



Washington State Department of Ecology

Electronic Product Recycling Program

Preliminary Economic and Least Burdensome Analysis for Amendments to Chapter 173-900 WAC

*Prepared for
Ecology's Solid Waste and Financial Assistance Program*

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This is a preliminary document.
Ecology requests comments on this document and any relevant data.

Executive Summary

Preliminary Benefit-Cost Analysis

Based on research and analysis required by RCW 34.05.328(d)(e) the Department of Ecology determines:

There is sufficient preliminary quantitative and qualitative evidence that the probable benefits of an electronic product-recycling program outweigh the probable costs for Ecology to propose the rule.

The law creates benefits and costs but it cannot be implemented without the rule. Therefore Ecology is evaluating the law and the rule together. The rule re-states and implements several of the requirements in Chapter 70.95 RCW – Electronic Product Recycling. The primary focus of this rule is implementing the law, which requires that the cost of recycling be borne by manufacturers for the following electronic products: TVs, computers, laptops and Monitors. This rule includes the:

- Creation of “recycling plans” so that manufactures will be able to cover the cost of collection, transportation, processing, and recycling.
- Requirements for collectors, transporters, and direct processors.
- Requirements for retailers, charities, local government, and Material Management and Financing Authority.
- Requirements for public outreach.
- Sampling methods used to determine return shares, equivalent shares, and fees.

Net Benefits

The law, the rule, and the program taken together are expected to generate net benefits of \$1.8 million, with costs of \$25.8 million and benefits of \$27.6 million. The individual components of costs and benefits are presented in the table.

Table 1

Benefits and Costs of the Recycling Program	
COSTS	\$ 25,800,000
Administrative fees	\$221,500
Collection	\$12,500,000
Transportation	\$1,100,000
Processing	\$11,700,000
Processors dropping out	\$50,000
Sampling	\$141,000
Plans	\$100,000
Forms	\$15,000
BENEFITS	\$27,600,000
Reduced recycling costs	\$130,000
Willingness to Pay	\$27,500,000
NET	\$1,800,000

Preliminary Least Burdensome Analysis

Based on research and analysis required by RCW 34.05.328(d)(e) the Department of Ecology determines:

There is sufficient evidence that the proposed rule is the least burdensome version of the rule for those who are required to comply, given the goals and objectives of the law for Ecology to propose the rule.

Ecology considered a variety of approaches and made the decision to write a rule that sticks very closely to the requirements of the law. Most of the costs of this rule are actually a transfer of costs from individuals, landfills, collectors, transporters, and processors to manufacturers.

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Preliminary Economic and Least Burdensome Analysis

Conclusion

Ecology determines, based on sufficient preliminary quantitative and qualitative data, that that the probable benefits of the proposed rule are greater than the probable costs and that Ecology can propose the rule. Ecology also determines that the rule we are proposing is the least burdensome version of the rule that meets the general goals and specific objectives in the law (RCW 70.95).

Purpose of this analysis

The Washington State Department of Ecology (Ecology) is proposing to amend the Electronic Product Recycling Regulation, Chapter 173-900 WAC. The Administrative Procedures Act (RCW 34.05.328(d)(e)) requires two types of analyses before adopting a significant legislative rule – a cost-benefit analysis and a least burdensome alternative analysis. This report provides the results of these analyses and shows the potential impacts associated with the proposed rule.

Background

2004 Recommendations to Legislature

At the request of Washington lawmakers in 2004, Ecology and the Solid Waste Advisory Committee (SWAC) developed recommendations for how the State can implement and finance a program to collect, recycle, and reuse electronic products. Ecology and the SWAC worked with the representatives below:

- Electronic product manufacturers
- Electronic product retailers and waste haulers
- Electronics recyclers
- Charities, cities, counties, environmental organizations, public interest organizations, and other interested parties

2006 Electronic product recycling law

Based on the 2004 recommendations from Ecology and the SWAC, Washington lawmakers approved a new law - RCW 70.95N, Electronic Product Recycling - that became effective July 1, 2006.

This new law requires computer and television manufacturers to provide consumer-convenient recycling of their covered electronic products throughout our state.

The rule defines covered electronic products (CEPs) as computers (including portable or laptop computers), televisions, and computer monitors used by households, charities, school districts, small businesses, or small governments, located in Washington.

