounts of natural resources.** Recent studies have shown the production and manufacturing of electronic components such as memory chips and processors for personal computers is both energy- and material-intensive. Because of this “upstream” resource investment, analysis indicates that extending the lifespan of a product through reuse or refurbishment of whole products, and capturing the components for use in remanufacturing provide significantly more resource conservation benefits than simply recycling the product to capture streams of raw materials.⁴
- **Obsolete electronic products are not easy to recycle.** Electronic products contain a variety of components with a mix of materials. Substantial labor costs can be incurred to disassemble and separate materials for recycling. Increasingly products are being shredded before disassembly which generates a stream of mixed, and consequently low-value materials. Recovered materials include those such as leaded glass and plastics for which there may be weak, distant or nonexistent markets. An efficient collection and processing infrastructure for e-waste would help reduce costs and improve recovered materials markets.

³ See Section 2.5 (committee’s estimates of amounts of e-waste in Oregon)

⁴ Ruediger Kuehr & Eric Williams (editors.): *Computers and the Environment: Understanding and Managing Their Impacts*, Kluwer Academic Publishers, Eco-Efficiency in Industry and Science Series, Dordrecht/NL, 2003.

- **E-waste contains toxic components.** Electronic products contain hazardous substances that can potentially create risks to human health and the environment if not properly managed. Although market changes are reducing the number of CRTs (cathode ray tubes) sold, the CRT in a television or computer display contains several pounds of lead. The circuit boards found in computers, TVs, cell phones, VCRs and other products generally contain lead, cadmium and other toxic substances. Improper processing of e-waste, whether domestically or overseas, can be hazardous, from wastes or processing chemicals, both to the persons involved in the processing and to the environment.
- **The public is increasingly interested in more convenient recovery opportunities.** Metro’s customer satisfaction surveys show that finding “the most convenient” solution and “ensuring waste will be reused or recycled” were the top rated reasons for calling Metro’s recycling hotline.⁵ Residents in the Metro region are increasingly interested in finding out about recycling opportunities for their e-waste - with calls to the hotline regarding electronics increasing 15% last year - from 5,165 in 2003 to 5,958 in 2004.⁶ Recently, manufacturers and retailers have offered more convenient opportunities in the Pacific Northwest - for example, pilot retail collection programs - and consumer response has been strong.⁷ Although both local and state governments in Oregon are interested in seeing more convenient collection opportunities, budget constraints and competing priorities may limit their ability to respond.
- **The flow of e-waste in Oregon is expected to increase in coming years.** Some changes feeding this flow --- such as the shift to HDTV (high definition television) -- are already underway. The impact of other changes – for example, replacement of VCRs and DVDs with digital recorders – may be more difficult to predict. And, of course, changes from technologies that have yet to be introduced to the market will affect the amount and type of e-waste available for reuse and recovery.

2.2 Barriers and Tools for Electronics Reuse and Recycling

A number of factors constrain the growth of electronics-scrap reuse and recycling – lack of certainty regarding the business environment, information gaps for the general public about what to do with their obsolete products, and economic barriers.

⁵ “Metro Recycling Information Line – Customer Satisfaction Survey,” prepared for Metro by Gilmore Research Group, June 2004.

⁶ Metro Waste Reduction and Recycling Department.

⁷ The US EPA and several Pacific Northwest local governments are evaluating results of the recent HP-Office Depot and Good Guys pilot projects. See EPA’s “Plug-In To eCycling’s” program website for an overview <http://www.epa.gov/epaoswer/osw/consERVE/plugin/press.htm>; and summary of the HP-Office Depot results <http://www.epa.gov/epaoswer/osw/consERVE/plugin/pdf/hp.pdf>. The “Good Guys” pilot project got more than twice the amount of material expected <http://dnr.metrokc.gov/dnrp/press/2004/817electronics.htm>.

Lack of certainty is a formidable barrier for a variety of reasons:

- Uncertainty may exist about the amount and quality of the supply of used electronic products in the waste stream. The uncertainty makes investment in new capacity for increased supply of used electronics for reuse and recycling difficult to encourage.
- Government regulations can be unclear (i.e., there could be differences between state and federal regulations).
- The absence of certification or environmental management standards for collectors, processors and end users could hinder market entry.

Insufficient information could also constrain market participation:

- Generators of used electronics may lack information about why, how and where to take products for reuse or recycling.
- Existing reuse or recycling options may be distant, inconvenient or expensive.
- Generators may not have information about environmental regulations, thus leading to uncertainty about safety and liability.

The economic barriers are varied and numerous:

- The absence of local or regional collectors, processors and end users means higher transportation costs.
- An undeveloped market means economies of scale are absent (e.g., lower processing volumes and thus higher-per unit costs).
- Export markets for processed materials are low-cost competition for local or regional markets.
- Collection and processing costs may be higher in rural areas (fewer economies of scale).
- The market playing field can be uneven when the absence of standards can lead to stockpiling or dumping after collection. In other words, if materials can be collected and there is no demand for them to be recycled into new products, businesses can merely store or dump the products, while giving the illusion of providing a recycling service.
- Financing is not attracted to collection or processing ventures that are new, untested or hazardous.

- Obsolete and older electronics lack value for reuse, and with ever lower prices and more features, the value to reuse markets ever declines.
- Electronics-to-electronics markets are undeveloped locally and regionally

A plethora of market development tools exist to remedy, reduce or remove market barriers to increased e-scrap reuse and recycling. Several of the following tools can be used by local, state and federal agencies, and private non-profit organizations such as the Oregon Recycling Markets Development Corporation.

- Research/market studies to address information gaps.
- Procurement standards requiring recycled content and refurbished equipment where practical.
- Procurement to drive increased demand for recycled materials.
- Education, promotion and market data
- Landfill disposal ban to generate a greater supply of discarded electronic products for recycling.
- Regulation/enforcement of standards for the reuse and recycling of discarded electronic product.
- Loans, grants to support new business startups, research and development, etc.
- Subsidies, e.g., to help offset low-cost competition abroad or high collection and processing costs in rural areas.

2.3 Environmental Impacts of Used Electronic Products in Oregon

This section provides a summary of environmental concerns related to electronic products and their end-of-life management in Oregon. The scope of products considered in writing this summary are the products being addressed in the Senate Bill 867 advisory committee process. These products include: televisions, computers, computer monitors, computer peripherals and desk top devices such as small printers and multi-function machines.

This summary includes Oregon specific information and general information about this waste stream. A list of references cited and key resources used is provided in Appendix A.

Considering environmental concerns, it is important to have a general understanding of the quantity of material for Oregon and the life span of these products.

- Recovered in Oregon: 2,400 tons in 2003 (estimated for 2003)⁸
- Disposed in Oregon landfill: Estimated 27,000 tons in 2002, which equals 0.5% of the total waste disposed.⁹

⁸ 2003 Oregon Solid Waste Recovery Data. Prepared by Oregon Dept. of Environmental Quality. December 2004.

- Stockpiled in Oregon: Estimated 7,500 tons in 2003¹⁰
- Lifespan in U.S.: Personal Computer life span estimated at 5 years. TV life span estimated at 7 or more years.¹¹

Estimated sales of personal computers in the U.S. by 2005 are 580 million units sold since 1981, of which about 325 million will be older than five years by 2005.¹² The U.S. Environmental Protection Agency estimated in 2000 that about 11% of the computers that become obsolete each year are recycled and 75% are put in storage to be managed as waste at some future date.¹³ This is a growing waste stream.

2.3.1 General Environmental Issues and Concerns

Hazardous Constituents

The products contain hazardous constituents that in and of themselves to date do not have documented health or environmental threats in Oregon during product use. Presence of these constituents does not automatically indicate a hazard. However, depending on end-of-life management methods, these constituents have the potential to cause harm to human health and the environment. The hazardous or toxic constituents include:

- Lead – On average there is about 6 pounds of lead in a cathode ray tube (CRT). The lead is encapsulated in the form of leaded glass. Much smaller quantities of lead are also in most CPU circuit boards in the form of solder. Printers and other small peripherals also have small amounts of lead solder. Some portable (laptop) computers contain sealed lead acid batteries.¹⁴ Lead can leach out of the glass, solder and batteries under certain disposal conditions.¹⁵ It can also be released to the air and contained in the ash when incinerated. If the lead in the circuit board

⁹ 2002 Oregon Solid Waste Characterization and Composition. Prepared by Oregon Dept. of Environmental Quality. April 2004.

¹⁰ See Section 2.5

¹¹ Assessment of E-waste Collection & Processing Issues for the Metro Region. Prepared by Cascadia Consulting Group and e4 partners, inc. for Metro Regional Environmental Management. August 2002.

¹² Ruediger Kuehr & Eric Williams (editors.): Computers and the Environment: Understanding and Managing Their Impacts, Kluwer Academic Publishers, Eco-Efficiency in Industry and Science Series, Dordrecht/NL, 2003.

¹³ Ibid

¹⁴ Organisation for Economic Co-operation and Development. Working Group on Waste Prevention and Recycling, Adopted by the Delegates of the Environmental Policy Committee. Technical Guidance for the Environmentally Sound Management of Specific Waste Streams: Used and Scrap Personal Computers. ENV/EPOC/WGWPR(2001)3/FINAL. February 18, 2003.

¹⁵ Organisation for Economic Co-operation and Development. Working Group on Waste Prevention and Recycling, Adopted by the Delegates of the Environmental Policy Committee. Technical Guidance for the Environmentally Sound Management of Specific Waste Streams: Used and Scrap Personal Computers. ENV/EPOC/WGWPR(2001)3/FINAL. February 18, 2003.

is heated or shredded for reclamation, lead fumes or fine particulate can be released into the environment.¹⁶

- Cadmium – Small amounts are in the plated contacts, switches and cadmium may be used as a stabilizer in PVC wire insulation. Laptop computers may contain a rechargeable nickel cadmium battery. Cadmium may be released in the form of fumes or dust during high temperature metal processing or during incineration.
- Antimony – This is a component in the lead solder. CRTs may contain antimony in the screen and/or cone glass. Antimony has been known to leach out under certain land disposal conditions.
- Beryllium – A small amount is used in the form of a copper-beryllium alloy (typically 98% copper, 2% beryllium) in the motherboard. Beryllium in a copper-beryllium alloy may be released as beryllium oxide dust or fumes during high temperature metal processing.
- Mercury – A small amount may be contained in the lighting device used to illuminate a flat panel display. Mercury can be released to the environment during shredding, landfilling or incineration of flat panel displays.
- Brominated flame retardant – Used in some plastics to prevent overheating and potential fires. In processes involving heat, such as combustion or plastics extrusion, the release of halogenated organic compounds can be a concern if processing conditions are not properly maintained. Compounds of particular concern include the chlorinated or brominated dibenzodioxins and furans.
- Barium oxide – Contained in the getter plate of the CRT electron gun. Dust from this constituent can be released during the dismantling and handling of CRTs.
- Chlorine – Contained in any PVC insulation of wires and cables used in consumer electronics.
- Lithium – Can be used in laptop or small batteries on a motherboard. Lithium will be released during shredding of a circuit board where a lithium battery is attached and has not been removed prior to shredding. Lithium can react with oxygen and moisture to create heat, potentially causing a fire.
- Phosphors – A coating, usually zinc sulfide and rare earth metals, is used on the interior of the CRT screen to convert the kinetic energy of an electron beam to light. Cadmium sulfide has also been used in older CRTs. Cadmium can leach into a landfill and it can also present an inhalation hazard to workers breaking CRTs.

¹⁶ ibid

These constituents become a concern during management of the materials as waste at end of life -- not during the use of the product. However, there may also be long-term health effects from production stages, such as micro-chip fabrication, on workers, families, and neighboring communities due to chemical exposure and emissions according to the 2003 United Nations University report, "Computer and the Environment: Understanding and Managing their Impacts."

Material Resources

In addition to the hazardous or toxic constituents contained in the products there are also materials such as steel, aluminum, copper, iron, zinc, precious metals (silver, gold, platinum, and palladium), as well as various plastic resins. These materials represent resources that, when mined and refined/processed for use in the manufacture of these products, can cause significant environmental damage and waste generation. The mining of these raw materials and production of the manufactured materials causes impacts worldwide. However very few, if any, of the materials used in these products are made in Oregon or are made from resources extracted in Oregon.

Sustainability Concerns

There are concerns related to sustainability surrounding the manufacture of these products as well. The environmental impacts are more global rather than local due to the fact that Oregon plays a relatively small role in the actual manufacture of these products.

For example, there is significant energy used in the chain of production processes to manufacture computers. This energy use is particularly important due to the relatively short lifespan of these products. Approximately 528 pounds of fossil fuels, 48 pounds of chemicals, and 3300 pounds of water are used to make one desk top computer and monitor. Most of the energy consumption associated with a computer is in its manufacture rather than its use¹⁷

Locally, the Draft Oregon Strategy for Greenhouse Gas Reductions report to the Governor's Advisory Group on Global Warming states that increasing the reuse and recycling of electronic waste would reduce the net greenhouse gas emissions by 0.019 – 0.034 MMTCO₂ E (million metric tons of carbon dioxide equivalent) per year over the next 20 years.

2.3.2 Waste Stream Impacts and Concerns in Oregon

There is currently very little Oregon-specific data to document environmental impacts directly linked to electronics waste generated and managed in Oregon. Many of the toxic components found in electronics products, such as lead, cadmium, mercury, and beryllium are found in groundwater and leachate samples from landfills. However, no studies have been conducted to establish a direct link between these toxic constituents

¹⁷ Ruediger Kuehr & Eric Williams (editors.): Computers and the Environment: Understanding and Managing Their Impacts, Kluwer Academic Publishers, Eco-Efficiency in Industry and Science Series, Dordrecht/NL, 2003

and the electronic waste disposed in landfills. In fact these toxic constituents are not considered to be highly mobile in a landfill environment.

In examining environmental impacts from electronics waste managed in Oregon it is important to consider the difference between concerns related to waste managed in regulated landfills and controlled recovery operations versus the risks associated with improper or illegal management of these materials.

Safe Management

1. Landfills in Oregon: The SWANA March 2004 report on “The Effectiveness of Municipal Solid Waste Landfills Controlling Releases of Heavy Metals to the Environment” generally reflects the experience in Oregon related to leachate in lined landfills.

The SWANA report concludes that heavy metals do leach out of waste products such as electronics and can be detected in leachate from landfills. However, evidence shows that landfills with liners and leachate collection systems can safely manage these RCRA heavy metals and contain releases to groundwater at levels that protect public health and the environment, at least during the design life of the landfill which is generally less than 50 years.

In addition, reports from the U.S. Environmental Protection Agency and the United Nations University state that 36% - 40% of lead found in landfills comes from CRTs.

There are also important pieces of information that the SWANA report does not adequately address and are a concern related to landfill disposal of electronic waste in Oregon.

- First, toxic constituents like lead, mercury, and arsenic can be biotransformed into a gas in landfills by anaerobic bacteria. There is limited data on this topic to date, therefore it is difficult to conclude that this is not a concern in landfills
- Second is the status of lined landfills in Oregon. In 2004 Oregon has 32 operating municipal solid waste and construction/demolition landfills. Of those 32 operating facilities, 10 have active lined cells operating and the other 22 operate without lined cells. The majority of Oregon’s municipal solid waste is disposed in the lined landfills. In 2003 an estimated 93% went to lined landfills. However, electronic waste in Oregon is disposed in both lined and unlined landfills so this is a potential environmental concern, especially for the unlined landfills. In addition to the 32 active landfills another 55 facilities have closed in Oregon since 1992. There is a high likelihood that many of these landfills received waste electronics during their active life. A significant number of these landfills were not lined and therefore vulnerable to groundwater contamination or gas formation from some of the toxic constituents contained in waste electronics. Since the electronics waste

stream was arguably smaller during the active life of these closed facilities the environmental concerns may be negligible.

- Most of the toxic materials in electronics are very long-lived. For example, heavy metals will be present in landfills essentially forever. However, the protective systems of landfills will eventually deteriorate, creating a potential long-term problem.

There is not a history of data on the disposal of electronic waste in landfills or about the gas transformation in landfills so it is too early to make conclusive statements in Oregon about the potential environmental impacts resulting from landfill disposal of these materials.

2. Waste-to-Energy and Incineration: Oregon also has one solid waste incinerator and one waste-to-energy facility in which electronic waste may be disposed. In the past there have been some issues with the ash from the incinerator containing some of these hazardous constituents. Air emissions from incinerated electronics can potentially be a concern depending on facility operations as noted in Section 2.3.1.
3. Handling and Processing of Electronics for Reuse and Recovery: Currently in Oregon we have facilities that primarily collect electronic waste, refurbish equipment for reuse, and dismantle and demanufacture equipment for reuse and to be sent out-of-state for recovery and processing. There is one processor in Vancouver, Washington who shreds whole components to recover metals and plastics and also two steel manufacturers in Oregon who process metal into raw material and may handle some metal from electronic waste. Precious metals are primarily brokered out-of-state as are CRTs.

Environmental concerns associated with collection and handling of electronics for reuse and recovery, in addition to those described above in Section 2.3.1 related to the hazardous constituents, include:

- Batteries should be removed and managed properly.
- If heat is used to soften solder to remove batteries or chips from printed circuit boards care must be taken to protect workers from exposure to lead.
- Shredding of plastic and metals can cause dust that potentially contains the various hazardous constituents. Also, if lithium is contained in the materials shredded, there can be risk of fire due to exposure of lithium to air and moisture. If a fire arises there can be hazardous air pollutants.
- During smelting of metals there can be releases of some hazardous constituents which that need to be managed through controls on exhaust emissions. If some halogen containing material fragments are mixed in with the metals during the

smelting process there may also be concerns related to emissions, such as dioxin.

- Storage on-site should be managed so that large amounts of materials are not stored for great periods of time. Collection and demanufacturing facilities should manage material so that it is shipped off site to responsible processors on a frequent basis in order to minimize risk of fire and damage to material. If there is breakage or fire then there may be hazardous waste to manage as well as potential hazardous emissions to air and water.
- Packaging and Transportation of materials do not pose any particular environmental risk as long as materials are packaged in such a way that there is minimal risk of breakage and exposure to the elements. Steps should be taken to assure that materials are being sent to environmentally responsible processors and that the material actually arrives at the designated processor or recovery facility.

Improper Management

Oregon currently has primarily collectors, demanufacturers, and reuse facilities for electronics. These types of management activities, if done properly, pose relatively limited risk to human health and the environment. However, because electronic waste contains valuable resources/raw materials such as gold, platinum, copper, and palladium there is a very real risk that unscrupulous people may obtain large quantities of these materials and process them in unsafe and environmentally damaging ways to recover the valuable materials. Examples of incidents and serious environmental violations that have occurred in Oregon in the recent past include:

- A. Portland – In 2002 a major fire occurred at an electronics processing and dismantling facility. The facility had hundreds of computer monitors and computer related parts stored in its recycling facility when the fire occurred. The building in which the recycling operation was being conducted did not have proper fire or safety equipment. A clean-up was required and 112 tons of toxics and hazardous waste was removed from the facility.
- B. Veneta – In 2002 an illegal electronics waste processing site was discovered. The operation was using strong acids to recover gold from electronics. There were thirteen 55 gallon drums of chemicals on site, many of which had corroded and were releasing hazardous constituents into the environment. In addition vats of acid and arsenic had been dumped on the ground. Over 6,000 pounds of hazardous waste was removed from the site. There was evidence of toxic air releases as well as potential drinking water well contamination as a result of this operation.

Because these types of uncontrolled processes have occurred here in Oregon and could happen in the future it is even more important that Oregonians have an economically stable and easily accessible infrastructure available designed to handle the end-of-life management of electronic waste in a safe and controlled manner. Having an environmentally sound and economically viable system can reduce the opportunities for uncontrolled mismanagement.