Manufacturers must make these services available to these groups by January 1, 2009.

Reason for this rule proposal

There are toxic substances in CEPs that can come out of them when they are thrown away in a landfill. Because of this, many landfills and transfer stations across the state have started to reject CEPs to prevent the contamination. This has caused a rapid increase in the number of CEPs coming into recyclers to over 22 million pounds¹ per year.

Ecology estimates that between 2003 and 2010 the number of obsolete CEPs in Washington State will be:

- 4.5 million personal computers,
- 3.5 million cathode ray tube monitors, and
- 1.5 million flat panel monitors.

Ecology expects the amount of recycled CEPs to increase to 56.5 million pounds after we implement the proposed rule.²

This rule proposal will also allow recyclers to treat CEPs that come from households (small quantities) separate from those that come from businesses (large quantities). Without this rule, recyclers would have to merge the waste streams and they would be required, under the dangerous waste rule, to treat all of them as dangerous waste.

This rule proposal will also take advantage of a federal exemption for cathode ray tubes (CRTs) allowed to the states and will allow recycling of CRTs to continue and increase.

Without this rule, recycling will be an increased financial burden on Washington citizens and landfills. This rule implements the law and the law transfers the cost of recycling CEPs to the companies that manufacturer the CEPs. .

The law and the rule provide a net savings for Washington.

Scope of analysis

This analysis covers the first 20 years of program costs including the costs of Phase 1 and Phase 2 of this rule-making process. The analysis covers both capital and annual costs. Capital costs are annualized on a 20-year basis.

Comparison of the current and proposed rules

Current rule requirements

Ecology is writing the rule in two phases. For phase 1 of the rule making Ecology adopted rules that:

- Require manufacturers, collectors, and transporters of CEPs to register with Ecology.
- Sets a fee structure and payment schedule for manufacturers.

¹ Reported recycling total tonnage for CEPs in Washington. Survey data June 2007.

² It is unclear at this time what the relative share of CEPs from business vs. residences will be. Given that a larger share of the TVs may come from homes, Ecology believes at least 45% of the pounds will be residential. However, the share for residences could be much higher.

- Require mandatory brand labeling of all CEPs.

Description of proposed changes

For Phase 2 of the rule making Ecology is proposing to adopt the rest of the requirements of the new law. This includes:

- Recycling plan submittal
- Plan review and content
- Program implementation
- Return share and equivalent share calculations
- Direct processor registration and standards
- Registration and performance standards for collectors and transporters
- Exemption from the Dangerous Waste Rule for recycled cathode ray tubes

Baseline for Analysis

The law, RCW 70.95N, Electronic Product Recycling, and the existing electronic product recycling rule (WAC 173-900) and the existing Dangerous Waste Rule (WAC 173-303) form the baseline for this analysis. Existing federal and state laws and rules regarding disposal of solid waste, dangerous waste, and electronics also forms part of the baseline. However, this analysis covers the costs and benefits of the law and the rule. The reason for this is that the law creates the benefits but those benefits cannot be realized without the rule to implement the law.

Law – RCW 70.95N, Electronic Product Recycling

The law includes many detailed requirements. Most of the rule is drawn word for word from the law.

Existing rule – WAC 173-900

The existing rule outlines the

- Definitions for words within the rule.
 - Registration process for manufacturers, transporters, and collectors.
 - Administrative fees.

Existing dangerous waste rule – WAC 173-303

The current dangerous waste rule would require generators to designate CEPs as dangerous waste if they are large quantity generators.

Analysis of costs & benefits

Costs

Costs for collectors

Ecology analyzed the cost for collectors based on the assumption that there are 88 collection sites throughout Washington State. The law requires there must be at least one service in each county of the state as well as in cities with a population of greater than ten thousand.

Collection facilities reported they would need the plans to pay them at the rate of \$0.26 per pound for their collections. It is not clear what rates the plans will negotiate with their collectors.

This rule proposal will not allow collection facilities to charge for drop offs or to disassemble the CEPs for recycling. This will be lost revenue for these facilities. Therefore, collection facilities also reported how much revenue they currently get from the:

- Fees for taking the CEPs (\$4.6 million)
- Sales of parts and recyclable materials (\$630,000).

This means they are actually requesting an increase of \$10.1 million from the plans over what they currently receive to offset this loss (see below).

Staffing Collection Site During Operating Hours: Only one collection site reported they had an honor system for dropping off CEPs. All other facilities staff their collection sites during operating hours. However, this one facility recently decreased its hours of operation instead of adding more staff. They therefore meet the requirement with out added costs. .

Storage Facilities: Ecology requires every collection site to have enclosed storage areas that are protected from the weather and have impervious floors or they must place the CEPs in a container designed to reduce the risk of contamination from glass and other fine solids from the CEPs. Currently, about 7% of collection sites do not have this type of storage area. Ecology estimates it will cost those facilities a total of \$31,000 to install the proper type of storage.

Annual Registration: Ecology estimates it will cost collectors about \$95 each to submit their annual registration using the electronic registration process. This is a total of about \$8,000 for all facilities.

Registration Updates: The rule requires collectors to notify Ecology within fourteen days when there is a change to the information provided with their registration. Ecology estimates, on average, that each collector will have about 5 registration updates each year. If Ecology assumes a cost of \$50 per hour³ and 30 minutes to submit these changes, Ecology estimates a total of \$9,400 a year for collector registration updates.

Documentation of CEPs: Ecology requires that the plans must collect data on what county each CEP comes from and then provide this information to Ecology. For this analysis Ecology assumes this cost will accrue to the plans via activity undertaken at the collection sites. Ecology expects it will cost an average of \$9,000 per site and a total cost of \$795,000 for all facilities to meet this requirement.

Posting Information at Collection Sites: Recycling plans are required to provide information to collectors for them to post in a visible location at their sites. This is to

³ The mean wage in Washington for first line supervisors/managers is \$22.29/hr. We assume employer cost for benefits, management: \$13.43/hr for a total of \$35.72/hr. This is rounded up to \$50 to account for collection site overhead. This estimate may be high however in a setting where an office may be under utilized overhead per hour that the office is used can be higher than usual.

inform covered entities of how and where CEPs received into the program are recycled. The cost of this is minimal.

Lost Revenue from Charges to drop off CEPs: When Ecology implements this rule, collection sites will no longer be allowed to charge consumers for dropping off unwanted CEPs. This will affect 88% of the collectors that currently charge to take CEPs. Prices now range from:

- \$5.00-\$19.00 or \$0.35-\$1.00/lb for monitors and \$0.40/lb for laptops.
- \$20 and up for televisions.

This is a loss of \$56,500 per year, per facility, and total of \$4.6 million.

Lost Revenue from Foregone Sales of Recycled Components: This rule will require collectors to stop stripping components from CEPs for recycling to participate in the program. 40% of these collectors currently do this. Ecology estimates a \$20,000 loss for each of these collectors and a total of about \$630,000. The income is not lost to Washington because the rule transfers this income from the collectors to the processors.

Plan Participation: The plans will hire and pay the collectors to do their collections for them. Thus, a cost to the collectors will become a cost to the plan. Collection sites will be reimbursed to participate in a plan; the respondents estimated that they want to be reimbursed \$0.26/lb. With an estimate of 1 million units weighing 56.5 million pounds to be collected in the first year, ecology expects the total reimbursement the collectors will ask for, including the income transfer, will be \$14.6 million.

Note that it is unlikely that the collectors will be able to extract this much from the plans. The plans will be unwilling to pay over \$.50 per pound for collection, transport, and processing because that is all they would have to pay if they collect too little. Thus the collectors will have to share the \$.50 per pound with the transporters and processors. Further, once a plan has collected and processed its share of CEPs they will be unwilling to pay more than \$.45 because that is all that they will be reimbursed by the other plans. In practice what this limit means is that this estimated \$14.6 million cost will have to come down to under \$11.5 million in order to meet the maximum rate that the plans will be willing to pay. Since this is the maximum that the plans would be willing to pay, given the lowest possible costs of transport and recycling, Ecology assumes that this will be the cost.

Costs for transporters

The plans will hire transporters to move CEPs from collection sites to processing. Therefore, costs to the transporters will become costs to the plans. Ecology surveyed transporters and found that very few companies plan on transporting electronics. Additionally, those that were planning on this type of transport found it hard to estimate how much per pound they would have to be reimbursed to participate in a plan.

In another approach, the Washington Utilities and Transportation Commission estimated that it would cost between \$70 and \$83 per hour to transport electronics, an average of \$76.50/hour and therefore \$1.28/minute.