2.4 Electronic Product Recovery Infrastructure in Oregon

The information in Section 2.4.1 below is based on an electronic and telephone survey done during 2003 by the Department of Environmental Quality (DEQ). The Portland tri-county metropolitan area was covered in a study conducted by Metro in 2002 and updated in Section 2.4.2 below. Maps showing facility and service locations in Oregon are provided in Appendix B.

The DEQ survey focused on defining the current electronics collection infrastructure for households and small businesses in Oregon outside of the Portland metropolitan area. The survey included counties, cities over 25,000 population, haulers, landfills, thrifts, retail stores, and recyclers. One hundred and fourteen (114) entities were surveyed and 69% responded. Of the 79 who responded, 28 are doing some type of collection activity. With the exception of local reuse and refurbishment activity, a large portion of the material collected is trucked to the Portland metropolitan area for brokering, demanufacturing, and processing. Some material is also going directly to Washington for processing and brokering.

2.4.1 Summary Findings for Outside the Portland Metropolitan Area

Collection

- **Recycling and reuse collection infrastructure:** The current infrastructure is diverse. Of those who responded to the survey and provide collection services, the breakdown by type of entity providing collection is shown in the table below.

	Entity Type	% of Total Respondents Providing Collection
1	Landfills	3%
2	Thrifts	19%
3	Retail	23% (Mostly cell phones)
4	Recyclers	20%
5	Local Governments	15%
6	Haulers	20%
	Total	100%

- **Type of Collection Service Provided:**
 - Events (6)
 - Drop Off (21)
 - Pick-up (7)
 - Mail-in (1)
- **Scope of Service:** Many collectors do not distinguish between household and business generators. Thirteen of the 28 entities providing collection collect from

all categories of generators (household, small business, large business, and institutions). 27 of the 28 entities collect from households and small businesses.

- **Type of Electronics Collected:**
 - Computers, monitors, peripherals – 75% collect
 - Cell phones – 67% collect
 - TVs, VCRs, DVDs, stereos – 33% collect (primarily thrifts)
- **Convenient Collection:** The average area served by the collection service was about a 35 minute driving distance one way.
- **Demand for Collection Options:** 68% of the respondents statewide who provide collection services said that demand for options is increasing.
- **Capacity for Increased Collection:** Most survey respondents indicated they could handle more material.

Finance

- **EOL Fees:** 30% of the entities providing collection charge an end of life (EOL) fee. The majority charge only for CRTs. Charges range from \$5 to \$30 and the most common charge is \$10 per unit.
- **Collection Program Funding:** Most of the collection programs are currently being provided through existing operating budgets of those entities providing collection. Some examples of program funding sources include: donations, EOL fees, general county and city solid waste budget (garbage rates and disposal fees), local taxes, sale of materials collected.

Disposition

- **Demanufacturing, Brokering, Processing:** The majority of the material collected for recycling is transported to the Portland metropolitan area for handling once it is collected. Transportation is commonly provided from the collection point to the Portland area by the broker/processor.
- **Due Diligence:** Of the entities who provide collection services 30% do some type of due diligence to assure sound environmental management practices for the ultimate disposition of the electronics they collect. Of those 3% use a written or site visit form of due diligence.
- **Domestic and Overseas Processing:** The handlers and brokers in the Portland metropolitan area who are receiving electronics collected outside of the metro area indicate material is being processed domestically, in Canada, and also in Asia and China. No processing currently occurs in Oregon.

- **Landfill Diversion and Environmental Protection/Sustainability:** Based on surveys, many of the collectors are proud of their efforts to keep the waste electronics from being disposed of in landfills. At the same time, many of them also have very little information or knowledge of the ultimate handling and disposition of the materials they collect.

2.4.2 Summary Information for the Portland Metro Region of Oregon

In the Metro region, a mix of service providers offers e-scrap reuse and recycling opportunities for households and small businesses. Ongoing drop-off of e-scrap is available at several local companies and non-profit agencies. Electronics manufacturers and retailers have conducted collection events, including one recently that extended for several weeks. Local governments, often in cooperation with electronics manufacturers and local businesses, have also provided some collection opportunities.

Metro's Recycling Information hot line and web site maintains a list of those locations where residents can drop off their used electronics. In 2004, Metro received over 5,958 calls looking for information from residents on where to take their used electronics. Information on those other collection opportunities provided by electronics manufacturers, retailers and local governments is also available through the Metro hot line and web site.

In 2002, Metro conducted a study of the e-scrap reuse and recycling infrastructure in the region. The report looked at the necessary elements of an economically healthy e-scrap "supply chain" --- collection, handling, processing and end markets for materials --- and surveyed what currently existed in the metropolitan area. (Since the report was written, a metro-area major non-profit e-scrap service provider (StRUT) has closed.) The report observed that this "supply chain" was in the early stages of development. The report identified issues, such a regulatory framework and funding mechanisms, which would need to be addressed to ensure an efficient and environmentally sound e-scrap system was established in the region. The report also noted several local, regional, and national electronic scrap service providers expressed interest in expanding their operations to serve the Metro region.

2.4.3 Statewide Map of Electronics Management Infrastructure

Appendix B includes three maps which provide a statewide picture of the basic electronics recycling and reuse infrastructure in Oregon. This is a rapidly changing and evolving industry in Oregon and well as nationally and internationally. These maps are intended to provide perspective and a visual snapshot in time.

In addition to the Oregon-based opportunities shown in Appendix B, it's important to note that many computer manufacturers, national retailers, and other national organizations are starting to address the challenge of electronics take-back. The on-line auction site eBay.com recently launched a national web-based forum for individuals and businesses to learn more about how they can re-sell, recycle, and donate used equipment.

(www.eBay.com/rethink). Additional information about programs offered by the private and public sectors is available at www.eiae.org. Although these opportunities do not comprise a comprehensive solution, they should be examined as part of the total landscape of electronic reuse and recycling in Oregon.

2.5 Projections of Recovery of Waste Electronics in Oregon

The question of how much e-waste might actually be delivered to a collection system by residents and small businesses is addressed below.

There are two main purposes for estimating the generation of e-waste:

- It is necessary to project quantities that will be managed in order to predict the costs of the system and therefore system financing needs.
- The projected quantities can be used to predict the size of the infrastructure that will be needed and the jobs and economic activity that will be generated.

The amount of material that will be generated for recycling is controlled principally by two factors – the convenience of the collection system and the effectiveness of the public promotion campaign. Since substantial quantities of e-waste are stockpiled in residences¹⁸, it has been repeatedly demonstrated by pilot collection projects that a convenient, well promoted collection program will generate a substantial, even surprising, flow of product. A few existing and ongoing collection programs also indicate that the flow can be expected to grow over time.

Two methods have been used to estimate the amount of electronics that will be recovered:

1. A waste flow spreadsheet model that uses historical sales data, product life spans, and options for discard to project year-by-year quantities that will be available to a recycling system.
2. A calculation that uses data from existing, long-term, convenient and well-promoted collection programs.

The problem is that these two methods result in very different numbers, with the waste flow model predicting much higher quantities than actual programs have experienced. However, no U.S. collection program has been operating long enough to have reached a sustained even flow of product. The existing programs are continuing to experience an annual increase in product collected.

2.5.1 Predictions by Waste Flow Models

Waste flow models generated over time have become increasingly sophisticated. An EPA contractor – ERG consultants – produced a waste flow model that was used by

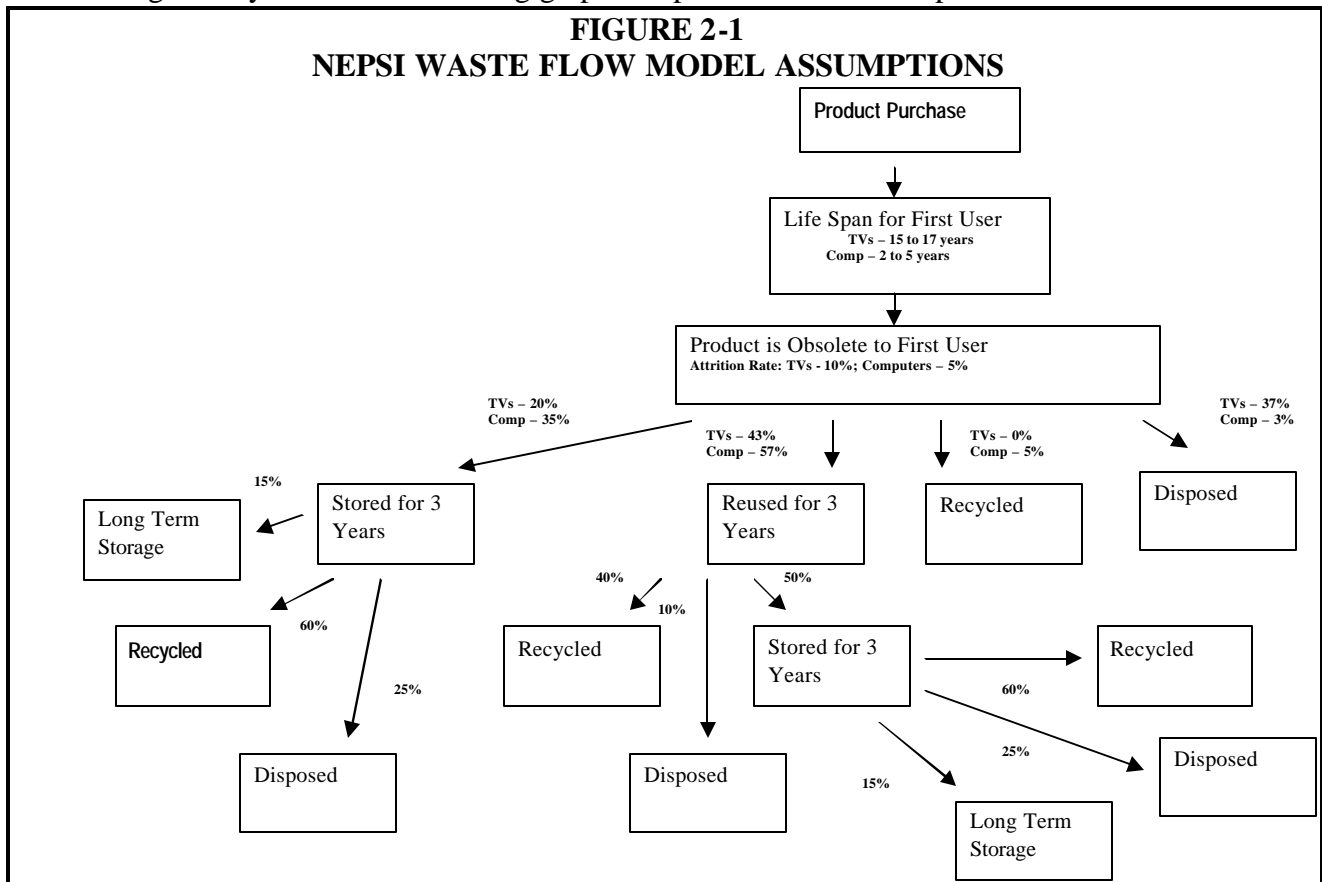
¹⁸ See Section 2.5.3.

NEPSI stakeholders. It was built on an earlier study for Environment Canada, which, in turn, was based on a Carnegie Mellon Report, “Computers and Environment”, and a 1999 National Safety Council (NSC) “Electronic Product Recovery and Recycling Baseline Report”. The NSC report numbers are quite high, and it is often still cited in discussions of electronic waste flows. However, the later models have considerably improved the estimations by using more realistic sales figures – for example, the NSC report did not take into consideration the decline due to a slowing economy – more accurate life spans, and other improved assumptions.

The common data elements (stocks and flows) of the best waste flow models include:

- Annual product sales
- First use life span
- Annual obsolete
- Annual reuse
- Annual storage
- Annual recycled
- Annual disposed
- Annual available

The waste flow model is based on a spreadsheet that projects the quantities that flow through the system. The following graphic depicts the flow assumptions.



The model predicts the number of units and pounds available by year for different product categories. “Available” is calculated from the product that is disposed or recycled in the above figure, and does not necessarily mean that the product will be collected for reuse or recycling. Rather it means that if a collection program is provided, residents will have this product “available” to be provided to that program. But residents will still have to decide to bring it to the collection site, put it out of the curb, or whatever is required.

The following table contains estimates of the number of units and pounds available for Oregon, generated by translating national sales figures into those for Oregon based on relative population size:

TABLE 2-1

Number of Units and Pounds Available								
Year	Monitors		PCs		Laptops		TVs	
	Units	Pounds	Units	Pounds	Units	Pounds	Units	Pounds
2003	90,983	2,729,475	113,728	3,411,844	13,416	134,156	173,606	8,680,285
2004	125,606	3,768,195	157,008	4,710,243	16,705	167,046	179,164	8,958,221
2005	179,004	5,370,111	223,755	6,712,639	28,195	281,951	183,051	9,152,549
2006	181,083	5,432,504	226,354	6,790,630	35,224	352,241	185,738	9,286,894

Adding them all together results in a total for product that is annually available to collection programs that target the categories of electronics listed in Table 2-2. This is not necessarily the amounts that will be collected, since human behavior will determine how much product is provided to the collection system.

TABLE 2-2

Summary of Units and Pounds of Used Electronics Available in Oregon

Total			
Year	Units	Pounds	Lbs/ capita
2003	391,732	14,955,761	4.24
2004	478,484	17,603,704	4.93
2005	614,004	21,517,250	5.96
2006	628,400	21,862,270	5.98

2.5.2 Projections from Collection Program Experience

Many pilot collection programs have been conducted all over the country. The challenge is to find programs that:

- Have characteristics comparable to the projected state or national program. In the case of NEPSI or a state legislated program, this would include that they are long-standing, provide collection opportunities that are convenient to the public, and have been well promoted.
- Have captured good data representing quantities collected that can be assigned to a known population or one that can be accurately estimated. This is critical to determine a quantity per capita, which is needed to predict quantities for any given community.

The NEPSI stakeholders studied this question and determined that only two programs in the U.S. had these characteristics at the time the NEPSI process was underway:

- An 11 year continuously operating, and expanding, collection program in Hennepin County, Minnesota, and
- A statewide network of collectors, supported in part by the State, in Massachusetts that has been operating since 1999.

The following Tables 2-3 and 2-4 depict the collection rates for these two programs.

TABLE 2-3
Existing Collection Program Experience
Hennepin County, MN

	Tons Recycled	Pounds per Capita	Tons Adjusted for OR
1992	11	0.02	34
1993	72	0.13	221
1994	152	0.27	466
1995	200	0.36	613
1996	262	0.47	803
1997	366	0.66	1122
1998	706	1.27	2164
1999	851	1.52	2609
2000	1066	1.91	3268
2001	1252	2.24	3838
2002	?		
2003	1231	2.21	3773

TABLE 2-4
Existing Collection Program Experience
State of Massachusetts

	Annualized Pounds per Capita
2nd half 1999	0.22
1st half 2000	0.57
2nd half 2000	1.75
1st half 2001	1.79
2nd half 2001	2.65
1st half 2002	2.75

2.5.3 Estimating the Residential Stockpile

The waste flow models, and public surveys, show that much of the out-of service electronics is in stockpiles in people's basements and attics. Surveys have shown that the public believes their old computers, and even televisions, should have some value for reuse or recycling. Therefore, they do not commonly dispose of them with garbage, but rather save them with the thought that a reuse or recycling opportunity will emerge.

A study conducted for the California Integrated Waste Management Board in 2001 surveyed the public and asked whether they had an old and unused CRT device, either a TV or computer monitor, in storage in their home. The following statistics are adjusted for Oregon's population:

- Total number of computer monitors likely to be in storage in Oregon: 334,258
- Total number of televisions likely to be in storage in Oregon: 302,921

Using the California statistics, for a typical community, if the number of households in the community is multiplied by 53%, that should approximate the number of old CRT devices in residential storage. It should be noted, however, that no hard data exists correlating the estimates developed in the California survey.

2.5.4 Projecting Numbers for Oregon

An estimate was provided to the Committee of number of units and pounds of used electronics that could be expected to flow into an Oregon collection program, if such program was long-standing, convenient and well promoted. Using the waste flow model, a recovery rate of 50 percent was estimated based on professional judgment. Using the data from existing programs, a per capita annual rate of 2.5 pounds was estimated. Table 2-5 presents these results:

Table 2-5
Estimated Projected Oregon E-Waste Collection Quantities

Year	Waste Flow Model Results		Per Capita Results	
	Recovered at 50% Recovery		Recovered at 2.5 lbs per capita	
	Units	Pounds	Units	Pounds
2004	239,242	8,801,852	237,175	9,060,103
2005	307,002	10,758,625	241,393	9,221,215
2006	314,200	10,931,135	245,676	9,384,828

Note that the 50 percent recovery is simply an estimate based on professional judgment of how many people would use the system. Also, the per capita results are based on existing collection programs that are still experiencing growth in the amount of product being collected. That said, these number can serve as a preliminary estimate of the amount of product that could be expected in the early years of a collection program in Oregon.

Chapter 3

Alternative Statewide Scenarios for Oregon

This chapter outlines several scenarios which the Committee developed for an Oregon model that would address the financing and operations of a statewide system for electronics recovery, reuse and recycling developed to address electronic waste challenges in the state these issues.

3.1 Development of Optional Scenarios for Oregon

At the Advisory Committee meeting on June 15, 2004, the Committee decided to develop a set of scenarios for an Oregon model that would address the financing and operations of a statewide system for electronics recovery, reuse and recycling. An Oregon Scenarios Working Group was formed to report back to the full Committee.

The working group met by conference calls and identified eight alternative scenarios for financing and operating a statewide program, which were described in a matrix (see Appendix C). The matrix provided information, developed by working group consensus, regarding the characteristics of the scenarios including how the money would be managed, how collection and processing services would be provided, how recycler standards and market development would be assured, what roles would be played by different stakeholders, and many other factors. Estimates of revenue needs and implementation costs in Oregon for each of the scenarios were not developed or reviewed by the group. A pros/cons section of the matrix compiled opinions of individual working group members regarding each scenario.

After evaluating these scenarios the working group identified three scenarios that had the greatest potential for Oregon, and that either have been legislated or are in operation in the U.S. today. Each has their supporters and opponents, their pluses and minuses. These became the Tier 1 scenarios, while the remaining scenarios became Tier 2 (see Appendix C).

It should be noted that in addition to development and discussion of the various scenarios the Committee as a whole did reach consensus that a national solution is ultimately the best solution but that in the meantime the citizens of Oregon deserve local options that address their needs in an environmentally sound way.

Two minority reports were prepared by Committee members and are provided in Appendix D and E, as follows:

1. Minority Report - Chapter 3; Alternative Statewide Scenarios for Oregon – Prepared by Hewlett Packard Company (Appendix D)

2. Minority Report - Benefits of an Advanced Recovery Fee Approach for Electronics End-of-Life Management in Oregon - Prepared by Frank Marella, Sharp Electronics and Wayne Rifer, Rifer Environmental (Appendix E)

3.2 Summary of Tier 1 Scenarios

The Tier 1 scenarios were further developed in a matrix by the working group. These are:

- ✓ Government-Funded/Run System
- ✓ Advanced Recycling Fee
- ✓ Partial Producer Responsibility

The Tier I scenarios are summarized below.

3.2.1 Government-Run System

Primary Features

- State and local government finances and operates the system
- Collection services provided directly by local government or via contractors/grantees
- Recyclers contracted to consolidate, transport and process

In a government-run system, the state and local government finance and operate the system using revenues established through legislation or local ordinance. Examples of jurisdictions where such systems are currently in operation include the state of Delaware and Hennepin County, MN.