Ecology then estimated the distance from each of the 88 mandatory collection sites to the closest of 8 cities with known processors; this was then doubled to account for a roundtrip. The average roundtrip distance from a collection site to the nearest processor was 114 miles, or 138 minutes.⁴ Multiplying the 138 minutes/roundtrip by \$1.28/minute gave an average cost of \$176.50/trip.

According to the three surveys Ecology did receive, the respondents estimated an average load of 11,833 pounds per truck load. Dividing the average per trip (\$176.50) by the average weight per trip (11,833 pounds) gave a reimbursement of \$0.02 per pound for transporting electronics. Ecology estimates that transporters will transport over 1 million units weighing 56.5 million pounds, for a total cost of \$1.1 million.

Costs for processors

The plans will hire processors to recycle materials for them. Therefore costs to the processors will become costs to the plans.

Ecology surveyed processors. Most processors currently working in Washington do more than simple processing. They offer collection or transportation services, too.

There are three sets of costs which require analysis.

- The first is the cost of continuing the processing operation as they have in the past.
- The second is the incremental added costs of meeting requirements that are new for the processor.
- The third is foregone revenue for activities that the processor may be giving up if they do not get a contract with a plan.

Ecology estimated the cost of continuing operations based on current charges. Survey results⁵ indicate a wide range of charges for processing. The reported costs range from \$0.43 per pound for one company that collects, transports, and processes down to \$0.16 per pound for another company that only does partial processing but will not continue to process under the proposed rule.

Facilities that collect and process have a different cost for collection than most collectors. If you subtract the collector costs above from their collection and processing costs, the cost runs into negative territory. They are open for business for other reasons such as repair, reuse, refurbishing, or sales of new items. Therefore, their marginal cost per unit of collection is lower and there are no costs for transportation. This makes it difficult to decide what portion of their costs to attribute to the processing activity alone. Because of this, Ecology took their cost for collection and processing and subtracted out the \$0.02 per pound for transportation and then divided the remainder of the costs for these facilities in half, arbitrarily splitting the remaining cost between collection and processing. This produced a range from \$0.11 to \$0.22 per pound and an average cost of \$0.207 per pound for processing.

4 http://ops.fhwa.dot.gov/freight/freight_analysis/perform_meas/fpmtraveltime/index.htm average truck speed on I-5

5 Only one known processor declined to respond.

The potential for export of CEPs to China provides the cap on costs against which most of these companies compete. The estimated cost for transporting to, and processing in, China is about \$0.23 per pound. The existing costs above are just within this limit.

Most processors already do most of the items required in the proposed rule. However, the rule does add new requirements for direct processors and some of these requirements were not included in the above costs for some of the processors.

For each processor the potential compliance cost is different. The items of concern included costs for:

- Registration.
- Reporting.
- Sampling.
- Environmental health and safety management systems.
- Buying scales.
- More space to operate their business.

These costs did not apply to every processor but produced a range of added costs from \$0.018 to \$0.05 per pound with an average cost of \$0.019. When we add this to the \$0.207 above, the cost rises to \$0.226 per pound.

There is a limit to what the processors can charge the plans. This cost comes close to matching the cost of transporting to, and processing in, China. Given this some plans may ship to China. Thus, not all the new or existing flow of business will come to the American processors. This does not affect the cost of the program here in Washington but may affect the unquantified cost of contamination affecting China.

Existing processors report 22 million pounds of recycled CEPs. Ecology has extrapolated from the pounds reported by the smaller processors to an estimated 5 additional collector/processors that may exist in repair shops. This would bring the total pounds currently being processed to 23 million. The current cost of processing these pounds is about \$5.3 million (\$0.226/lb). Ecology believes this is less than half of the total pounds of CEPs that will be processed under the rule. The estimated total pounds of recycling under the rule are expected to be 56.5 million. The cost of processing these pounds is about \$12.8 million.