Under this system the local government provides collection services utilizing the system most appropriate for the population of the individual community. The local government using the established funding, performs such service. The locals would then work with recyclers contracted (and paid) by the state to consolidate, transport and process the collected products. Contracted recyclers would be required to meet Environmentally Sound Management practices (ESM) in order to bid on the contract. State and local government, manufacturers, and possibly retailers would provide consumer education. NGOs would also be asked to support this program (or the other options if implemented). State and Local Government would also be responsible for developing markets for the collected materials as well as reporting on the program's progress. Under the government system, all product (and product manufacturers) are treated equally, including orphan products (products whose manufacturer or successor is no longer in business). Consumers are educated or required to place the product into the system at the end of the product's life.

Pros and Cons This system would be relatively easier to implement because it builds on existing solid waste management systems. There are few incentives to reduce the cost of the system and little likelihood that additional innovation would be spurred. It would

require funding to be raised by new fees. There is no incentive for improved product design; there is no driver for increased markets; there is no product stewardship in this option.

3.2.2 Advanced Recycling Fee

Primary Features

- A legislated fee is collected on new product sales
- There are two alternatives for management of the fee:
 - a) Fee is remitted to government, which functions as a third party organization to administer the system and funds.
 - b) Fee is remitted to a trust fund, and a not-for-profit organization runs the system and administers the funds
- ARF covers costs to collect, transport, and process all products, including orphan and historic
- Government enforces on retailers, ensuring the fee is collected and remitted

Under an Advanced Recycling Fee (ARF) system, a visible fee is placed on the product and collected from the consumer at point of retail sale. It is legally questionable whether a state-based fee can include internet and catalogue sales.

There are two versions of this system. Under a government-ARF, the collected fee is remitted to the government, which would administer the funds and establish operating criteria for the system (using the ARF as the funding mechanism).

The other alternative is to have a 3rd party organization (TPO) (for example a not-for-profit corporation with a manufacturer-controlled board of directors with government and NGO's also represented) run the system, taking over most of the government's responsibility. Government would have enforcement obligations, ensuring that the fee is collected and remitted by all retailers (and manufacturers who act as retailers). The amount of the fee could be capped by the legislation, but the TPO, an agency or the legislature would have the authority to adjust that fee within the cap to ensure that sufficient (but not excessive) funding is available to operate the system. The fee could be set to cover the administrative and operational costs of the private or government run system, as well as government enforcement costs.

Under this system, the ARF for a given year covers the costs for collecting, transporting, and processing all brands of current, orphan, and historic products that enter the system in that year. The government (or TPO) as well as the individual manufactures and retailers, would again perform education. NGO's would assist in monitoring the system and encourage consumers to participate. Consumers would be required to pay the fee on the product at point of initial retail sale (old refurbished and resold products would be exempt) and place the product into the system at the end of its life.

An ARF, not to exceed \$10, with a government managed fund was adopted in California for CRTs only. The NEPSI model is an ARF managed by a third-party organization, later transitioning to partial producer responsibility for all NEPSI products including CRTs, computers, computer peripherals, and televisions.

Pros and Cons The key advantages of this system are that it is easy for consumers to understand, provides funding for the entire system, is relatively easy to enforce at “brick and mortar” retailers. As is done in the California law, an ARF bill can induce compliance by out-of-state and internet sales channels through punitive measures in the legislation, for example by prohibiting sales to the State by companies that do not pay the ARF.

However, concerns still remain among some manufacturers as to whether a “level playing field” can be achieved. There are also contradictory data as to whether this approach will lead to improved product design, allow for parties to take leadership roles, or result in an increased market within the industry for the materials. Under an ARF, all companies pay the same amount for similar products, thus it is claimed that the ARF would not provide an incentive for improved environmental performance. Also, Oregon does not have a sales tax so the infrastructure needed to collect fees at point of retail sale may need to be established. The costs for fee collection were estimated by the State of California to be \$5 million, though the costs in Oregon are unknown. The State of Oregon’s ability to enforce collection of the ARF on internet and catalogue sales would also need to be evaluated under this option. Generally a “substantial nexus” is required within a state for collection of fees or sales taxes from retail, and internet sellers could escape this requirement, placing local retailers at a competitive disadvantage.

3.2.3 Partial Producer Responsibility

Primary Features

- Local Government is responsible for collection of products from consumers
- Manufacturers take responsibility for recovery of products from consolidation points
- Responsibility for orphan products is distributed by law amongst manufacturers
- State Government enforces on manufacturers, ensuring they manage their share of product

Under the partial producer responsibility model, government would be responsible for the collection of the products from consumers. Manufacturers are mandated by law to take financial and physical responsibility for collected end-of-life products from consolidation points for their own branded products or an equivalent portion. Generally manufacturers submit a plan regarding how they will fulfill their responsibilities, which government approves and enforces. Typically, there is no separate financing mechanism associated with this system, resulting in the government having financial responsibility for collection. Manufacturers may work together or separately on their part of the system.

This option requires a method to be developed to allocate the costs for orphan and historic products to current manufacturers or to government.

A variation on this approach is being implemented in Maine with the actual startup scheduled for January 2006.

Pros and Cons This option may result in the most cost-effective system and lead to improved product design and increased reuse of materials. In a system where the manufacturer is financially responsible for recycling their own product, the cost of recycling that product affects their total financial responsibility. If design changes will decrease the recycling costs, the free-market will reward that manufacturer and encourage further design improvements.

However, there are risks that this option will be less efficient and not address or maximize reuse of materials. If manufacturers are obligated to recycle their own branded products, rather than an equivalent share of all returned products, there can be increased costs for sorting and separate handling. If recycling a proportional share is allowed, then statistical sampling could achieve the objective, though a design incentive may be blunted. This system may disadvantage established manufacturers (who will have major amounts of products in the return stream) over newer market entrants (whose products are less numerous in waste streams than their new sales). A surety, or other type of guarantee requirement, could alleviate this inequity; however such systems are likely to be complex. Enforceability against manufacturers with little or no presence in the United States or Oregon may be difficult if not impossible.

3.3 Evaluation of the Scenarios

The working group provided its final report on the Tier 1 scenarios to the full Advisory Committee at the November 16th meeting. The Committee had agreed to vote on the following question:

Of the three Tier 1 options developed by this Advisory Committee, which one would be your organization's preferred long-term approach in Oregon?

The Committee vote was intended to be used for informational purposes. The vote results do not constitute a recommendation by the Committee.

Committee members had the option to vote for one of the three, to vote to maintain the status quo, that is, that no statewide approach should be developed, and to abstain. Further, the second scenario, an Advanced Recycling Fee (ARF), was subdivided, such that the votes for an ARF are divided into two portions in the table below. The ARF options are:

2a) ARF to be managed by a private, industry-based Third-Party Organization (TPO), similar to the NEPSI proposed solution.

2b) ARF to be managed by a governmental agency, similar to the California legislation.

The result of the vote, including some absentee voters, is as follows:

Advisory Committee Votes on Oregon Scenarios	
1) Government-Run System	0 votes
2) Advanced Recycling Fee	7 votes
2a) ARF managed by a TPO	(5 votes)
2b) ARF managed by government	(2 votes)
3) Partial Manufacturer Responsibility	1 vote
4) Maintain status quo, no statewide approach	5 votes
Abstain	4 members
One committee member was absent and did not provide an absentee vote.	

Much of the reluctance on the part of the five members who voted to “maintain status quo”, was based on a strong preference for a national solution to a state-by-state solution. In fact, there was agreement among the Committee members that ideally there would a national solution, and a state solution would not be necessary.

Chapter 4.0

Regulations, Permitting and Certification

This chapter provides information on the status of existing state and federal regulations regarding electronic product reuse and recycling. In addition, the chapter includes the Advisory Committee's considerations regarding a disposal ban, and options for processor permitting and certification.

4.1 Existing State and Federal Regulations of Electronic Product Reuse and Recycling

SB 867 asked that current state and federal regulations be reviewed to determine if they encourage or impede the effective reuse and recycling of electronic products. The purpose of this summary is to provide basic regulatory information to inform the advisory committee process and final report.

The current regulatory and policy structure in Oregon encourages reuse and recycling by providing no regulatory barriers to these activities. However, in the case of cathode ray tubes (CRTs) there is currently some ambiguity about their regulatory status related to recovery because the state is currently operating under a policy rather than a regulation in anticipation of a federal regulation being adopted to clarify CRTs' generated in regulated quantities hazardous waste status when being recycled. Because there is no regulatory oversight of reuse and recycling collection and demanufacturing operations under current regulations for solid waste recovery facilities, this leaves some uncertainty for consumers related to safe reuse and recycling options available for their waste electronics. The current oversight system for reuse and recycling is by industry self-regulation through various certification programs and guidelines. It is presently the consumers' responsibility to become informed about these programs in order to make good choices for reuse and recycling. This represents at least a perceived barrier to getting some of the stockpiled materials out of storage and into the reuse and recovery systems in a timely manner.

The summary of electronic waste regulatory requirements for Oregon outlined below is current as of November 2004. The regulations and policy described relate to any electronic waste, but are summarized in the context of the electronic waste materials being addressed by the SB867 Electronic Product Stewardship Advisory Committee. These materials include computers, computer monitors, computer peripherals, consumer desk top devices such as printers and fax machines, and televisions.

It should also be noted that, in addition to state and federal environmental requirements for electronic waste, there is also a variety of international requirements which may apply to export of this material. This summary does not attempt to include these international requirements.

4.1.1 Management of Electronic Waste Generated by Households

- State Regulations:
 - Exempt from state CRT Management Policy
 - Exempt from hazardous waste regulations
 - Required to be managed as a solid waste
 - Can be reused or recycled at any facility conducting these operations
 - Reuse and recycling facilities in Oregon are not required to have a permit
 - Can be disposed of in a permitted solid waste disposal facility
- Federal Regulations:
 - Same as state regulations

4.1.2 Management of Electronic Waste Generated by Businesses and Institutions

A business or institution that generates electronic waste must make two determinations. First, they must determine if the electronics they are discarding are hazardous waste. Some cathode ray tubes (CRTs) in waste computer monitors and televisions have tested hazardous for lead under Federal EPA hazardous waste regulatory criteria.¹⁹ Other electronic components such as central processing units (CPUs), keyboards, laptops, plasma screens, etc. can be tested for hazardous waste toxicity. However, there is not clear guidance on how standardized test methods such as TCLP, or sample preparation methods in SW846, should be applied; businesses disposing of these materials are responsible for determining if their waste is hazardous waste. Because guidance on reasonable and relevant methods for sampling, testing and analyzing whether computer hardware is hazardous is lacking at this time each generator must make the best decision they can with available information. Second, the business must determine its hazardous waste generator status. In determining generator status, a business must account for all hazardous waste generated, not just electronics. The following chart outlines the hazardous waste generator categories.

Status	Waste Quantity Generated	One Calendar Month	Accumulate Any Time On-Site
CEG	0 – 220 Pounds	X	
CEG	Up to 220 Pounds		X
SQG	221 – 2199 Pounds	X	
SQG	> 2200 Pounds		X
LQG	2200 Pounds or more	X	

CEG = Conditionally Exempt Generator

SQG = Small Quantity Generator

LQG = Large Quantity Generator

¹⁹ In the University of Florida study, “Characterization of Lead Leachability from Cathode Ray Tubes using the Toxicity Characteristic Leaching Procedure” by Timothy G. Townsend et al, 1998, note that average leachable lead concentrations in 15 out of 36 CRTs did not exceed the Federal EPA limit of 5ppm.

Once the above determinations have been made by the business they can then determine which regulations and policy apply.

- Federal and State Regulations
 - Except where noted in the text below, federal and state regulations are the same in Oregon.
 - If electronics from a business or institutional generator are legitimately being reused, they are not considered waste and are not subject to solid waste or hazardous waste regulation.
 - All hazardous waste generators of electronic waste, including CEGs, may legitimately recycle this waste and therefore would be eligible for some relief from full state or federal hazardous waste management requirements. It should be noted that if the materials are not safely handled during reuse or recycling then the hazardous waste generator of the waste may be responsible for environmental damage and hazardous waste requirements.
 - Reuse and recycling facilities in Oregon are not required to have a permit
 - If the generator of electronic waste, including CRTs, is a hazardous waste generator and not a CEG, they are prohibited from disposing of the waste in solid waste disposal facilities and must meet hazardous waste management requirements if the items exceed toxicity characteristic levels or are determined to be a hazardous waste.
 - If the hazardous waste generator is a CEG then they may dispose of electronic waste in a permitted solid waste disposal facility.
 - State Pollution Control Tax Credits may be available to manufacturers of electronics and electronic components who reduce pollution by reducing the amount of lead contained in the components they manufacture.
- State Policy - CRTs
 - Policy currently states that if CRTs are being reused or recycled they are exempt from hazardous waste regulation.
 - All CRT-containing equipment that is **not** reused or recycled is subject to applicable hazardous waste regulations. If you are a LQG or SQG you must manage them at permitted hazardous waste facilities and meet all hazardous waste generation, transportation and storage requirements. If you are a CEG you may dispose of them at permitted solid waste facilities and manage them as solid waste.
- Federal Regulation (proposed) - CRTs
 - The U.S. Environmental Protection Agency (EPA), in 2002, proposed a regulation that would provide an exclusion from hazardous waste regulation under the Resource Conservation and Recovery Act (“RCRA”) for CRTs that are recycled in accordance with the requirements of that proposal. *See* 67 Fed. Reg. 40,507 (June 12, 2002). The proposed regulation would essentially codify current state policy which says if CRTs are being reused or recycled they are exempt from the hazardous waste management

requirements for generation, storage, transportation and disposal. There is no indication if or when EPA may finalize this rule.

4.1.3 State Interim Policy for Management of CRTs

Currently, the state of Oregon has an Interim Policy (2002-PO-001) in place for management of cathode ray tubes (CRTs) (www.deq.state.or.us/wmc/hw/policy/2002-PO-001.pdf). This policy does not apply to CRTs generated by households. This policy includes eight conditions that persons or facilities deciding to recycle their products are required to meet. The intent of this policy is to address “how CRTs can be managed under existing hazardous waste management regulations while EPA is finalizing its CRT management rule.” The EPA interim rule was first released for public comment in June 2002; no further public action has taken place since then.

The State of Oregon Interim Policy is intended as guidance for non-household facilities that generate and handle computer monitors and TVs for recycling, and did not constitute formal rulemaking. The goal behind release of the Policy was to try and facilitate increased recycling, repair or reuse of CRT containing products from hazardous waste generators.

The Advisory Committee recommends that Oregon revisit the interim CRT rule and consider formal rule making to strengthen enforcement and provide clarification.

4.2 Disposal Ban

The Advisory Committee deliberated the rationale for and the usefulness of a disposal ban on e-waste. To date, several states have enacted laws or rules banning disposal of e-waste components such as cathode ray tubes (CRTs), including Massachusetts, California, and Minnesota.²⁰ Advisory Committee members had differing views as to whether a law banning disposal of e-waste is appropriate for Oregon or not.²¹ Reasons offered in support of a disposal ban on e-waste included: 1) conserving resources and providing a higher and better use for marketable materials; 2) ensuring a reliable flow of e-waste to a collection and processing infrastructure; and 3) limiting toxic constituents of e-waste from becoming an environmental problem.

With regard to number three above as a sound rationale for a disposal ban, Advisory Committee members generally agreed that environmental problems resulting from the disposal of e-waste *in a modern, lined landfill* could not be scientifically established.²²

²⁰ Oregon has no statutory disposal ban on e-waste, but has adopted federal hazardous waste regulations that prohibit disposal of CRTs in large quantities by regulated generators. Small businesses and households are exempt from the regulations.

²¹ The following items are currently banned from disposal in Oregon: whole tires, lead-acid batteries, used oil, vehicles, and white goods.

²² The latest available information associated with landfill disposal of e-waste, a March 2004 report from the Applied Research Foundation of the Solid Waste Association of North America (SWANA), reviewed data and report findings on releases of heavy metals in landfill leachate and gas and concluded: “MSW landfills can provide for the safe,

(For a more complete discussion on the environment and e-waste, see “Environmental Concerns Related to Used Electronic Products” in Section 2.2)

With regard to numbers one and two above as sound rationales for a disposal ban, Advisory Committee members agreed that diversion of e-waste from disposal to a higher and better use is desirable, and that a reliable flow of e-waste to a collection and processing infrastructure would probably be aided by a ban on disposal.

Advisory Committee members also agree that disposal bans should not be viewed in isolation. Advisory Committee members support consideration of a disposal ban if it follows a number of prerequisite policy conditions that are generally considered part of a comprehensive e-waste program. These conditions are as follows:

- **Funding source.** Either through an Advance Recycling Fee (ARF) or producer responsibility framework, such funds need to be instituted and available to build up infrastructure for e-scrap collection, transportation, and processing.
- **Markets.** Funds must be dedicated in part to programs emphasizing enhancement of existing and creation of new end markets, as well as the development of new processing technologies.
- **Standards.** Environmental, health and safety standards must be developed for sound management of collected materials, including reporting and documentation procedures for end-markets.
- **Infrastructure.** Adequate collection, handling, and processing infrastructure must be conveniently available to the public so that they have a place to take this material for reuse and recovery.

After these policy conditions are addressed, a disposal ban option can be considered, with particular consideration given to:

- Objects of the disposal ban. Identify the universe of electronic products to be banned from disposal.
- Enforcement. Determine appropriate level (generator, collector, disposal facility) at which e-waste disposal ban enforcement is applied, and resources necessary to accomplish enforcement.
- New supplies. Identify the potential impact on existing infrastructure and markets of new supplies of e-scrap resulting from a disposal ban.

efficient, and long-term management of disposed products containing RCRA heavy metals without exceeding limits that have been established to protect public health and the environment.”

4.3 Processor Permitting and Certification

The Advisory Committee convened a workgroup to address the potential need for electronic scrap collector and processor permitting and/or certification requirements based on environmentally sound management (ESM)²³ standards. The workgroup was made up of a cross-section of the full committee, including two processors.

Many components in electronic products contain materials that can be hazardous during processing. These include lead in CRT glass, mercury in lamps, chemical additives in plastics, and various substances in batteries and circuit boards. The goals behind development of an ESM standard and certification program and/or creation of a new regulatory program for managing electronic materials processed are as follows:

- Protecting public health and welfare and the environment.
- Ensuring that those businesses collecting and processing electronics generated in Oregon are doing so in an environmentally responsible manner.
- Creating a consistent, known environment so public and private investment can be made in electronics recycling infrastructure.
- Creating a level playing field so that recyclers (including downstream processors) that handle material in an environmentally sound manner are not undercut by irresponsible recyclers.

4.3.1 Permitting and Certification Programs, Existing and Under Development

Described below are a handful of electronic scrap collector and processor permitting/certification programs currently in place or being developed.

International Association of Electronics Recyclers (IAER)

In 2000, the IAER introduced a formal process to certify electronics recyclers. The scope of IAER certification focuses on three primary areas: Management Systems (Environmental, Health, Safety, & Quality), Operational Capabilities, and General Business Factors. To be certified, companies must successfully complete a pre-screening process and on-site audit. Certification criteria are provided in Attachment A and can be found on IAER's website at www.iaer.org/certificationstandards.htm.

To date, two companies nationally have been certified by IAER, and ten companies are in the process of certification. The IAER Certification costs approximately \$5,000.

States of Iowa and Connecticut

The State of Iowa Environmental Protection Commission recently adopted rules regarding cathode ray tube (CRT) device recycling (Iowa Administrative Code Chapter 567-122). These rules were adopted to insure that the discarded CRTs are recycled in a

²³ The term ESM is used to describe standards on recycling processors to protect the environment and worker health and safety.

manner that is safe for human health and the environment. The rule establishes two kinds of permits: CRT Recycling permits and CRT Collection Permits.

A CRT Collection Permit is needed for any facility that collects discarded CRTs on an ongoing basis but does not process, refurbish, or demanufacture CRTs. A collection facility may donate or sell CRTs that are in good working order without repairing or rebuilding them.

A CRT Recycling Permit is needed for facilities that refurbish, demanufacture, or process CRTs so that they are returned to use as raw materials or products. A CRT recycling facility may collect CRTs as part of their recycling operation without a CRT Collection Permit.

The State of Connecticut has also recently developed a program to regulate businesses involved in processing electronics for recycling. The Connecticut Department of Environmental Protection has issued a general permit for disassembly of used electronics such as computers and televisions. Large quantity handlers that accumulate more than 5000 kilograms of universal waste onsite at any one time and handles used electronics are required to register. Authorized facilities must comply with the conditions of the general permit regarding general operating conditions, management of material from disassembly and maintenance of the disassembly area.

EPA Plug- In Guidelines

In May 2004, EPA issued Guidelines for Materials Management as part of EPA's Plug-In To eCycling. Currently, the guidelines are intended for use by Plug-In To eCycling partners, who will test the provisions and provide information about the most effective and practical methods for safely managing used electronic equipment. EPA is in the process of identifying an entity or entities (a third party organization (TPO)) that will use these guidelines to develop a national certification program for electronics recyclers and other handlers. EPA estimates that a national certification program will be available within the next two years.

In the meantime, EPA expects manufacturers, retailers, governments and others who are directly contracting with recyclers and others for recycling and refurbishment services to verify their adherence to these guidelines.

Guidelines encourage anyone who handles used electronic equipment to:

- Maximize reuse, refurbishment, and recycling over disposal and incineration.
- Ensure that exported electronic products are being sent for legitimate reuse, recycling, or refurbishment, and provide for special handling of components which may contain substances of concern.
- Make sure that collection, recycling, refurbishing, and disposal facilities follow management practices that are consistent with the Guidelines.

In addition to ensuring environmentally safe recycling of old electronics, these Guidelines aim to promote and maintain adequate markets for the reuse and recycling of electronic equipment by providing safe, reusable equipment or industrial feedstock materials to legitimate markets, wherever they exist.

It should be noted that many NGO's object to the allowance of prison labor and export activity in these guidelines.

BAN/SVTC Pledge

The Basel Action Network (BAN) and the Silicon Valley Toxics Coalition (SVTC) have developed a recycler's pledge. The pledge includes, among other requirements:

- Prevention of hazardous e-waste from going to municipal incinerators or landfills
- Prevention of the export of hazardous e-waste to developing countries
- Use of free-market rather than prison labor to dismantle or recycle e-waste

Other Efforts

NEPSI developed a set of Environmentally Sound Management (ESM) guidelines for use with contracted recyclers. They are intended to become contract requirements for all processors receiving materials and payment under the NEPSI system. The standards are similar to the EPA Plug-In Guidelines. These materials guidelines were never completed and are in draft form pending completion of the NEPSI dialogue.

The Organization for Economic Cooperation and Development (OECD) also has guidelines for electronic recyclers, which was used as the basis for EPA's Plug-In guidelines.

4.3.2 Contents of ESM Standards

Typical contents of ESM standards include:

- Ensuring reuse, refurbishment and recycling techniques are used to the full extent practicable
- Guidelines for when incineration and land disposal is unavoidable
- Compliance with all applicable federal and state requirements
- Compliance with export requirements
- Guidelines for materials designated for reuse or refurbishment
- Guidelines for materials designated for recycling

Two issues have been particularly contentious in development of ESM standards:

- 1. Export of hazardous substances** Some environmental advocacy organizations have advocated that the export of hazardous materials to developing countries be banned. This is supported by the Basel Convention which the U.S. is considering joining, and which prohibits export of hazardous wastes from developed countries to developing countries. Some recyclers and manufacturers that use recyclers have discontinued export of certain materials.

- 2. Use of Prison Labor** Similarly, advocacy organizations have objected to the use of prison labor because, they contend, it is not protected by the same standards for worker health and safety, it is forced labor, and it undercuts private recyclers, impeding the development of a sustainable system. Some manufacturers have banned the use of prison labor in their contracting.

With the exception of the BAN/SVTC Pledge, most standards do not address these issues directly, but rather indirectly through processing and health and safety standards.

4.3.3 Permitting/Certification Recommendations for Oregon

The Advisory Committee initially identified three alternative scenarios for Oregon electronic scrap collector and processor permitting and/or certification. These three alternatives include:

- 1) Develop a State Voluntary E-Waste Handler Certification Program
- 2) Adopt EPA's Plug-In to eCycling Guidelines Certification When Implemented, and Use Existing Standards in the Interim
- 3) Implement a Mandatory E-Waste Handler Regulatory Program

It was recognized that permitting and certification programs throughout the United States should be standardized as much as possible, or recyclers and other handlers will be left with a difficult patchwork of ESM standards to attempt to follow. With this in mind, the Advisory Committee endorsed alternative #2, which is described below.

Adopt EPA's Plug-In to eCycling Guidelines Certification When Implemented, and Use Existing Standards in the Interim

Primary Features

- Adopt EPA's national certification program once it is implemented (likely within 2 years)
- In the interim, use existing standards such as EPA's Plug-In to eCycling Guidelines as a voluntary information/screening tool for selection of a recycler
- Recyclers who demonstrated compliance with the eCycling Guidelines would be included in statewide referral websites such as DEQ, DAS, and METRO

As described above, EPA recently issued Guidelines for Materials Management as part of EPA's Plug-In To eCycling. These guidelines were developed as a first voluntary step to try and develop national guidance for the management of "end-of-life" electronics. EPA estimates that a national certification program will be available within the next 2 years and a verification process will be included.

It is proposed that the state of Oregon adopt EPA's national certification program once it is implemented (likely within 2 years). In the interim, Oregon should use EPA's Plug-In to eCycling Guidelines for Materials Management as voluntary guidelines, available to manufacturers, retailers, governments and others who are directly contracting with recyclers and others for recycling and refurbishment services as an information/screening tool for selection of a recycler.

Several approaches could be implemented to incentivize recyclers to demonstrate compliance with the eCycling Guidelines:

- Inclusion in statewide referral websites such as DEQ, DAS, and METRO
- State procurement for disposition of obsolete electronics would require demonstration of compliance
- Publicly sponsored e-waste collection programs would require demonstration of compliance

It is important to note that the parties who contract with recyclers, whether the recycler is certified or not, is ultimately responsible for actions of the recycler under Federal RCRA and CERCLA laws.

Chapter 5

Analysis of Job Growth and Market Development

The economic development and job creation opportunities related to electronic waste management was one of the considerations specified in SB 867. This Chapter provides information regarding these opportunities.

The Job Growth and Market Development Working Group studied the potential job and income growth in Oregon and the factors that can impact the e-waste marketplace. The Working Group was comprised of members from both the public and private sectors including local, regional, and national e-waste processors, recycling experts, and government staff.

5.1 Assumptions

Job growth projection for the e-waste industry in Oregon was derived from the estimated amount of additional electronic material that is expected to be *recoverable* for reuse and/or recycling, and the necessary human resources required to manage this supply. See Section 2.4 for these estimated numbers.

Certain pre-existing conditions are assumed to exist in order to support an increase in the current levels of e-waste recovery in Oregon. They include:

- Laws and regulations, including a statewide funding mechanism, are clearly defined and in place to support long-term investment in e-waste processes
- Adequate statewide infrastructure exists for e-waste collection and processing
- Consumers are educated regarding end-of-life options for electronic products

With respect to processing capacity and wage income, actual employment data was provided by each of the e-waste processors represented in the Working Group to establish a baseline. For employment in collection from the public, a model that had been developed by NEPSI was used. The figures vary depending upon the collection method used. An average was taken of employment from three different methods: periodic collection events, permanent large drop-off centers, and numerous smaller collection sites. Given this information along with the estimated increase in recoverable e-waste supply, additional job and income growth was calculated.

For the purpose of this analysis, the projections in job and income growth do not quantify the personnel involved in the operations of out-of-state, downstream uses of recycled product. Nor do they include government employees engaged in promoting and/or overseeing the system. Moreover, the reuse market was not included in these projections since economies are largely achieved through an increase in volunteer labor.

5.2 Projected Job and Income Growth

Based on the methodologies, assumptions, and factors outlined above, roughly 36 new jobs representing approximately \$1,150,000 in gross wages and benefits could be created (see Labor Generation table). In addition to direct job and revenue growth, the “multiplier effect” would roughly double these figures²⁴ to include the indirect revenue from businesses that provide support services to the e-waste industry as well as “induced” benefits, i.e. the additional local spending generated from e-waste and support services employees.

Scrap material from e-waste disassembly is transported out of state for processing. Though outside the scope of this analysis, this poses yet another opportunity for job creation in the recycling and reuse sector.

5.3 Current Barriers and Opportunities

- 1) Barrier -- Lack of certainty regarding existing government regulations and pending changes.

Businesses are hesitant to make major investments in operations due to the “gray areas” of government regulations and the expectation that changes in policy and/or enforcement may have a detrimental impact on their activities.

Opportunity – Public/private dialogue

Representatives from businesses, government and NGOs can work together to develop a system that addresses the economic, environmental and social issues of e-waste processing.

- 2) Barrier -- Weak infrastructure to support a statewide end-of-life management of electronic products

There is no established method for consistent recovery of electronic products that is readily accessible and convenient to consumers throughout the state of Oregon. Particularly in the rural areas where the recycling of basic materials can be difficult, the handling of electronic products is even more cumbersome.

Opportunity – Market development for urban and rural economies

Depending upon the model to support end-of-life management (e.g. ARF, visible fee, government-run, etc.), new systems will need to be developed to facilitate the disposal and take-back processes. The outcome will produce jobs across the state in

²⁴ “US Recycling Economic Information Study,” The National Recycling Coalition, July 2001

both urban and rural communities while supporting the product and environmental stewardship for which Oregon is highly regarded.

- 3) Barrier -- Lack of consumer knowledge regarding “end-of-life” options for electronic products.

Average consumers are increasingly aware of the potential value associated with electronic products, even after the products are no longer of use to them. The anecdotal feedback from experts in the recycling and reuse industry indicates an information gap exists between the recycling/reuse programs and the consumer who represents a potential supplier of electronic goods. Furthermore, the marketing of these programs tends to be at the grassroots level where most of these programs began.

Opportunity – Educational outreach

Through collaborative efforts between OEMs, distributors, retailers, e-waste processors, and local municipalities, campaigns can be launched to raise the level of awareness among Oregon consumers regarding the benefits of reusing and/or recycling electronic products as well as the programs that exist to serve this purpose.

- 4) Barrier -- An uneven playing field inhibits economies of scale

Allowing unregulated “dumping” disregards the negative environmental and social impacts and creates an uneven playing field for businesses that exercise responsible stewardship. Brokers that take materials for free and ship overseas are competing with businesses that process these materials locally and must charge a fee to cover the cost of operations. This form of unfair competition inhibits the economies of scale that are necessary to develop a viable e-waste market in Oregon.

Opportunity - Certification / Permitting

By introducing e-waste certification, similar to the concept of a licensed and bonded general contractor, a base line could be established that would help increase the visibility of e-waste processors and encourage greater competitiveness within the industry.

5.4 Conclusion

Though barriers exist, Oregon stands to benefit by supporting the growth of the electronic reuse and recycling industry. Estimates of direct, indirect, and induced benefits include approximately 72 jobs and over \$2.3 million in gross wages. In addition to the economic benefits, an increase in e-waste recycling and reuse helps preserve Oregon’s natural resources and enhance the quality of life of its citizens. The efforts of the Committee represent an important investment in developing a strategy to address the challenges of

electronic waste management, and may provide information of value to other states and regions.

Specific opportunities noted in Section 5.3 above include encouraging ongoing public/private dialogue to address the uncertainties currently discouraging development of infrastructure; explore opportunities for market development to provide stronger incentives for infrastructure development; invest in education and outreach to ensure the public knows where to take used equipment for reuse and recycling; and explore certification options to discourage dumping and level the playing field for processors.

Chapter 6

Education and Outreach

The Advisory Committee was specifically tasked by the enabling legislation with developing recommendations for educating consumers and businesses in the area of electronics product recycling. This chapter describes some of the education and outreach options considered by the Committee and their recommendation for next steps.

The discussion about Oregon's outreach and education needs for electronic products began with identifying target groups, the types of information they would need to make waste management decisions for unwanted or obsolete electronic products, and the potential methods available to disseminate the information.

6.1 Target Groups and Informational Needs

The target groups identified included consumers, small businesses, large businesses, institutions (e.g., schools), local governments, retailers and recyclers. Considerations for each of these groups are described below.

- **All of the target groups** will need to know:
 - how to donate old equipment for reuse or recycling
 - why it is important to manage old or unwanted equipment differently from other waste
 - that their old electronics were handled in an environmentally sound manner
- **Businesses and institutions** also need to know what legal requirements for electronic waste management would apply to them, based on their hazardous waste generator status.
- **Local governments** will need all of the general information, plus
 - regulations for their community and businesses for program outreach and information
 - environmental and legal requirements for electronics recycling facilities locating in their area
 - environmental and legal requirements for collecting electronics products, should they choose to offer this service
- **Recyclers (and collectors)** will need to know and understand
 - criteria for performance and legal requirements
 - that the equipment or parts they send out are handled in an environmentally sound manner
- **Retailers** will need to be aware of the various end-of-life options and understand the environmental requirements for recyclers

6.2 Summary and Recommendations

The advisory committee agreed that there is not one single best way to reach the many target groups. Due to the diversity of Oregon's regions, some methods, such as radio ads, are very effective in one region, but cost prohibitive in other areas. A variety of methods should be utilized to provide education and outreach throughout the state.

Two outreach methods which could be used to reach all the target groups are websites and a call center. The use of websites, which could be hosted by manufacturers, industry groups and Oregon State government, is a highly rated option, as they would be easy to access and update, could link to each other, and most importantly, could provide Oregon-specific information. The call center is another favored option. It would operate similarly to Metro's Recycling Information Line but would function on a statewide basis. It would need to be promoted widely to be successful. For both the websites and call center options to work, information would need to be updated regularly. A number of websites currently exist, although some modifications may be needed. Hosting locations, costs, funding, and other logistical issues would need to be explored further to assess the call center option.

The following next steps are recommended:

High Priority Recommendations

- **Call center.** Investigate development of a call center to serve households and small businesses within the state on reuse and recycling options for electronics. Recommend appropriate entity – e.g. public, private, non-profit or public/private partnership - for providing service. Analyze potential costs, operational details, financing mechanisms and/or agreements (e.g. contracts, intergovernmental agreements) that might be necessary. This should be a one-stop, one phone number “brand” for where to get information in Oregon about electronics recycling options.
- **Website.** A state agency, or a public-private partnership should quickly take the lead and develop and host a website as a portal for statewide information - coordinating ongoing updates of website with information from industry, reuse and recycling operations, local governments, etc. The website should also include information on national producer recycling programs.
- **Existing Educational Efforts.** Assess what educational efforts are already in use and their effectiveness in order to build on successful efforts and avoid duplication of effort.
- **Template Materials.** Evaluate the need for and effectiveness of using template materials (e.g., ads, flyers, brochures, articles) for use by local governments. If determined appropriate, develop materials and provide to local governments.

- **Rural Survey.** Conduct a survey sampling in rural areas of the state that have not been represented in discussions to date. How can we make it as easy for them to recycle as it is to purchase a computer? When and how do they want to get electronics recycling information?

Medium Priority Recommendations

- State agencies, federal agencies, and industry groups should develop clear guidance documents and criteria about the legal requirements of various generator classes, reuse and recycling operations, and collectors. Information should be dispensed through industry and trade association media and standard regulatory channels.
- Use garbage collection bill inserts and local government solid waste and recycling publications to distribute information about electronics recycling.
- Local governments should incorporate electronic reuse/recycling option information into business assistance programs and ongoing outreach avenues.
- State workgroup representative could work with manufacturers and industry to develop consistent and appropriate language for Oregon specific information to be placed on the product box, in the manuals and on the industry (national) websites. (For example, providing stickers to manufacturers/retailers that have a web address and hotline phone number(s) on them.)

Low Priority Recommendations and Special Opportunities

- Coordinate with retailers to provide consistent and appropriate language for Oregon-specific information for distribution at time of purchase. Manufacturers, state or local governments or other parties may spearhead this. Also, retailers may participate in promoting special campaign information with shelf talkers and ads.

Chapter 7

Reuse Entities and Opportunities

The Advisory Committee explored the role of electronics reuse entities in Oregon and the opportunities and barriers for creation of additional reuse entities, particularly outside of urban areas. The Committee is aware of two reuse models in existence in Oregon: non-profit organizations focused solely or primarily on electronics reuse and charitable organizations with a broader mission, for example thrift shops, which collect used electronics for reuse. In addition several for profit businesses who ship collected materials overseas also broker materials for reuse.

Reuse entities play a critical role in diverting electronic equipment that can be upgraded or refurbished from direct disposal. Reuse entities often also have an overarching social mission, such as training low-income people and providing computers to needy individuals.

7.1 General Characteristics of the Noncommercial Computer Reuse Sector

There has not been a comprehensive study of noncommercial computer reuse in Oregon; however, a fall 2004 study conducted by CompuMentor²⁵ focused on the Bay Area provides some insight into the characteristics of this sector. Highlights from this study which may be relevant to this report are provided here.

According to this study, the noncommercial computer refurbishing field represents about 2% of overall computer recycling industry in the US. It is comprised of noncommercial organizations that refurbish discarded computer equipment to help achieve a broader social mission (e.g. reducing environmental impacts or helping individuals or organizations “cross the digital divide”) (CompuMentor, 2004).

The study indicated that typically these organizations employ a few paid staff and rely heavily on volunteers. Many of them expect their capacity to double in the next three years.

The study also notes that private foundation and government grants are currently not adequate to support the development of the noncommercial computer reuse field to the extent it will need to grow to meet demand. This suggests the need for a strategy to ensure the adequate development of this sector to meet the expected demand, particularly related to the social objectives of helping low income communities cross the digital divide.

²⁵ CompuMentor (Fall 2004), “Islands in the Wastestream: Baseline Study of Noncommercial Computer Reuse in the United States”.

7.2 Non-Profit Organizations Focused on Electronics Reuse in Oregon

Free Geek of Portland and Mac Renewal of Eugene are two of the non-profit electronics reuse organizations in Oregon. These two organizations are described briefly below. Additional information regarding Free Geek and Mac Renewal is provided in Appendix F.

Free Geek was founded by Oso Martín in February of 2000 to provide access to no-cost or low-cost computer technology and to recycle obsolete electronic waste. Free Geek relies on many volunteers, who trade their time for a refurbished computer. In four years, Free Geek has tripled in physical size, while growing its budget ten-fold. Free Geek has many programs including computer recycling, computer adoption, computer building, computer education, a thrift store and a “Computers for Kids” program. More information on these programs is available on the Free Geek website at www.spiritone.com/~angel/FGstartup/narrative.html.

Free Geek is working with two sister projects, [Free Geek-Michiana](#), operating in South Bend, Indiana and, [Free Geek Penn](#) located in Lancaster County Pennsylvania. Free Geek has developed a Free Geek Startup HOW TO Manual to guide organizations interested in replicating the Free Geek model. The manual can be found at www.freegeek.org/howto/startup.

The MacRenewal project, founded by Lorraine Kerwood in 1999, recycles used Macintosh and other computer technology by restoring donated equipment and providing equipment and training to people who otherwise would not have access to computers, including people with disabilities, people who are homebound and/or bed ridden, elders, children living in Oregon foster care homes, adults who have been moving from institutional care into group homes, economically disadvantaged youth and adults, migrant workers and their children, and economically disadvantaged families of color.

MacRenewal has just begun working with Partners in Solidarity, a non-profit group supporting rural Guatemalan communities in self-sustainable development. So far, MacRenewal computers have been placed in 35 different hospitals, clinics, schools, non-government organizations, orphanages, and shelters. MacRenewal has formed partnerships to help expand their program's outreach. MacRenewal's partners include Community Information Services, St. Vincent DePaul Society of Lane County, Inc., Free Geek, and Bring Recycling.