These costs are comparable to costs reported by other states.⁶

⁶ California data from Form 220A, <http://www.ciwmb.ca.gov/Rulemaking/EWaste/Regs061127.doc>, and <http://www.ciwmb.ca.gov/Electronics/Act2003/Retailer/Fee/>. Maine data from Consolodator data and contract information for regions 1 through 4. Minnesota data from <http://www.pca.state.mn.us/oea/plugin/ElectronicsReport.pdf>

Cost Data from Other States				
State	Collectors	Transporters	Recyclers	All
California	\$0.20		\$0.28	\$0.48
Maine	\$0.12	\$0.06	\$0.19	\$0.37
Minnesota	\$0.17	\$0.05	\$0.04	\$0.27
Maryland: computers only			\$0.05	

Table 2

One processor does not expect to be able to comply with one of the components of the processor standards. They will therefore be unable to obtain a contract and this will cause a loss of approximately \$50,000.

Costs for sampling

RCW 70.95N.110 requires statistically significant sampling to determine the percentage return share by brand name. The plans are required to do the sampling with an independent third party or an Ecology staff member. The proposed rule includes the following:

- Ecology will develop a quarterly schedule for when sampling is done at the facilities of direct processors used by plans.
- Plans will incur costs for sampling and they must make sure that the processor’s staff or their own supplemental staff are available to perform sampling with minimal disruption to normal operations.
- A third party, selected from an Ecology-approved list, will observe sampling.

Sample allocation and days

The total necessary number of samples per year to get a 95% confidence interval and a 0.005 significance level is 10,070 units. Ecology assumes that 4 plans will be conducting sampling, and that 6 processors may handle material for plans.⁷ Based on the proposed sampling method the total required days of sampling to get the sample size will be 108 days each year.

Staff labor costs

Ecology assumes a sampling crew of 5 members will be required for each sampling day, including 1 manager and 4 staff.

Mean wage in Washington for first line supervisors/managers: \$22.29/hr⁸
Employer cost for benefits, management: \$13.43/hr
Total: \$35.72/hr

Mean wage in Washington for material movers, hand: \$12.39/hr⁹
Employer cost for benefits, material moving: \$7.31/hr
Total: \$19.70/hr

Total crew cost is \$114.60 per hour. Thus the total labor cost per 8-hour sampling day is \$916.80 per day. The cost of 108 sampling days is \$99,014.40 annually.

⁷ Based on the plans of current processors responding to the survey.

⁸ Bureau of Labor Statistics

⁹ Bureau of Labor Statistics

Third party labor costs

Plans will also need to employ one third party observer per sampling day. Ecology expects the plans will compensate this person similarly to a professional statistician.

Mean wage in Washington for statisticians: \$31.55/hr¹⁰
Employer cost for benefits, professional: \$13.43/hr
Total: \$44.98/hr

The total labor cost per sampling day for third party observers is \$359.84 per day. The cost of 108 sampling days is \$38,862.72 per year.

Equipment costs

Conducting sampling will require specialized equipment, including:

- Scale (registered with Department of Licensing, 400 pound capacity) - \$1500
- Dollies or other appropriate equipment for moving units - \$500
- Programmable (wireless) bar code readers, printers, stickers – \$1000
- Computer capable of running a sampling database program provided by Ecology - \$700
- Digital camera for photographing unidentifiable units - \$200
- Maintenance and replacement costs after the first year – 10% per year

Each plan will be required to supply equipment. Since these are sunk costs for each contractor, Ecology will estimate total costs assuming 4 plans must purchase and maintain equipment. Total annualized¹¹ equipment costs are \$875 each year per plan, or a total of \$3500 each year.

Total sampling costs: \$141,000 per year.

Costs for CEP recycling plans

The rule requires that manufacturers participate in a plan and sets up a Standard Plan.

The proposed rule will allow manufacturers to opt out of the Standard Plan if they receive Ecology approval to use an Independent Plan. Ecology assumes that manufacturers will only use an independent plan if it costs less. Therefore, the cost of the Standard Plan would be the highest cost option.

The plans must cover the cost of collection, transportation, processing, recycling and sampling for their manufacturers. These costs are included in the sections above. Plans must also submit a plan, pay a fee for review of the plan, do record keeping, participate in public outreach, and submit reports.

At the time of this writing work on the Standard Plan has not begun. The costs of the plan, plan review fee, record keeping, public outreach, and reports will be included in the final Cost Benefit Analysis. The plans may have other costs, however these are not required by the rule. As a place holder Ecology assumes these requirements will cost \$100,000 per year.

10 Bureau of Labor Statistics

11 Equipment cost is annualized based on a real discount rate of 2.1% and a return on capital of 8%.

Registration costs

Ecology has tried to develop a simple registration process for the transporters, collectors, direct processors, and manufactures. Ecology estimates it will take between five minutes and two hours, for each company to fill out the registration form. If Ecology assumes a cost of \$50 per hour, then it will cost between \$4 and \$200 for transporters, collectors, direct processors, and manufactures to register. Manufacturers who have many brands and collectors running more than one site will need more time to fill out the form. If 200 companies require \$75 worth of time to fill out the forms this will cost \$15,000.

Uncertainty and analysis results

The following variables probably generate costs that this analysis does not address.

1. Cost of CEP recycling plan

The cost of collection, transportation, processing and recycling dominates all other costs. The cost is highly dependent on the number of pounds and on how competition affects the rates the collectors, transporter, and processors charge.

For the first 5 years, under the law, the maximum cost that the manufactures will pay to the collectors, transporters and processors is \$.45 per pound because this is the reimbursement rate in the law for plans that don't collect their Equivalent Share. If the rates they are offered by their collectors, transporters, and processors totals more than \$.50, then they won't collect or process very many CEPs. The range of costs reported by each component of recycling is large. Costs will shift as the market adjusts. The market should be competitive if there are sufficient processors and costs could fall over the first few years. They will also pay \$.05 per pound for each pound that they under collecting administrative fees. Given that this will be an 11% increase in their recycling costs, Ecology assumes the plans will try to meet their equivalent shares.

2. Cost of Travel for Sampling

It is unclear where the Third Party Observers will be traveling to observe sampling activities so we did not estimate this cost.

Qualitative costs

The qualitative costs of the rule include the need for many collectors and recyclers to reorganize how they do business. This is an expensive process in terms of both time and effort. For some companies their primary business is to collect and reuse parts and products. These companies also do some of the activities that constitute recycling. A few of these companies will decide to drop the recycling activity and become collectors while the rest will pay for the added requirements in the rule and will become registered direct processors. They are deciding between the added revenue from the plans for collection coupled with the loss of sales of parts for metals extraction versus the additional revenue from plan payments for recycling coupled with the cost of complying with the direct processor requirements.

Two companies are trying to figure out what new niche they can fill because they don't expect the plan payments to cover their current costs and they expect they will not be able

to continue to dismantle computers in order to sell parts for recycling. One of these companies has decided they will not continue processing but the other is still considering its options.

In the case of computers, more than one processor has indicated they can sell them for recycling in China for more than they receive for recycling in Washington. Some may choose to do this. As stated earlier, the downstream cost of contaminant releases in China is not known.

Retailers will have some costs because they need to look at the Ecology web site before ordering CEPs to make sure the brand name is listed. At one time, Ecology expected there would be some costs because some companies would not list their brands. However, compliance has been good. Retailers with new brands, who previously sold white box CEPs, will be in the program as manufacturers.

Benefits

Chapter 173-900 WAC provides for the recycling of covered electronic products once they are no longer wanted. This rule generates benefits by reducing potential damages from hazardous components of discarded electronic products and from conservation of the resources that they contain.

Ecology estimated the willingness to pay for recycling of current covered electronic products (CEPs) is at least \$.49 per pound because that is what the public is already paying. Ecology has extrapolated this willingness to pay to all the electronic waste and estimated the willingness to pay is \$27.5 million.

Ecology must evaluate the benefits based on the effect of the rule. The law should increase recycling and reduce the number of electronic products that reach landfills. This is beneficial because most electronic products have some contaminants. Recycling should increase because the recyclers will no longer charge the consumers, while disposal at landfills will continue to cost. The cost is transferred by the rule to the manufactures. This makes proper recycling of the equipment more likely.

There are five benefits of the law:

- The potential to reduce contamination in landfills.
- Reducing the average cost of recycling.
- Reducing the cost of separating electronics.
- Reducing illegal dumping.
- Willingness to pay to recycle unwanted electronics.

Reduced costs of landfill cleanups

In the past, landfill cleanups have been very expensive. CEPs have added to the contaminant load in landfills. Recycling will reduce this. However, Ecology has to examine the likelihood that this proposed rule will prevent such cleanups.