MacRenewal is hosted at the [Computer Reuse and Recycling Center \(CRRC\)](#), a 501(c)(3) nonprofit organization based in Eugene, Oregon.

Based on the experience of Free Geek and MacRenewal, the key elements for an economically viable electronics reuse non-profit include:

- A facility located in an area with sufficient population to support the volunteer base needed and provide sufficient computer donations

- A facility located reasonably close to e-scrap recycling resources, as transportation costs are very high
- Partnerships with other non-profits in the area, such as Salvation Army, Goodwill, etc. in order to maximize collection opportunities

7.3 Charitable Organizations Collecting Used Electronics

Other organizations which collect used electronics include Goodwill and a variety of thrift stores around the state.

Goodwill. Nationally, more than 200,000 computers alone are donated each year to Goodwill, which is proactively creating solutions for the mounting surplus of computers, monitors and other electronic items they receive. Goodwill stores in Austin, TX; Orange County, CA; Pittsburgh, PA; Wilmington, DE; Tallahassee, FL; Charleston, SC; and other cities are refurbishing reusable computers, de-manufacturing non-working equipment into recyclable components, and avoiding rising landfill disposal costs. And at the same time, they're expanding their job training and career services, and generating revenue through the resale of the computer equipment. (Goodwill website, http://www.goodwill.org/index_gii.cfm/2648)

Goodwill faces a number of challenges in dealing with the electronic equipment donated to their stores. About 80 percent of the computers donated to the Goodwill stores involved in collection are unusable. Goodwill has testified to the US Congress that organizations like theirs are often stuck with piles of computers and televisions that they have to pay to dispose of safely, diverting dollars from the vital human services they provide their communities. It is important to recognize that Goodwill and others are collecting e-waste for the benefit of the community, and should not bear the financial burden of proper e-waste disposal. Another Goodwill discontinued accepting computer donations in 2001, but has since spent more than \$72,000 to recycle unusable donated computers - an amount that could have provided 42 hours of intensive job training and placement services to 200 persons with disabilities and other disadvantages. Information about Goodwill can be found at their website http://www.goodwill.org/index_gii.cfm/2648 .

Other Thrift Stores. Value Village describes one of their "core values" as providing benefits for their greater community through their recycling efforts. According to their website, unsold goods, including electronics, are sent to developing countries or to material wholesalers (<http://www.valuevillage.com/recycles/>).

It is likely that many other independent thrift stores also handle used electronic equipment. However, there is limited information available regarding how these organizations handle this equipment

7.4 Conclusions

Organizations that reuse and refurbish electronic equipment play a critical role in diverting this equipment from premature disposal. These organizations often also have an important social role in providing refurbished equipment to lower income groups and individuals, as well as providing job training. At present, these organizations play a role which is not viable for for-profit businesses, due to the cost of labor and the still-evolving markets for reused and recycled equipment.

There are opportunities to support these organizations by ensuring that the public knows about them. There may also be a need to provide outreach to some of these organizations to ensure that they handle the equipment they collect in an environmentally responsible manner.

Chapter 8

Public and Institutional Procurement of Environmentally Responsible Electronic Products

The Oregon Department of Administrative Services (DAS), State Procurement Office (SPO), continues to make progress in the effort of sustainable purchasing and the promotion of electronic products that produce less waste in their manufacture, consume fewer resources in their operation, and are equally environmentally friendly at the end of their useful lives. The following is a brief overview of some of the major efforts in environmental purchasing of electronic products that DAS has been involved in.

8.1 Oregon Department of Administrative Services State Procurement Office Participation in EPEAT

The Electronic Product Environmental Assessment Tool (EPEAT) is a process to design and implement a tool for evaluating the environmental performance of electronic products throughout their life cycle. The process, funded by U.S. EPA, was initiated to meet the growing demand by large institutional purchasers to buy greener products. It is expected to gain wide acceptance in IT (information technology) purchasing by federal and state government.

The EPEAT tool is the product of a consensus process by a multi-stakeholder Development Team of expert stakeholders (manufacturers, recyclers, purchasers, NGO's and Governments) who have met for over a year. The Development Team completed the design of the tool and an initial set of environmental criteria. The EPEAT tool is now in its implementation phase.

DAS SPO has been represented on the EPEAT Development Team and is looking forward to the end result and being one of the first government agencies to implement the tool.

8.2 Procuring Information Technology Equipment

DAS SPO was a participant and drove the environmental criteria in two key procurement projects in 2004. The primary environmental objective of the two projects was to procure personal computing equipment which uses less energy over time, resulting in decreased pollution, energy costs and a reduction in negative effects on human health and the environment. Further, these two projects aimed to provide purchasers with a take-back program in which they can be assured that the equipment is disposed of in a way that does not pose a hazard to the environment. These two projects are:

- Western States Contracting Alliance (WSCA) developed a Request for Proposals (RFP) for PC Hardware which included desirable environmental criteria for purposes of evaluation. Examples of the WSCA RFP environmental criteria by which a manufacturer's electronic goods were scored:

- ✓ Takeback/recycling program
 - ✓ Product environmental improvement program
 - ✓ Energy efficiency program(s) by identifying the Products that meet Energy Star or other recognized program for energy efficiency
- Through DAS SPO, the State of Oregon “Smart Buy” project initiated an RFP for IT Equipment and Peripherals. Both solicitations contained mandatory and desirable environmental criteria which were used to score proposals.

The environmental mandatory criteria in the Oregon Smart Buy RFP were:

- ✓ Contractors offer electronic products that meet the most recent set of U.S. Environmental Protection Agency’s and Department of Energy’s Energy Star guidelines and have the Energy Star label or substitute affixed to any goods offered under the contracts.
- ✓ All Energy Star power management features must be fully activated upon delivery.
- ✓ Contractors must report to DAS SPO on compliance with the environmental specifications as well as provide information to purchasing agencies on the proper recycling and/or reuse of used equipment.

The environmental desirable criteria included in the Oregon Smart Buy RFP were:

- ✓ Propose a program to provide take-back and management services for end- of-life electronic products.
- ✓ Shrink-wrap, foam and other types of packaging to be recycled.
- ✓ Provide electronic products that minimize the use of toxic and hazardous constituents.
- ✓ Offer electronic products that use recycled content and produce products that can easily be recycled.
- ✓ Address ISO 14001 certification and if they are certified.
- ✓ Demonstrate that bidder and/or manufacturers are actively pursuing additional ways of minimizing their environmental impacts at manufacturing, assembly, warehouse, distribution and/or other facilities.

Computers and other electronics are a growing focus of environmentally preferable purchasing activities due to their hazardous chemical constituents and their significant energy use. In addition, government purchasers are increasingly considering total cost of ownership when purchasing products, and the costs for proper disposal of this electronic waste will almost entirely come from state and local governments’ budgets. Consequently government purchasers are increasingly asking manufacturers to provide take-back service at the end of the products’ lives.

8.3 Drafting of New Procurement and Equipment Disposal Rules

DAS State Procurement Office is drafting new procurement rules for state agencies subject to DAS authority to follow. These rules will implement the roll-out of the new public procurement code which is effective on March 1, 2005. DAS SPO is preparing rules that will support environmentally responsible procurement in compliance with the Governor's Executive Order No. EO 03-03 to create "A sustainable Oregon for the 21st Century". The new rules will outline how a state agency purchaser can ensure that Oregon is procuring products which are environmentally responsible.

Also, DAS State Surplus Property Program has finished recent work on administrative rules for state agencies' Disposal of Surplus Electronic Equipment and Property Containing Cathode Ray Tubes (CRT). The policy underlying the rules is to provide a safe and accountable method for disposing surplus computer equipment and property containing CRT.

Through these two areas of rulemaking, state agency purchasers will focus on the purchase of environmentally responsible computing equipment that at end of useful life results in the maximum recycling of electronic product waste. Purchasers will also be made aware that the recycling of computer equipment must be conducted such that all circuit boards, aluminum, leaded glass, other lead-bearing portions of the cathode ray tube, and other recyclable or reusable elements are recovered and recycled to the maximum extent possible. Finally, if disposal of property is appropriate, it will be handled at the end of a cradle-to-grave responsibility chain, with accounting for ownership and ultimate disposal throughout.

8.4 Other Regional and National Guidelines for Governmental Procurement of Environmentally Responsible Electronic Products

Several other efforts have been undertaken to promote environmental purchasing of electronic products and to develop valuable information resources. Some of the prominent ones are listed below:

- The Center for a New American Dream developed the document "Principles for Purchasing Environmentally Preferable Computers, Monitors, and Peripherals"²⁶. In addition the Center hosted a free nationwide conference call on Purchasing Environmentally Preferable Computers in November 2004.
- The Product Stewardship Institute developed the document "Purchasing Environmentally Preferable Computers, A Guide for Government Procurement Officials"²⁷ in February 2003.

²⁶ www.newdream.org/procure

²⁷ <http://www.productstewardship.us/supportingdocs/epp.pdf>

- The Silicon Valley Toxics Coalition developed the document “Computer Take-Back Campaign and Health Care Without Harm’s Environmentally Preferable Procurement Guidelines for Information Technology Equipment in Health Care”²⁸ to assist health care providers and administrators in their efforts to reduce the environmental impact of their facilities.

The New American Dream and the Product Stewardship Institute documents include recent references to several additional federal, state and private procurement programs and guidelines.

8.5 Oregon Department of Administrative Services State Procurement Office Goals

- DAS SPO hopes through these efforts to provide stewardship and leadership in promoting "Environmentally Preferable Procurement" (EPP) of electronic products.
- Using the strategies and tools outlined above will reduce the overall environmental footprint of state government and effectively increase the sustainability of state government.
- Implementing an EPP program for IT equipment can also result in the purchase of IT equipment with lower operating costs, extended useful lives and reduced disposal costs.

²⁸ <http://www.cehca.org/hcwhsuccesses.htm#ComputersandHealthCare>

Chapter 9 Key Votes, Findings and Recommendations

9.1 Alternatives for Statewide Oregon Scenarios

The Committee work group developed a set of scenarios for an Oregon model that would address the financing and operations of a statewide system for electronics recovery, reuse and recycling. After evaluating these scenarios the working group identified three “Tier 1” scenarios that had the greatest potential for Oregon, and that either have been legislated or are in operation in the U.S. today. The Tier 1 scenarios included:

1) Government-Run System

- Government finances and operates the system using waste fees
- Collection services provided directly by government or via contractors/grantees
- Recyclers contracted to consolidate, transport and process

2) Advanced Recycling Fee

- A legislated fee is collected on new product sales
- There are two alternatives for management of the fee:
 - a. Fee is remitted to government, which runs the system
 - b. Fee is remitted to a trust fund, and a not-for-profit organization runs the system
- ARF covers costs to collect, transport, and process all products, including orphan and historic
- Government enforces on retailers, ensuring the fee is collected and remitted

3) Partial Producer Responsibility

- Local communities are responsible for collection of products from consumers
- Manufacturers take responsibility for products from consolidation points
- Responsibility for orphan products is distributed by law amongst manufacturers
- Government enforces on manufacturers, ensuring they manage their share of product

The Committee voted on the following question:

Of the three Tier 1 options developed by this Advisory Committee, which one would be your organization’s preferred long-term approach in Oregon?

The Committee vote was intended to be used for informational purposes. The vote results do not constitute a recommendation by the Committee.

The result of the vote, including some absentee voters, is as follows:

Advisory Committee Votes on Oregon Scenarios

1) Government-Run System	0 votes
2) Advanced Recycling Fee	7 votes
2.a) ARF managed by a TPO	(5 votes)
2.b) ARF managed by government	(2 votes)
3) Partial Manufacturer Responsibility	1 vote
4) Maintain status quo, no statewide approach	5 votes

Abstain 4 members

One committee member was absent and did not provide an absentee vote.

There was agreement among the Committee members that ideally there would be a national solution, and a state solution would not be necessary.

9.2 Regulations, Permitting and Certification

9.2.1 Oregon's Interim Policy for Management of CRTs

Currently, the state of Oregon has an Interim Policy (2002-PO-001) in place for management of cathode ray tubes (CRTs) generated by hazardous waste generators (www.deq.state.or.us/wmc/hw/policy/2002-PO-001.pdf). The state of Oregon Interim Policy provides guidance for generators and recycling facilities who handle non-household computer monitors and TVs for recycling, and does not constitute formal rulemaking.

The Advisory Committee recommends that Oregon revisit the interim CRT rule and consider formal rule making to strengthen enforcement and provide clarification.

9.2.2 Disposal Bans

Bans on disposal of electronics have been implemented in several states for different reasons:

- To reduce the amount of toxic substances being disposed in landfills
- To drive product into alternative channels, especially for recycling, thus creating the needed flow of product to make recycling more economical

The Advisory Committee recommends that disposal bans not be viewed in isolation. Generally, Committee members support consideration of a disposal ban as long as a number of prerequisite policy conditions, considered part of a comprehensive e-waste program, are met. These conditions are as follows:

- **Funding source.** Either through an Advance Recycling Fee (ARF) or producer responsibility framework, such funds need to be instituted and available to build up infrastructure for e-scrap collection, transportation, and processing.

- **Markets.** Funds must be dedicated in part to programs emphasizing enhancement of existing and creation of new end markets, as well as the development of new processing technologies.
- **Standards.** Environmental, health and safety standards must be developed for sound management of collected materials, including reporting and documentation procedures for end-markets.
- **Infrastructure.** Adequate and convenient infrastructure for collection, handling, and processing needs to exist in order to provide an environmentally sound alternative to disposal.

After these policy conditions are addressed, a disposal ban option may be considered, with particular consideration given to:

- **Objects of the disposal ban.** Identify the universe of electronic products to be banned from disposal.
- **Enforcement.** Determine appropriate level (generator, collector, disposal facility) at which e-waste disposal ban enforcement is applied, and resources necessary to accomplish effective enforcement.
- **New supplies.** Identify the potential impact on existing infrastructure and markets of new supplies of e-scrap resulting from a disposal ban.
The Advisory Committee initially identified three alternative scenarios for Oregon electronic scrap collector and processor permitting and/or certification. These three alternatives include:

9.2.3 Processor Permitting and/or Certification Programs

The inappropriate processing of electronics can harm the health of workers and cause environmental damage. This is especially the case in under-developed countries where worker safety and the environment are not protected as they are here. A very high percentage of used electronics are shipped overseas because it is far cheaper than domestic processing, and very poor practices have been documented²⁹. Thus there is desire to prevent these practices by both domestic processors and downstream recyclers through adoption of standards and/or certification programs.

EPA recently issued Guidelines for Materials Management as part of EPA's Plug-In To eCycling Project. These guidelines were developed as a first voluntary step to try and develop national guidance for the management of "end-of-life" electronics. EPA estimates that a national certification program will be available within the next 2 years and a verification process will be included.

²⁹ "Exporting Harm: The High Tech Trashing of Asia", Basel Action Network, www.ban.org.

After evaluating several alternatives for permitting or certification of processors, the Advisory Committee endorses adopting EPA's national certification program once it is implemented (likely within 2 years). In the interim, the Committee recommends that Oregon use EPA's Plug-In to eCycling Guidelines for Materials Management as voluntary guidelines, available to manufacturers, retailers, governments and others who are directly contracting with recyclers and others for recycling and refurbishment services as an information/screening tool for selection of a recycler.

Several approaches could be implemented to incentivize recyclers to demonstrate compliance with the eCycling Guidelines:

- Inclusion in statewide referral websites such as DEQ, DAS, and METRO (based on periodic review of recycling operations)
- State procurement for disposition of obsolete electronics would require demonstration of compliance
- Publicly sponsored e-waste collection programs would require demonstration of compliance

9.3 Job Creation and Market Development

The Advisory Committee found that specific opportunities that may encourage job creation and market development include:

- Encouraging ongoing public/private dialogue to address the uncertainties currently discouraging development of infrastructure
- Exploring opportunities for market development to provide stronger incentives for infrastructure development
- Investing in education and outreach to ensure the public knows where to take used equipment for reuse and recycling
- Exploring certification options to discourage dumping and level the playing field for processors

9.4 Education and Outreach

The Committee concluded that a variety of methods will be required to provide education and outreach throughout Oregon. Two high priority outreach methods were identified for all the identified target groups:

- Websites
- Statewide call center

The call center should be a one-stop, one phone number "brand" for where to get information in Oregon about electronics recycling options.

Other high priority recommended next steps included:

- Assess what educational efforts are already in use and their effectiveness
- Evaluate the need for and effectiveness of using template materials (e.g., ads, flyers, brochures, articles), develop materials and provide to local governments, as appropriate
- Conduct a survey in rural areas of the state that have not been represented in discussions to date

9.5 Reuse Organizations

The Committee finds that organizations that reuse and refurbish electronic equipment play a critical role in energy and material conservation by diverting this equipment from premature disposal. These organizations often also have an important social role in providing refurbished equipment to lower income groups and individuals, as well as providing job training. At present, these organizations play a role which is not viable for for-profit businesses, due to the cost of labor and the still-evolving markets for reused and recycled equipment.

There are opportunities to support these organizations by ensuring that the public knows about them. There may also be a need to provide outreach to some of these organizations to ensure that they handle the equipment they collect in an environmentally responsible manner.

9.6 Public and Institutional Procurement of Environmentally Preferable Electronic Products

The Committee finds that the Oregon Department of Administrative Services (DAS), State Procurement Office (SPO), continues to make progress in the effort of sustainable purchasing and the promotion of electronic products that produce less waste in their manufacture, consume fewer resources in their operation, and are equally environmentally friendly at the end of their useful lives. A few examples of DAS efforts include:

- Participation on the development team of the Electronic Product Environmental Assessment Tool (EPEAT)
- Participation on development of environmental criteria in two key procurement projects in 2004 (the Western States Contracting Alliance (WSCA) and the State of Oregon "Smart Buy" project)
- Development of new procurement rules for state agencies (subject to DAS authority) to support environmentally responsible procurement in compliance with the Governor's Executive Order No. EO 03-03 to create "A sustainable Oregon for the 21st Century".

- Development of new rules for state agencies' Disposal of Surplus Electronic Equipment and Property Containing Cathode Ray Tubes (CRT).

Several other efforts have been undertaken by the Center for a New American Dream, the Product Stewardship Institute and the Silicon Valley Toxics Coalition to promote environmental purchasing of electronic products and to develop valuable information resources.

DAS SPO goals include:

- DAS SPO hopes through these efforts to provide stewardship and leadership in promoting "Environmentally Preferable Procurement" (EPP) of electronic products.
- Using the strategies and tools outlined above will reduce the overall environmental footprint of state government and effectively increase the sustainability of state government.
- Implementing an EPP program for IT equipment can also result in the purchase of IT equipment with lower operating costs, extended useful lives and reduced disposal costs.

Appendix A

List of Key Information Sources for Section 2.3 – Environmental Impacts of Used Electronics in Oregon

Computers and the Environment: Understanding and Managing their Impacts. United Nations University. Edited by R. Kuehr and E. Williams. 2003.

Effectiveness of Municipal Solid Waste Landfills in Controlling Releases of Heavy Metals to the Environment. SWANA Applied Research Foundation. 2004

Comments on the Effectiveness of Municipal Solid Waste Landfills in Controlling Releases of Heavy Metals to the Environment. . By G. Fred Lee, PhD, DEE. July 16, 2004

Organization for Economic Co-operation and Development. Draft Recommendation of the Council on the Environmentally Sound Management (ESM) of Waste. Environment Policy Committee. ENV/EPOC(2004)20. April 6, 2004.

Organization for Economic Co-operation and Development. Technical Guidance for the Environmentally Sound Management of Specific Waste Streams: Used and Scrap Personal Computers. Working Group on Waste Prevention and Recycling. ENV/EPOC(2001)3/FINAL. February 18, 2003.

2002 Oregon Solid Waste Characterization and Composition. Prepared by Oregon Dept. of Environmental Quality. April 20, 2004.

Draft 2003 Oregon Solid Waste Recovery Data. Prepared by Oregon Dept. of Environmental Quality. Draft, September, 2004.

Information on pollution incidents from improper management taken from Oregon Dept. of Environmental Quality complaint and inspection reports.

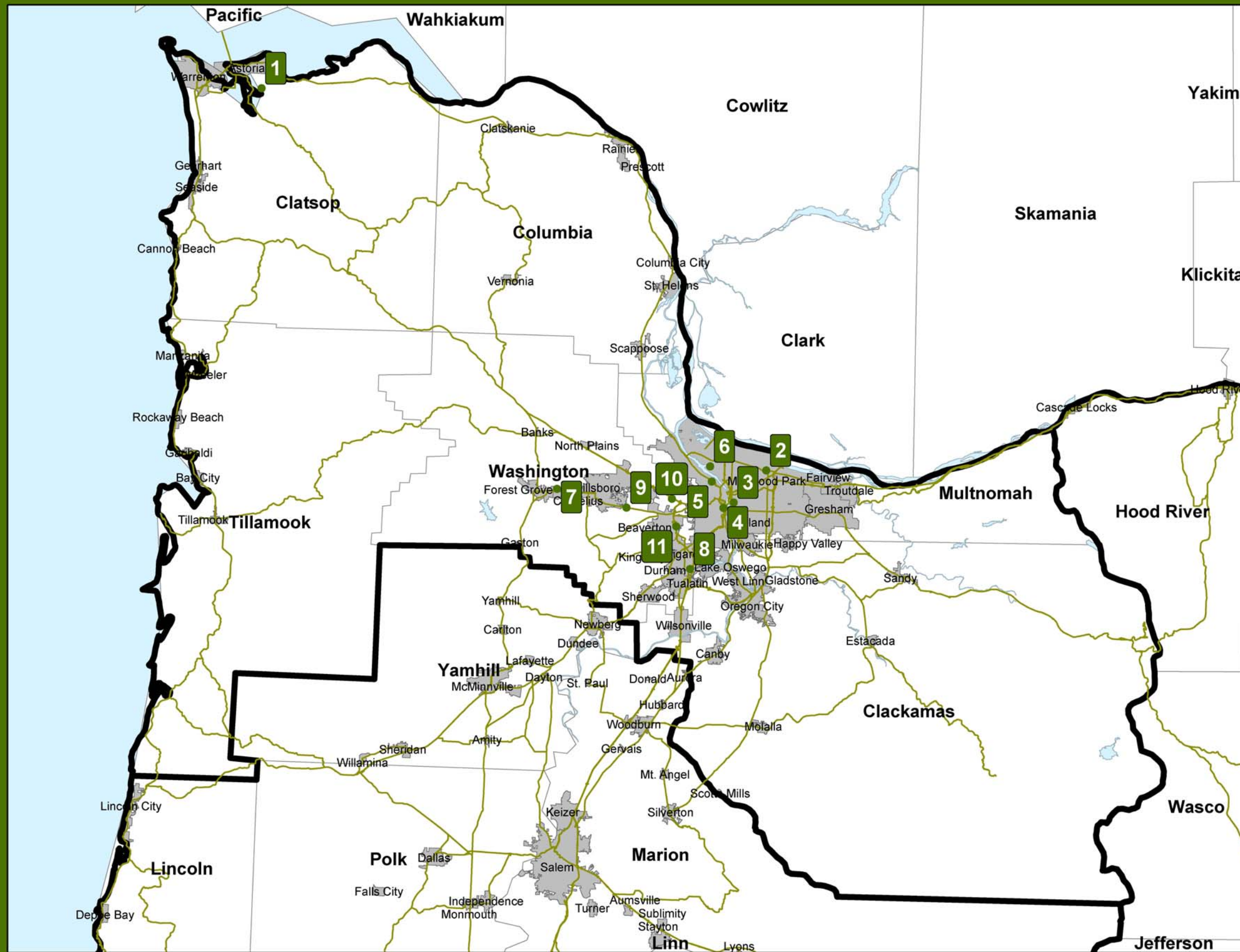
Oregon Solid Waste Information and Facility Tracking System. Maintained by Oregon Dept. of Environmental Quality. 2004.

Oregon Strategy for the Greenhouse Gas Reductions, section on materials use, recovery, and disposal. Draft. October 13, 2004. Prepared for the Governor's Advisory Group on Global Warming.

Appendix B

Maps of E-Waste Management Infrastructure in Oregon

Metro and DEQ Northwest Region



Clatsop County

1. Clatsop Transfer and Disposal
1790 Williamsport Road
Astoria, 97103
Transfer Station Drop Off

Multnomah County

2. City Recycle LLC
7737 NE Killingsworth
Portland, 97218
Recycler Drop Off

3. Free Geek
1731 SE 10th Ave
Portland, 97214
Non-profit Recycler Drop Off

4. Mercy Corps
3015 SW 1st Ave
Portland, 97201
Non-profit Recycler Drop

5. SJ Nudleman
2707 NW Nela
Portland, 97210
Recycler Drop Off

6. Technology Conservation Group
6125 N Basin
Portland, 97217
Recycler Drop Off

Washington County

7. Computer Drive Connection
909 N Fremont Lane
Cornelius, 97113
Recycler Drop Off

8. Earth Protection Services
7272 SW Durham Rd #100
Tigard, 97224
Recycler Drop Off

9. Laser Services
21785 SW TV Hwy
Aloha, 97006
Recycler Drop Off

10. Simply Marvelous Recycling
11700 SW Butner Rd
Portland, 97225
Recycler Drop Off

11. Quantum Resource Recovery
10750 SW Denney Rd
Beaverton, 97075
Recycler Drop Off



E-Waste Collection Infrastructure for Oregon

600 NORTHEAST GRAND AVENUE
TEL (503) 797-1742
drc@metro.dst.or.us

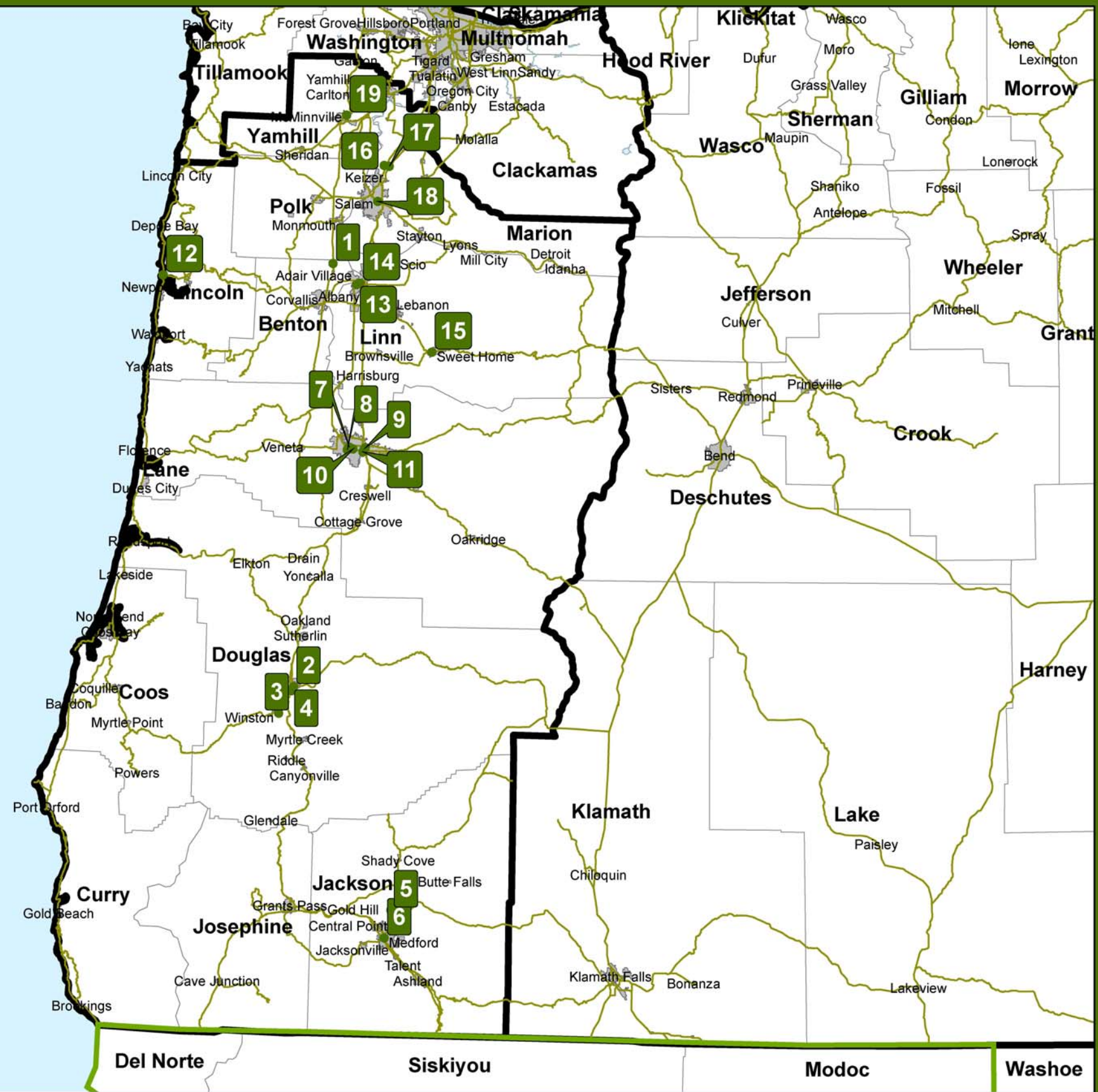
PORTLAND, OREGON 97232-2736
FAX (503) 797-1909
www.metro-region.org



December 2003

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DEQ Western Region



- | | |
|---|--|
| <p>Benton</p> <p>1. Coffin Butte Landfill
28972 Coffin Butte Rd
Corvallis, 97330
Landfill Drop Off</p> <p>Douglas</p> <p>2. Douglas County Recycling
1036 SE Douglas Ave
Roseburg, 97470
Event</p> <p>Jefferson</p> <p>3. Winston Middle School
330 Thompson Ave
Winston, 97496
School Drop Off</p> <p>Lincoln</p> <p>4. Monitors and More
1900 SE Main St
Roseburg, 97470
Recycler Drop Off</p> <p>Jackson</p> <p>5. American Appliance Recyclers
2645 Ave G
White City, 97503
Recycler Drop Off and Pick Up</p> <p>Lane</p> <p>6. Value Village
850 Biddle Rd
Medford, 97504
Thrift Drop Off</p> <p>Coos</p> <p>7. Computer Reuse and Recycling Ctr.
222 Polk St
Eugene, 97402
Reuse Drop Off</p> <p>Curry</p> <p>8. St Vincent De Paul
1880 W 11th Ave
Eugene, 97402
Thrift Drop Off</p> <p>Josephine</p> <p>9. Value Village
555 W Centennial Blvd
Springfield, 97477
Thrift Drop Off</p> <p>Curry</p> <p>10. Computer Store
61 W 8th Ave
Eugene, 97401
Retailer Drop Off</p> | <p>Marion</p> <p>11. Glenwood Central Receiving Station
3100 E 17th Ave
Eugene, 97403
Transfer Station Drop Off</p> <p>Lincoln</p> <p>12. Lincoln County Courthouse
225 W Olive St
Newport, 97365
Event</p> <p>Linn</p> <p>13. Albany Lebanon Sanitation
1214 Montgomery St SE
Albany, 97322
Event</p> <p>Deschutes</p> <p>14. Goodwill Industries
1605 Pacific Blvd SE
Albany, 97321
Thrift Drop Off</p> <p>Jackson</p> <p>15. Sweet Home Sanitation
1325 18th Ave
Sweet Home, 97386
Transfer Station Drop Off</p> <p>Marion</p> <p>16. Association of Mid Valley
3680 Brooklake Rd NE
Salem, 97303
Transfer Station Drop Off</p> <p>Lane</p> <p>17. Environmental Protective Services
8905 Pueblo Ave NE
Brooks, 97305
Recycler Drop Off and Pick Up</p> <p>Clatsop</p> <p>18. Value Village
2460 Mission St SE
Salem, 97302
Thrift Drop Off</p> <p>Yamhill</p> <p>19. McMinnville Recycling Depot
2200 NE Orchard Ave
McMinnville, 97128
Transfer Station Drop Off</p> |
|---|--|



E-Waste Collection Infrastructure for Oregon

600 NORTHEAST GRAND AVENUE | PORTLAND, OREGON 97232-2736
 TEL (503) 797-1742 | FAX (503) 797-1909
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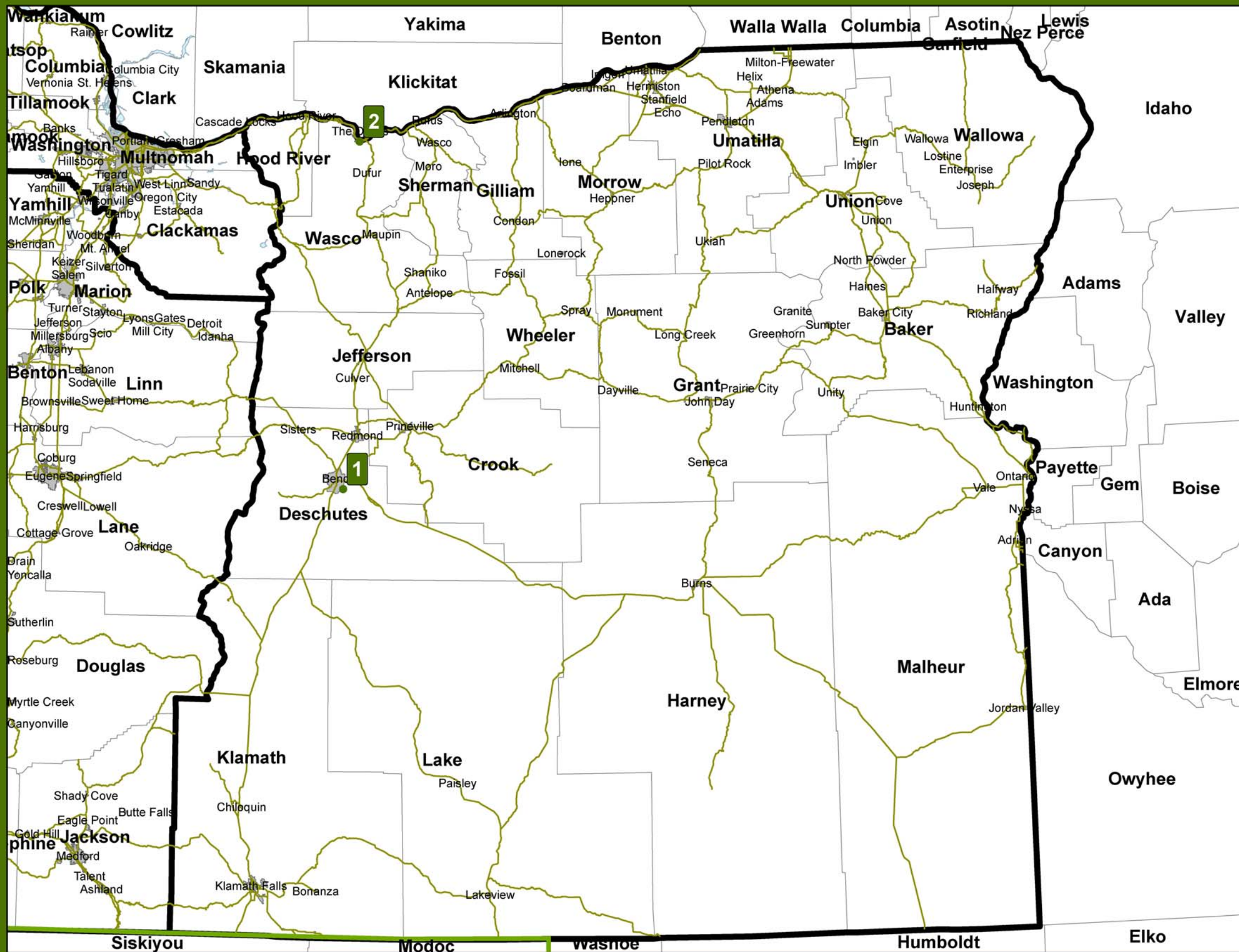
DEQ Eastern Region

Deschutes

1. Knott Landfill
61000 27th St
Bend, 97702
Recycler Drop Off

Wasco

2. The Dalles Middle School
1100 E 12th S
The Dalles, 97058
Recycler Drop Off



E-Waste Collection Infrastructure for Oregon

600 NORTHEAST GRAND AVENUE | PORTLAND, OREGON 97232-2736
TEL (503) 797-1742 | FAX (503) 797-1909
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Appendix C

Alternative Statewide Scenarios for Oregon Tier 1 and Tier 2

TIER 1 OPTIONS

	Government run	ARF with Visible Fee	Shared Manufacturer Responsibility
SYSTEM ADMINISTRATOR	Government controlled	Industry controlled TPO	Industry consortium or Brand Controlled
Description	Government run, government financed collection and recycling.	Visible fee on the sale of new products collected at the point of sale to finance an TPO to manage the collection, transportation, and recycling of used products.	Implemented collectively (or by brand) - manufacturers must take physical and/or financial responsibility for the recycling (and some transportation) of used products, but local collection is the responsibility of local governments and consumers. No front-end fees.
Fee setting responsibility	Government	TPO can modify fee within a statutory cap but cannot raise it beyond the cap	None
Funding Method	TBD (Tipping Fee, surcharge on garbage bill, increase on property tax, etc.)	ARF	Manufacturer is responsible, included (invisibly) in product cost
How the Money Flows	\$ passed to Government	\$ passed to TPO	\$ passed to TPO/Manufacturer managed
Primary Enforcement Needs	Government	Government	Government
Nature of Government Oversight	Government	TPO/Government	Manufacturer consortium/Govt.
Public Education and Promotion	Government & Manufacturer	Government, Manufacturer, Retailer	Unclear
Relationship to a National Solution	State bills to include sunset solutions to National	State bills to include sunset solutions to National. Compatible to front-end/backend fee system	State bills to include sunset solutions to National: however may require significant changes to system if national system is a Front end or backend fee
Level Playing Field: Equity and Fairness across brands for system costs	NA	ARF is charged on all current sales therefore is equitable according to current market share	Manufacturers are responsible according to the amount of their branded product recycled therefore is equitable according to current costs of recycling but not according to current market share. Manufacturers that are new to the market or "short termers" have no responsibility. Manufacturers with largest market share can gain competitive advantage. Must identify fair method of allocating orphans.
Orphan Responsibility	Government	All product returned is paid for by ARF, current, historic, and orphan	Must be allocated by law to current manufacturers. If manufacturers provide a financial guarantee for future products, there would be no orphans.
ESM Standards	Would be established by law and regulated by government	Could be included in the law. Specific ESM standards would be enforced through TPO contracting	Could be defined in law. Specific ESM standards would be enforced by manufacturer or consortia.
Market Development for Recycled Materials	Government responsibility	TPO Could promote development of markets Manufacturers who are members could use the recycled materials in products.	Manufacturers could use recycled materials in products
Performance Measures	Set by Legislation	Set by Legislation	Set by Legislation

Recycling Service Arrangements	Government	TPO authorized provider(s)	Consortium/brand owner
How is Collection Provided	Local Government	Anyone can collect and be paid the 'collection incentive payment', which is a set amount by weight paid by consolidators/primary-processors per their contract with the TPO.	Local Govt.
How is Consolidation Provided	Local Government	TPO-contracted provider (Can be local government or private recycler)	Local Govt.
How is Reuse Provided	Government to contract with third party refurbishers	Authorized provider (Can be local government with cost reimbursed)	Consortium to set reuse contracts, govt. sets goals
How is Transport Provided - to consolidation	Government or any authorized transporter	Authorized provider contracted with by the consolidator/primary-processor.	Local Govt.
How is transport provided - to recycling	Government or any authorized transporter	Authorized provider contracted with by the consolidator/primary-processor.	Consortium/brand owner to set contracts with 3rd parties
How is Processing/Recycling Provided	Any authorized Provider	Authorized provider contracted with by the consolidator/primary-processor.	Consortium/brand owner to set contracts with 3rd parties
Roles			
Product User's Responsibilities	Place product into system at end-of-life	Pay ARF at point of purchase and place product into system at end-of-life.	
Product Manufacturer's Responsibilities	Design and education if legislated	Collect ARF on direct sales. Participate in TPO Provide information to customer on recycling. Provide information to recycler on product.	Pay for the transportation from consolidation points and recycling of own products, plus possibly some orphans.
Government Responsibilities	Entire system, including financing	Enforce payment of ARF	Enforce program requirements on participants and fund collection and some transportation, possibly cover orphan product costs in system
Retailers Responsibilities	Education, if legislated	Add Visible fee to cost of product and remit to TPO	Education and collection (possibly) but no other requirements
Recyclers Responsibilities	ESM Standards, if contracted to do work in system	Provide recycling services under contract with TPO. Adhere to ESM standards	Provide recycling services through contracts with manufacturers. Adhere to ESM standard.
NGOs Responsibilities	None	Monitor performance of system and advocate for improvements. Work to educate consumers and encourage participation.	Monitor performance of system and advocate for improvements. Work to educate consumers and encourage participation.