To protect the landfill areas, some local governments, transfer stations, and landfill owners have already taken action to refuse electronics or to separate electronic products from the waste stream. As the costs for product separation increase, the landfills have

shifted some of these costs to the consumer by refusing to take the discarded products or by charging extra for them. Unfortunately, this has made it harder for consumers to dispose of electronic equipment properly.

Now that landfills are lined, the high cost cleanups should be rarer. Given that the contamination from landfills is reduced by liners, the need for high cost cleanup has declined.

Clearly some part of this benefit remains because individuals will breakdown the CEPs and put them in their garbage pails and the transfer stations and landfills will be unable to return them. However, given the reduced likelihood of these high cleanup costs, Ecology did not estimate this benefit for the preliminary analysis. Ecology may estimate it for the final Cost Benefit Analysis.

Reduced costs of recycling

Sometimes an activity becomes cheaper per unit if the volume of recycled material increases. Companies in Washington report that they are preparing for the change in volume.

The 57% of those respondents that do recycling and public collection at the same site, have costs ranging from \$.16 to \$.43 per pound with an average cost of \$0.32 cents per pound. This is lower than the average charge of \$0.49 that facilities are currently charging. If direct processors subcontract with these collector/sub-processors, this will bring down the average cost per pound of recycling. However, these small companies have lower throughput and thus the cost savings may only apply to 4% of the total product. Therefore the cost reduction will be at most \$0.13 per pound and only for the estimated 42% of recycling currently being done. If these companies can handle sufficient volume, the savings would be at most \$130,000 per year.

Reduced separation costs

Some landfills and transfer stations still take electronics. The landfills that do take electronics reported that they were smashed and buried. Other transfer stations and landfills do not take the CEPs or separate them from the waste stream. It is possible that some local governments, transfer stations, and landfill owners will have lower separation costs. Separation costs may or may not be affected because large transfer stations also sometimes set up multiple areas to recover other resources such as refrigerators, wood-waste, and construction materials. This possible benefit cannot be quantified.

Reduced costs of illegal dumping

People who don't want electronics but who can't afford to dispose of them properly sometimes dump them illegally. This is costly in terms of time and effort to remove them and dispose of them properly. This cost will be reduced. However, the gain from this is so unclear that this analysis does not estimate this benefit.

Willingness to pay

To estimate *willingness to pay*,¹² Ecology analyzed the prices that individuals and businesses are currently paying, in Washington, to recycle electronic products.¹³ Ecology also took into consideration the results of a Consumer Electronics Association survey that found 42% of households recycle their electronic waste.¹⁴

Using this information Ecology came up with an average rate per pound that represents what consumers are currently paying for recycling. This rate is then extrapolated to the 56.5 million pounds that will be recycled under the program each year. Ecology estimates the willingness to pay for electronic product recycling by Washington citizens is \$27.5 million. The average cost of collection, transportation, and processing being paid is \$0.49 per pound.

\$27.5 million dollars may or may not be a conservative estimate of the benefits of willingness to pay. Whether this over or understates the willingness to pay depends on the shape of the demand curve. Since no one has observed the demand curve, it is not possible to know.

The estimate may be conservative for the following reasons:

- A person who pays a price for a one-time-only service is willing to pay at least that amount but might have been willing to pay more.
- The cost of contamination may have been higher than Ecology estimated. This is because the analysis does not count the benefit of proper disposal or the cost of improper disposal by individuals who were unwilling to pay a fee. This latter cost would be the cost of proper disposal, which is imposed on others, or the potential cost of the contaminants not captured by the current system.
- There will be more locations for individuals to turn in the equipment. The increase in locations will reduce any previous travel costs associated with taking the unwanted electronic product to a recycling center.

It may over-state the benefits for the following reasons:

- Some of the people who are not participating now may be outside the current system because they were unwilling to pay this rate. The recycling program provides a convenient way to dispose of electronic products at no cost as opposed to charging

¹² Willingness to pay means that people like something because it is beneficial for them and they are, therefore, willing to pay for it. It is one measure of how much a thing is worth to them. In this case, willingness to pay is defined based on what people are paying a variety of programs in order to be able to recycle or get rid of the electronic equipment. One commenter in Phase 1 of the rule making misunderstood the meaning of willingness to pay. This method does not measure the cost to the landfills because the service may be heavily subsidized in order to reduce the probability of contamination. It is merely what people have been paying, on average, to recycle.