PROS AND CONS			
SYSTEM	Government run	ARF with Visible Fee	Shared Manufacturer Responsibility
Funding Method			
PRO	If cost is distributed among households as tax or "garbage fee" would be lowest of all fees (\$1-\$2 max)	Easiest for consumer to understand. Current sales cover all costs of system. Easiest to enforce. Can easily be made equitable to current costs of recycling	Minimizes overhead costs and allows manufacturers and markets to allow for the most cost efficient system.
CON	It is a tax. Funds could be diverted to other government functions, leaving system unfunded	Questions as to whether fee can be collected on sales originating out of state (Internet, catalogue) It is equitable across current market share but might not be according to current cost of recycling.	<p>The cost to an individual consumer will fluctuate, especially if a large manufacturer drops out of the market and creates new orphans. Surety and guarantee systems are extremely complex and may not work especially on a state level where manufacturers cannot identify how much of a product is in the state. Also no funding is provided for initial collection and transport to consolidation point costs. Also Manufacturers cannot track sales to individual states unless they act as the retailer through either their own stores or Internet Sales. This would drive manufacturers to sell via the Internet in order to include the cost of the program in the price of the product.</p> <p>For orphan products it is unclear what would happen if a company goes bankrupt.. Could result in small group of manufacturers shouldering the majority of the costs simply for being in the business for a long period of time.</p>
Design			
PRO	Programs such as EPEAT as well as the manufacturer's own efforts to reduce costs, will provide enough incentive to improve design.	Manufacturers are already reducing the use of hazardous materials and making products easier to assemble. They are doing this to reduce manufacturing costs, which include the costs related to safely storing, using and disposing of hazardous materials from manufacturing sites. In addition, design requirements similar to those in CA SB 20 (as amended by SB 50) and procurement programs such as EPEAT can ensure that improvement in design takes place.	DFR is directly tied to the ultimate recyclability of the product at the end of its life. This affects not only the cost of recycling, but also the ability to use material from the old product into new products. As an example, the batteries that are inside of a laptop, (not the rechargeable one), must be removed by hand. Grinding the laptop prior to removal of this battery turns the output stream into hazardous waste and must be disposed of, not recycled. A ground up battery will ALWAYS be hazardous waste. It currently requires 30+ screws to be removed in order to remove the internal battery. Changing the design of the laptop to decrease the number of screws that must be removed will increase the cost of the product. However, the labor savings on the recycling end gives a five fold return and that return could increase to ten fold with inflation by the time the product is returned at the end of its life. With no tie to the recycling responsibility, a manufacturer could use materials that inhibit recycling.

<p style="text-align: center;">CON</p>	<p>No incentives</p>	<p>No incentives</p>	<p>DFR assumes that the materials and the recycling processes that are utilized today will still be the predominant processes when the product comes back to be reused/recycling. But for products with long lives, such as 15-20 years, that assumption is not true. As well, a huge investment in design to achieve a small cost saving that can be gained if the product is recycled today may have virtually no value when the product is returned. Therefore, there is not necessarily any value gained from design for recycling. From an environmental standpoint, the most beneficial design criteria for a product with a long life is energy efficiency, not design for recycling. Companies are already moving away from using hazardous constituents where the technology allows in order to minimize their manufacturing, storage, reporting and disposal requirements</p>
<p>How does this method drive Economies of Scale - recycling volumes?</p>			
<p style="text-align: center;">PRO</p>	<p>If the system can economically generate large quantities of the material for the market then it will be successful</p>	<p>The system that most economically generates the largest quantity of materials for the market will be the most efficient. Under an ARF, there is no requirement to sort by brand which both increases costs due to the sorting step and decreases efficiency by creating smaller, less desirable piles of materials. An ARF-financed system will use competitive contracting to secure processing services on a national, regional or statewide basis (depending on the geographic scope of the ARF), which delivers the greatest possible economies of scale and uses competitive forces to continually drive costs down.</p>	<p>Economies of scale can be achieved or prevented depending on the model the state decides on. For example; setting up a single recycling operation may achieve the economies of scale that would drive costs down. However, more cost saving could be achieved by leveraging off the buying power of large manufacturers in areas such as logistics. The state could prevent economies of scale being reached if the model is to have many small recyclers.</p>
<p style="text-align: center;">CON</p>	<p>There is no incentive to be efficient.</p>	<p>Economies of scale must be tied to uses for the materials. Since many of these products are manufactured outside of the US, the manufacturers will only use them in new products if it makes economic sense. The selection of a financing model will not impact this decision.</p>	<p>Economies of scale must be tied to uses for the materials. Since many of these products are manufactured outside of the US, the manufacturers will only use them in new products if it makes economic sense. The selection of a financing model will not impact this decision.</p>
<p>Does the system encourage individual or collective manufacturer innovation and leadership?</p>			
<p style="text-align: center;">PRO</p>		<p>The ARF, which provides a type of secure, consistent funding, will allow manufacturers, retailers, not-for profits, and others the opportunity to introduce innovation to the system that will ultimately lead to lower costs, increased efficiency, and overall improved environmental performance. Improving environmental performance has already lead companies (by 2006 or earlier), to move away from lead-based solder, independent of our efforts in the area of product EOL. While it may be true that the government-run part of a system will not lead to innovation, an ARF, properly designed, will provide ample opportunity for industry and others to innovate without forcing those companies with no expertise in recycling but strength in other areas of environmental performance to create unnecessary infrastructure.</p>	<p>It is the free-enterprise market that requires companies to strive for leadership to ensure their success. Government run programs do not operate in the free-enterprise marketplace so innovation is not a priority</p>
<p style="text-align: center;">CON</p>	<p>Government run programs do not operate in the free-enterprise marketplace so innovation is not a priority</p>	<p>Government run programs do not operate in the free-enterprise marketplace so innovation is not a priority. Since at least part of this system (collection and transport may be government -run, this may be a problem.</p>	<p>Programs such as EPEAT, as well as a company's own goals of sustainability, can achieve leadership, on the same if not a larger scale than through a forced program. Little if any additional incentive can be drawn for leadership through the forced recycling of 15 year-old products.</p>

Enforcement			
PRO	Completely enforceable as government has contact and contracts with all involved parties	All retailers have presence in the state so is enforceable. Is also enforceable against all major players with no physical presence in the state. Can add incentives and punitive requirements as well as limited citizen suit capability to compel as many parties as possible to participate since most parties are located in the US.	
CON		Cannot catch everybody. Issue of how level is the playing field	Virtually impossible to force manufacturers with no ties to state to comply, especially if they come and go in and out of the market before products hit the end of life. Disadvantages established market participants.

TIER 2 OPTIONS

	NEPSI Solution	ARF with Visible Fee	ARF non Visible fee	ARF non Visible fee	Full Manufacturer responsibility
SYSTEM ADMINISTRATOR	TPO	Government Controlled	Government Controlled	Industry controlled TPO	Industry consortium or Brand Controlled
Description	An ARF on new product sales, managed by a TPO, funds returned to manufacturer for recycling of historical, current and future branded product	Fee on the sale of new products where fee is visible to the purchaser; fee covers government implementation of 100 percent of the costs of a recycling system (collection, transportation, and recycling). No manufacturer involvement.	Fee on the sale of new products where fee is not visible to the consumer (i.e., the fee is paid by the manufacturer and is integrated into the product price); pays for government program. No manufacturer involvement other than payment of the fee.	Fee on the sale of new products that is not visible to the consumer (i.e., fee is paid by the manufacturer and is integrated into the product price), pays for an industry consortium to manage the collection, transportation, and recycling of used products.	Manufacturers must take physical and/or financial responsibility for the collection, transportation, and recycling of used products, with implementation by an industry consortium. No front-end fees; costs are allocated to brand owners via some scheme.
Fee setting responsibility	Government based on TPO recommendation	Government	Government	Industry consortium (within a government set range)	None
Funding Method	ARF	ARF	Manufacturer absorbed in product cost	Manufacturer includes it in product cost and retailer passes it on	Manufacturer absorbed in product cost
How the Money Flows	\$ passed to TPO	\$ passed to Government	\$ passed to Government	\$ passed to TPO	\$ passed to TPO/Manufacturer managed
Primary Enforcement Needs	Government	Government	Government	Government	Government
Nature of Government Oversight	TPO/Government	Government	Government	TPO/Government	Manufacturer and/or manufacturer consortium/Govt.
Public Education and Promotion	Government based on TPO recommendation	Government	Government	Industry consortium	None
Relationship to a National Solution	State bills to include sunset solutions to National	State bills to include sunset solutions to National	State bills to include sunset solutions to National. Compatible to front-end/backend fee system	State bills to include sunset solutions to National. Compatible to front-end/backend fee system	State bills to include sunset solutions to National. Compatible to front-end/backend fee system

Level Playing Field: Equity and Fairness across brands for system costs	ARF is charged on all current sales and covers the cost of collection, transportation and recycling of all products collected regardless of brand.	Same as column 2	Same as column 2	Same as column 2	Manufacturers are responsible according to the amount of their branded product recycled therefore is equitable according to current costs of recycling but not according to current market share. Manufacturers that are new to the market or "short termers" have no responsibility. Manufacturers with largest market share can gain competitive advantage. Must identify fair method of allocating orphans.
Orphan Responsibility	All product returned is paid for by ARF, current, historic, and orphan	Same as column 2	Same as column 2	Same as column 2	Must be allocated by law to current manufacturers. If manufacturers provide a financial guarantee for future products, there would be no orphans. OPINION 1 Unclear what would happen if a company goes bankrupt.. Could result in small group of manufacturers shouldering the majority of the costs simply for being in the business for a long period of time.
ESM Standards	Could be included in the law. Specific ESM standards would be enforced through TPO contracting	Same as column 2	Same as column 2	Same as column 2	Could be defined in law. Specific ESM standards would be enforced by manufacturer or consortia.
Market Development for Recycled Materials	TPO Could promote development of markets Manufacturers who are members could use the recycled materials in products.	Same as column 2	Same as column 2	Same as column 2	Manufacturers could use recycled materials in products
Market incentives	No market incentives to manufacturers	No market incentives to manufacturers	No market incentives to manufacturers	Might create but not to benefit individual brand owners	Might create but not to benefit individual brand owners
Performance Measures	Set by Legislation	Set by Legislation	Set by Legislation	Set by Legislation	Set by Legislation
Recycling Service Arrangements	TPO	Government	Government	Consortium	Consortium/brand owner
Who Authorizes	Authorized provider (Can be local government with cost reimbursed)	Local Government or authorized provider	Local Government or authorized provider	Authorized provider (Can be local government with cost reimbursed)	Consortium/companies financially responsible, may set contracts with others
How is Collection Provided	Authorized provider (Can be local government with cost reimbursed)	Local Government or authorized provider	Local Government or authorized provider	Authorized provider (Can be local government with cost reimbursed)	Consortium/individual companies financially responsible, may set contracts with others

How is Consolidation Provided	TPO responsible, government set goals	Government to contract with third party refurbishers	Government to contract with third party refurbishers	Authorized provider (Can be local government with cost reimbursed)	Consortium/individual companies to set reuse contracts, govt. sets goals
How is Reuse Provided	Authorized provider (Can be local government with cost reimbursed)	Government or any authorized transporter	Government or any authorized transporter	Authorized provider (Can be local government with cost reimbursed)	Consortium to set contracts with 3rd parties
How is Transport Provided - to consolidation	Authorized provider (Can be local government with cost reimbursed)	Government or any authorized transporter	Government or any authorized transporter	TPO authorized provider(s)	Consortium/brand owner to set contracts with 3rd parties
How is transport provided - to recycling	Any authorized Provider	Any authorized Provider	Any authorized Provider	Consortium to set contracts with 3rd parties	Consortium/brand owner to set contracts with 3rd parties
How is Processing/Recycling Provided	Government based on TPO recommendation	Government	Government	Industry consortium	None
Roles					
Product User's Responsibilities	Place product into system at end-of-life	Pay ARF at point of purchase and place product into system at end-of-life.	Pay ARF at point of purchase and place product into system at end-of-life.	Pay ARF at point of purchase and place product into system at end-of-life.	Determine how manufacturer's program works and place product into system at end-of-life
Product Manufacturer's Responsibilities	Collect ARF on direct sales. Participate in TPO Provide information to customer on recycling. Provide information to recycler on product	Pay ARF directly to government based on sales in state and include it in cost of product	Pay ARF directly to government based on sales in state and include it in cost of product	Pay ARF directly to TPO based on sales in state and include it in cost of product	Pay for the collection, transportation and recycling of own products, plus some orphans
Government Responsibilities	Enforce payment of ARF	Same as Column 2	Same as Column 2	Same as Column 2	Enforce program requirements on manufacturers
Retailers Responsibilities	Collect ARF from consumer and remit as specified in law	Include fee in cost of product and remit to manufacturer	Include fee in cost of product and remit to manufacturer	Include fee in cost of product and either remit to manufacturer or to TPO	Education (possibly), but no other requirements
Recyclers Responsibilities	Provide recycling services under contract with TPO. Adhere to ESM standards	Same as Column 2	Same as Column 2	Same as Column 2	Provide recycling services through contracts with manufacturers
NGOs Responsibilities	Monitor performance of system and advocate for improvements. Work to educate consumers and encourage participation.	Same as Column 2	Same as Column 2	Same as Column 2	Same as Column 2

Appendix D

Minority Report Chapter 3; Alternative Statewide Scenarios for Oregon

Prepared by Hewlett Packard

I. Introduction

HP is pleased to provide this *minority report* as a supplement to the Report to the 2005 Oregon Legislature prepared by the Oregon Advisory Committee on Electronic Product Stewardship. HP supports the intent behind the creation of the advisory committee and was an active participant in its work. The following comments concern Chapter 3, *Alternative Statewide Scenarios for Oregon*, exclusively. HP is specifically concerned with the biased nature of this chapter of the report. Though there is no clear financing recommendation in the report, the report clearly outlines the benefits of a fee at point of sale (or Advanced Recovery Fee “ARF”) and the disadvantages of a system based on producer responsibility (or shared responsibility). The discussion fails to bring to light many of the disadvantages of the ARF nor does it discuss the advantages of producer responsibility. HP respectfully submits the following to assist in the fair evaluation of these two models.

These comments are based on HP’s experience managing end-of-life (EOL) electronic products. HP has operated recycling facilities in the United States for the past 16 years. We currently operate two state-of-the-art recycling facilities, processing approximately 4 million pounds of electronic material per month. For the past 4 years, HP has offered our innovative “Planet Partner’s” program, a voluntary recycling program, which offers the public a convenient, environmentally sound hardware recycling solution for computers and CRTs. In the summer of 2004, HP and Office Depot teamed up for a free nationwide retail return pilot program for IT products and televisions. This program was extremely successful as the public returned over 10.5 million pounds of electronic waste in a 7-week period. HP has also been actively involved in implementing take-back legislation in California, Maine and in Europe. Our experiences in these areas form the basis for HP's comments on the alternative scenarios discussed in Chapter 3.

It should be the goal of any take back system to maximize participation and minimize cost while providing a sustainable, total environmental solution. Based upon our experiences, we believe that the shared responsibility approach will result in a more effective, fair, and low cost solution for managing Oregon’s e-waste. HP also believes that the shared responsibility approach is the best solution for the environment. Besides the shared responsibility model, the only other take back system under discussion involves an advanced recycling fee (ARF) that is paid by the consumer at the time of sale. Based on the experiences in California and Europe, HP has seen that this type of

system fails both the consumer and the environment. Not only is it much more expensive to the consumer, the environment loses in the long run as a result of a lack of incentive to improve the design of the product.

II. Shared responsibility provides the best financing solution for Oregon

Shared responsibility in Oregon would be defined as each stakeholder using their own expertise to provide a total electronics recycling service to Oregon citizens. No one, other than the government, has the authority to enforce the regulations of the state. Therefore, it would fall to the government to assure participation in the system by all individual stakeholders. This will help create a level playing field that is necessary for the system to be sustainable. Consumers are responsible for participating in the system, and manufacturers are responsible for the physical and/or financial collection and recycling of their own branded products or an equivalent share.

There are many advantages to a system where the manufacturer of a product is responsible for managing recycling of the company's branded products. Since the cost of recycling would be included in the supply chain cost, much like the cost of transportation and packaging is now, there is incentive to decrease the cost of recycling in order to decrease the total supply chain cost of the product. Leveraging off the manufacturer's existing suppliers (procurement, transportation, etc.) will provide economies of scale savings. Also, the desire to reduce supply chain costs will drive recycling design improvements. No manufacturer will invest in improvements unless there is a benefit to be achieved by them for this improvement. This benefit can be direct or indirect. If the manufacturer operates their own recycling facility, lower recycling costs will be realized. If a manufacturer goes into the market place and contracts with another company to perform the recycling on their behalf, the manufacturer can demand a lower cost structure for their branded products. In either case, the lower cost of recycling will be passed on to the consumer through normal free market pressures. Under a shared responsibility model, companies could act individually, or in partnership with other companies of their choosing, to compete in providing recycling services and incentives to consumers and in developing recycling technologies. This type of market-based approach has the best prospect of creating the most efficient and flexible recycling solution, driving costs down for consumers.

Oregon is a very diverse state, from high-density metropolitan areas to sparsely populated rural areas. A "one-size-fits-all" approach is unlikely to provide an efficient, workable solution to the issue of electronic waste for all of the state. HP supports a system that allows for flexibility and a variety of options that make sense and meet the diverse needs of those that are being served.

Our goal is to create an approach that is fair and efficient, while also enabling market forces to drive costs down. For example, HP offers an "e-coupon" discount for consumers who utilize HP's recycling services under the Planet Partners program, whereby the consumer receives a substantial discount off the purchase of a new HP

product. Retailer and other promotional events have also elicited positive consumer responses. We believe that this type of market-based approach is the best structure for effective recycling programs for households and individual consumers.

III. ARFs will create a competitive disadvantage for companies in Oregon

HP believes the shared responsibility model provides the biggest return for the consumer's dollar. A shared responsibility model requires minimal bureaucracy and is limited to enforcement. It is important that the take back system Oregon establishes does not put Oregon businesses at a disadvantage in the marketplace.

An ARF system penalizes companies selling products today for the costs of managing products of companies sold in the past. Companies that previously had a market share are allowed to benefit from a free ride as a result of fees paid on products from other companies. Under an ARF system, the manufacture is no longer responsible for their products when that product becomes waste. In an ARF model, that responsibility transfers to the government.

IV. Oregon lacks infrastructure to collect, enforce and manage an ARF

An expensive bureaucracy must be established to collect and operate the ARF take back system. Because Oregon lacks the basic infrastructure associated with collecting state sales tax, it will be an even larger expense to establish an ARF system in Oregon than other jurisdictions have experienced. California has been touted as having the model take back system with their fees ranging between \$6 and \$10. Based on an average ARF of \$8, it will require the fee from the first 738,000 units that are sold each year in the state to cover the cost of collecting the fee from the retailer. This \$5.9 million covers the annual cost incurred by the Board of Equalization (the entity tasked with collecting CA state sales tax as well as the new ARF) for the additional staff needed within an already-existing tax-collecting infrastructure. Since Oregon has no sales tax, it has no existing infrastructure it can leverage. The cost to establish the necessary infrastructure, let alone run the collection bureaucracy is unknown, but will be paid by the consumer though none of these dollars will go towards the recycling of the waste.

There are questions whether an ARF can be collected from non-conventional retailers. California's Board of Equalization has received an opinion from their legal department that internet and catalog sales from out-of-state retailers would be subject to the Commerce Clause requirement for these companies to have substantial nexus in the state. For this reason, they have determined that the California ARF cannot be collected on these types of sales. This puts the local retailer at a distinct disadvantage.

V. ARFs provide no incentive for manufacturers to design for environmental attributes

Under the ARF system, similar products pay the same amount, eliminating any incentive to the manufacturer for improved environmental performance. Design modifications as simple as reducing the number of screws a product uses or where a battery is located will

lower recycling costs. Since the waste is no longer the responsibility of the manufacturer, design improvements such as these are lost under an ARF system.

VI. Cost differences

HP's experience in Europe has shown that ARF systems are more costly than a shared responsibility system. The primary differences in these costs stem from several factors, including the following:

- In our experience, government and collective systems tend to be significantly more costly in terms of administration. Large, bureaucratic systems tend to have higher overhead costs and little incentive to restrain these costs; in contrast, internalizing these costs as part of a business will keep these costs in check and enable companies to manage these costs as they do other aspects of their business.
- Industry or consortia system adds several layers to the distribution of funds, therefore increasing the fee to consumers. In HP's experience, when the fee passes through multiple entities, the cost to consumers increases. Each time a different entity, government or consortia, handles the money the transaction, handling and administrative costs must be added to the fee thereby unnecessarily increasing the final cost to consumers. As HP examines the different financing mechanisms, we evaluate the cost of each system to our business and our consumers. HP believes that the individual producer responsibility system offers consumers the lowest cost alternative, over government run or industry run fees at point of sale. Fee systems and monopolistic industry consortia also tend to accumulate large financial reserves, and these add to the overall costs of the system.
- Competition in the market for recycling services will help reduce recycling costs and promote improvements over time. Competition is a fundamental principle of American economic policy, and these same considerations are at work here. A government or collective system will likely lack the ability to ensure cost-effectiveness and bring the power of the marketplace to reduce costs and increase efficiency in the delivery and quality of these services, as well as drive innovation and improvements in recycling technologies. A competitive system, in contrast, where individual companies can work either alone or in partnership with others, will have the greatest prospect of bringing competition to the recycling market.

VII. Conclusion

HP strongly opposes mandated fees, which will substantially increase recycling costs and reduce competition. HP endorses a solution that requires a manufacturer to provide for the recycling of its own branded products for households and individual consumers. Implementing legislation should create a level playing field and allow manufacturers to select collaborative or individual operations to take back and recycle their discarded products from households and individual consumers. This type of solution would allow manufacturers to manage their recycling costs as they do other product costs (how much to charge consumer, whether visible) and would create an incentive for better design by

allowing manufacturers to receive design for recycling (DFR) benefits and effects and achieve economies in the recycling of their own products.

For all of the reasons outlined above, HP believes the best system Oregon can adopt for financing and recovery of electronics is a shared responsibility model and looks forward to working to make that happen.

Appendix E

Minority Report Benefits of an Advanced Recovery Fee Approach for Electronics End-of-Life Management in Oregon

Prepared by Frank Marella, Sharp Electronics and
Wayne Rifer, Rifer Environmental

The authors believe that the ARF-based model, as it was developed by NEPSI³⁰, provides the soundest and most effective basis for moving forward with an electronics end-of-life management system both at the national and state levels. Oregon can and should take leadership by implementing an ARF-based approach that will defer to a national system when one is implemented.

This minority report outlines the essential strengths of NEPSI's ARF-based approach. The NEPSI system has several unique elements that build on the ARF to create a system that will be cost-effective in building local services and provide incentives for improved environmental design.

Alternative Approaches As described in the Advisory Committee report, and as negotiated by NEPSI, the two most viable alternatives, which are compared in this minority report, are:

1. The Advanced Recovery Fee (ARF) system, which provides funds to pay for collection, recycling and other costs by a visible consumer fee, and
2. A partial producer responsibility approach that mandates manufacturers to manage their own product at end-of-life, or an equivalent share of product, and to internalize the costs in the product price. The word "partial" refers to the fact that the costs of collection would be left to local communities.

Note that there are several possible ways that the producer responsibility system could be organized. In contrast the details of the ARF-based approach are known from the NEPSI process. This makes comparing the two somewhat difficult.

The NEPSI System in Brief The NEPSI financing method is a hybrid system. The initial system includes an Advanced Recovery Fee (ARF) that is collected at retail on sales of all PCs, monitors, TVs and large peripherals that are sold to residents and small businesses or organizations. *The collected funds will be managed by a private Third-Party Organization (TPO), not by government.* The TPO will have multi-stakeholder governance that is dominated by electronics manufacturers. The TPO will use competitive contracting to manage end-of-life products nationally. A portion of the funds will pay for local collection costs.

³⁰ The National Electronic Product Stewardship Initiative is a multi-stakeholder dialogue including manufacturers, governments, environmental organizations, recyclers and others to design a national system for the end-of-life management of electronics.

At the appropriate time in the future the ARF may no longer be needed and the system may be transitioned to cost internalization or some other approach. NEPSI stakeholders believed that after the historic backlog is depleted, and an efficient infrastructure has been built, the ARF may no longer be needed and the system may be transformed to partial producer responsibility or even sunsetted altogether.

The NEPSI system includes several other essential elements:

- Methods to assure a nationally consistent base level of services, while providing for local flexibility
- A collection network that builds on existing operations and businesses, in order to provide convenience for the public
- A national materials processing system that is made efficient and cost-effective through competitive contracting
- Numerical performance measures for collection and processing
- Standards for environmentally sound recycling that are enforced through contracting procedures
- A program to develop markets for recovered products and materials that builds toward long-term economic sustainability.

Benefits of the NEPSI Approach One benefit of the ARF approach is that it represents the balanced consensus³¹ of the stakeholders who put in over 2½ years of collaborative negotiation. Any one stakeholder may, and some do, chose a different approach, but the balance of stakeholder interests resulted in a consensus on the ARF-based system.

The NEPSI-system is designed to most effectively and efficiently address the immediate challenge, which is to build and finance a collection and processing infrastructure that will provide convenience service for Oregonians, and that will assure ensure efficient and environmentally responsible processing. Moreover, this system should not place a new financial burden on state and local governments, which are struggling to meet their current financial obligations.

The ARF provides a predictable source of funds that can be efficiently managed to pay for all products that are returned by the public and small organizations.

Following are some of the strongest benefits of the ARF-based approach:

- The ARF-financed system would avoid burdening local governments with the costs of collecting and transporting products. The alternative approach requires local communities to pick up the costs of collection.
- Cost-efficiencies in transportation and recycling services will be gained through contracting that will utilize competitive bidding and will maximize economies of scale.
- The system will maximize local reuse by forming partnerships between collectors, contractors, and local reuse organizations.

³¹ “Consensus” in NEPSI was defined “that no few people can stand in the way of the decision”, and that an “80% majority” would affirm a vote.

- The ARF is a visible fee that the consumer sees when purchasing a new product. A visible fee is the best way to deliver an educational message that new purchases imply end-of-life economic and environmental impacts, and that reuse or recycling is the preferred option.
- The ARF maintains a level playing field in the market because it is equitable for all products and sellers. It offers the least opportunities for manufacturers to escape their responsibilities. Manufacturers that are foreign, small, or only recently entered the market can escape the producer responsible systems, as has been demonstrated in Europe.
- The NEPSI system will directly engage manufacturers in managing the end-of-life system through participation in the TPO. This will provide to manufacturers both an incentive to improve the design of the products for reuse and recycling, and information feedback from the end-of-life management organizations and companies.
- When implemented at a state level, the ARF-based system will most readily transfer to the national system, when-and-if it emerges based on the NEPSI model.

Difficulties of the ARF-Based System The ARF-based approach is not perfect, as, unfortunately, none of the solutions are. However, there are ways to address the main drawbacks. Following are the chief drawbacks that have been identified for the ARF system, along with ideas of how they can be addressed:

Drawback: Enforcement of the ARF on internet and catalogue sales may be difficult for a state, and some sellers may avoid paying the fee.

Response: Without doubt this is a difficulty. However, the magnitude of the problem may not be as large as expected. California addressed the internet sales problem in their legislation by requiring that all manufacturers that sell to State government abide by the law, including paying the ARF on their direct consumer sales. This should capture the largest internet sellers, but time will tell how effective this will be. In California the largest internet manufacturer has explicitly agreed to collect and pay the ARF. Only small sellers would probably end up to be enforcement problems. The portion of sales by small internet sellers that may escape the ARF is expected to be small.

In addition, enforcement is an equal or greater problem with the producer responsibility approach. A study in Minnesota identified over 1000 different brands of TVs and computers being returned for recycling. Enforcing recycling requirements on a large number of out-of-state and foreign manufacturers, including those who sell through internet sellers, could place substantial costs on the system.

Drawback: A flat ARF on all products lacks any direct incentive for improved environmental design. Producer responsibility is expected to incentivize design improvements more than an ARF.

Response: The NEPSI ARF-based system is designed to provide a degree of incentive to manufacturers. As noted above, the participation of manufacturers in managing the end-of-life system through the TPO will provide both an incentive for environmental design and feedback information from recyclers.

Moreover, it must be recognized that is difficult and costly under any end-of-life management system to deliver a direct financial design incentive to manufacturers, simply in the way that scrap is handled. Brands can be sorted and processed separately only at substantial cost. In reality, for any but one or two of the largest manufacturers, the amount of incentive that would be provided, is very small at best.

Also, with the European law banning the use of hazardous substances³², and the growth of environmental procurement programs by governments, environmental design is being improved through other means. Current trends in the industry are that electronics manufacturers are moving to eliminate hazardous substances and improve design for end-of-life management. Moreover, as implemented in California and proposed in other state initiatives, the ARF can be combined with direct design requirements or incentives, such as requiring local implementation of the RoHS directive.

Relative Costs of the Alternatives It has been asserted that the ARF-system would be much more expensive than a producer responsibility system. However, there is no independent or reliable basis for asserting that either system would be more expensive than the other.

Costs of Electronics Recycling Programs in Europe In Europe both ARF-based and individual manufacturer systems are operating in different countries. Unfortunately (but predictably), advocates of each side claim that their system is the cheapest and most efficient. However, these authors have seen no independent evidence to prove this one way or the other. Only one independent study³³ has been done to our knowledge that looked at costs. Following are some key points made by that study.

First the study notes that cost comparisons are highly unreliable due to many differences amongst the programs. “The availability and quality of information available on the individual schemes varies considerably... Comparing performance of European WEEE schemes on a like-for-life basis poses considerable challenges.” (p.5)

It has been claimed that the management and administrative overhead of a TPO system is high. However, the European programs that are based on a fee with a TPO seem to be reasonable, ranging from 3.5% to 7.5%, varying due to how much auditing and monitoring the TPO does of the contract recyclers.

Unfortunately the costs for programs run by individual producers are not analyzed in the report, both because the data is internal to the companies and therefore

³² The Restriction on Hazardous Substances (RoHS Directive) will ban many of the problematic substances in electronics, and this will impact products sold in the U.S. as well as Europe.

³³ “Study into European WEEE Schemes”, prepared for the UK Department of Trade and Industry by Energy Futures Solutions, November 2003.

proprietary, and also because, though the individual company “schemes operate in the majority of countries, volumes are minimal.”(p. 6)

However, the costs being paid by TPO run ARF-based programs in Europe for transportation and recycling are reported, and they are quite reasonable by U.S. standards, between 20 and 37 cents per pound.

One confusing issue is that several programs in Europe are required to build a reserve fund for future recycling. This temporarily increases the amount of the fees they charge two and even nearly three times. It is deceptive to attribute these substantial extra charges to the costs of the current recycling system.

And finally, quoting from the European study: “the costs per product are considered relatively small in relation to overall product price. The research consequently found no significant impact upon product pricing strategy, consumer behavior or cross border transactions.”

Costs for fee collections It is also claimed that the costs of collecting the ARF from retailers will be high. Indeed, in California the costs initially suggested by the State agency do seem very high. However, the Oregon Department of Revenue has identified a very reasonable cost for implementing the ARF system, per a confidential memorandum to Representative Dingfelder.

Reasons why the ARF system can effectively control costs In fact there are logical reasons to believe that the ARF run by a private TPO would be a cheaper system than having individual companies arrange for their own recycling services:

- The recycling services under the ARF would be secured on a state-wide basis through competitive contracting, using economies of scale and competition to drive costs down.
- With manufacturers governing the TPO, they have an incentive to reduce the fees on their products, and therefore to keep the system costs as small as possible.
- The ARF would not be marked-up by retailers, which typically amounts to at least 26 percent, however internalized costs would be.
- If individual companies are responsible for some share of costs in proportion to their own product sales (or returns) there will need to be systematic accounting and enforcement systems, and possible even brand sorting, adding costs.

Conclusion The ARF-based system, run by a private TPO, is a well-designed approach to managing end-of-life electronics, and one that has a consensus of stakeholder support out of the NEPSI process. NEPSI stakeholders thought through the many criticisms that have been leveled at an ARF-based approach and effectively addressed them in the system design. It is an approach that would work well on the state level, and would provide the most convenient, effective and cost-efficient system for Oregonians.

Appendix F

Free Geek and Mac Renewal Statistics

Provided below are some statistics and demographics for three existing Free Geek Operations and Mac Renewal.

- **Free Geek Community Technology Center** (Portland) is the founding location started in the spring of 2000. Located in a midsize urban area with good access to resources.
- **Free Geek Penn** is located in a small rural town in Pennsylvania. Reasonably close to some resources, but limited access in some areas.
- **Free Geek Michiana** is located in a rural area with almost no access to resources, but they are still having success due to good partnerships with other non-profit organizations in their area (Salvation Army).
- The **Mac Renewal Computer Reuse and Recycling Center** is located in a small city along the I-5 corridor in Oregon. Reasonably close to some resources, but limited access in some areas.

FREE GEEK Community Technology Center

- Founded April 13, 2000.
- Hours of Operation: 11:00am to 7:00pm Tuesday thru Saturday
- Facility: 15,000 SF - Office/Workshop/Warehouse
- Monthly Rent: \$5,500
- Monthly Utilities/Maintainence: \$1,250
- Staff: 15 Collective, 3 Interns
- Monthly Payroll and Benefits: \$24,000
- Volunteers: 3,000
- Computer Donations: 700/month
- E-Scrap Recovery: 15 tons/month
- E-Scrap Recovery Income: \$2,500-3,000/month
- Fees: \$10.00 per monitor

Available E-Scrap Recycling Resources (distance from facility):

- [Calbag Metals Co.](#), Portland, OR (5 miles).
- [Earth Protection Services](#), Tigard, OR (12 miles).
- Electronics Recycling, Portland, OR (1 mile).
- [Hallmark Refining Corporation](#), Mount Vernon, WA (233 miles).
- [Metro Metals NW](#), Portland, OR (5 miles).
- PC Plastics, Portland, OR (7 miles)
- [Quantum Resource Recovery](#), Beaverton, OR (11 miles).
- [Total Reclaim](#), Seattle, WA (169 miles).

Partnerships:

- [Mac Renewal](#), Eugene, OR (112 miles).
- World Computer Exchange/Mercy Corps

FREE GEEK Penn

- Founded: August, 2003
- Address: 400 west main Street, Ephrata, PA 17522
- Phone: 717-721-2494
- Hours of Operation: 10:00am to 6:00pm Monday thru Saturday
- Current Facility: 6,500 SF - Warehouse/Office
- Monthly Rent: \$1,465
- Monthly Utilities/Maintainence: \$215
- Staff: 3 Staff
- Monthly Payroll and Benefits: \$???
- Volunteers: ???
- Computer Donations: 500/month
- E-Scrap Recovery: 5 tons/month
- E-Scrap Recovery Income: \$10,000/month
- Fees: \$10.00 per monitor

Recycling Resources (distance from facility):

- [Earth Protection Services](#), Lancaster, PA (16 miles),
- [Lancaster County Waste Management Authority](#), Lancaster, PA (16 miles).

FREE GEEK Michiana

- Founded: 2002
- Hours of Operation: Volunteer night, every Tuesday evening, 6:00am - 10:00pm. FreeBox class most Saturdays.
- Facility: 2 locations totaling 1,000 SF
- Monthly Rent: \$0 (donated)
- Monthly Utilities/Maintainence: \$0 (donated)
- Staff: 0 Staff
- Monthly Payroll and Benefits: \$0
- Volunteers: 24
- Computer Donations: 50-100/month (limited by storage).
- E-Scrap Recovery: no stats available
- E-Scrap Recovery Income: \$0/month
- Fees: \$15.00 per monitor

Recycling Resources (distance from facility):

- LaPorte County and St. Joseph County Solid Waste Management District recycling centers.

- MCE - Michiana Cartridge Exchange (1 mile)

Partnerships:

- South Bend/Mishawaka Salvation Army Corps

Mac Renewal: Computer Reuse and Recycling Center

- Founded: May, 2004.
- Hours of Operation: Sat/Sun/Mon: 9:00 AM - 3:00 PM, Thurs/Fri: 9:00 AM - 6:00 PM
- Facility: 8,500 sq. feet Office/Warehouse/Shop
- Monthly Rent: \$3,500, triple net (property taxes relieved), 3 year lease.
- Monthly Utilities/Maintenance: \$???
- Staff: Volunteer
- Monthly Payroll and Benefits: \$0
- Volunteers: 100
- Computer Donations: 100/month
- E-Scrap Recovery: 8 tons/month
- E-Scrap Recovery Income: \$1,200/month
- Fees: \$15.00 per monitor

Computer Reuse and Recycling Center, home of MacRenewal
222 Polk Street Eugene, OR 97402

Phone: (541) 686-2366

FAX: (541) 686-0577

<http://www.lanecrrc.org>

OPEN HOURS: Saturday and Sunday: 9:00 AM - 3:00 PM

Monday, Thursday, and Friday: 11:00 AM - 6:00 PM; Closed Tuesday and Wednesday

Available E-Scrap Recycling Resources (distance from facility):

- [Earth Protection Services](#), Tigard, OR (101 miles).
- Electronics Recycling, Portland, OR (113 miles).
- [Hallmark Refining Corporation](#), Mount Vernon, WA (233 miles).
- [Metro Metals NW](#), Portland, OR (128 miles).
- [Quantum Resource Recovery](#), Beaverton, OR (107 miles).
- [Total Reclaim](#), Seattle, WA (381 miles).
- PC Plastics, Portland, OR (107 miles)
- AgriPlas, Keizer, OR (74 miles)
- Schnitzer Steel, Eugene, OR (2 miles)

Partnerships:

- Free Geek Technology Center Portland, OR
- Lane County Solid Waste Management, Eugene, OR