¹³ In some areas people cannot dispose of them via the garbage and so this may represent a willingness to pay to get rid of the CEPs.

¹⁴ One commenter indicated that Ecology had misread the article cited here. This is the quote: "Likewise, though 69 percent of the survey respondents say they recycle household trash all or most of the time, 42 percent say they recycle electronics and 43 percent say they recycle appliances with the same frequency." The commenter indicated that most electronics go to charity or to friends and family. The article shows that 88% do. The question for this analysis is, what happens when they are finally discarded. Recheck of article 10/18/06, http://www.findarticles.com/p/articles/mi_m0KWH/is_12_43/ai_n15978785/print

the owners. On the other hand, it is possible that they were not participating because the alternative of not recycling and instead placing it in the garbage was free because it was included in their monthly garbage rate and the marginal cost was zero.

The landfill and transfer station charges (Appendix 2) appear on average to subsidize TVs and to charge extra for monitors and computers. Some reported breaking even financially on their recycling program. In discussions, landfills and transfer stations state they don't make money on the recycling.

Qualitative Benefits

Companies that generate dangerous waste in sufficient quantities to exceed the small quantity generator status might have had to designate their CEPs as hazardous waste without this proposed rule. Landfills have been responding to the contaminants in CEPs, especially the lead in CRTs by turning them away. Citizens can easily hide CEPs in their garbage for collection. Once they receive a CEP, landfills and transfer stations can not hold CEPs without it being a long term liability. In the long term if this continued people would not have been able to discard their CEPs and this would have created pressure in the form of illegal disposal and demand for the recycling program which the law and this proposed rule creates. Ecology believes that the rule and the CRT exemption together have created an orderly transition without a spike in costs.

Ecology believes there are additional benefits that are not quantified above. This includes reducing waste, This alleviates the demand for space in landfills and the demand for the resources that would go into new materials which are saved for reuse through recycling. Fifty-six million pounds is a lot of material. Reducing the size of landfills and reducing the garbage haul is an offsetting gain that reduces the net cost of the rule outlined in the cost section.

Complying with the law has benefits and having certainty about the law's requirements has benefits. The law requires Ecology to write this rule. The law clearly places the cost of recycling on the manufacturers and Ecology has written the rule so that they will be able to do this in a manner that is as cost effective and as market driven as possible. The proposed rule uses the language of the law as closely as possible. Only where the rule has required Ecology to write requirements but given Ecology flexibility to write these as needed has Ecology written in new costs. Thus, Ecology expects the cost effectiveness and certainty created by the rule, which implements the law, is beneficial in and of itself.

The rule creates a level playing field between the manufacturers to the extent possible under the law. A level playing field was difficult to create in this setting because the law is very prescriptive and creates a comparative advantage for large companies by allowing companies with over 5% of the return share to form an independent plan. In doing this Ecology focused on reducing the costs of collector standards, processor standards, and the cost of the Standard Plan.

This rule will create jobs in Washington because of the income transfer it creates. This rule is unusual in that it transfers the cost of disposal from Washington citizens, businesses, and government bodies to manufactures of TVs, computers, and monitors, which are generally outside of Washington. This transfer of costs creates a net income effect for Washington households, governments, and businesses. The income effect will generate jobs.

Ecology used the 1997 OFM input output table to estimate labor impacts.¹⁵ The table uses industry and labor inputs and outputs to show the effects on different sectors from small economic changes.

Ecology allocated the share of the savings, from not having to pay for recycling, to each sector based on the share of total output. We based the share for education on the rest of the available savings.

Net cost impacts for the proposed rule were included for the additional costs created by the rule. The savings effect combined with the net cost impacts for specific sectors creates a net increase of approximately 343 jobs within Washington. It is likely that some of this effect is offset elsewhere by job losses outside of Washington. This does not include any injection impact from cash flowing to Washington from outside Washington for recycling work done here because it is likely that the prices of electronics will have an offsetting increase over time. Unemployment is low enough in Washington that most of it is frictional unemployment.¹⁶ Thus, new jobs must either cause labor to move into Washington or reduce supply of labor to other sectors. Therefore no gain is quantified for job creation.

Quantified net benefits

Ecology expects the net value of the law and the rule together will be \$1.8 million per year.

Table 3

Benefits and Costs of the Recycling Program	
Costs	\$ 25,900,000
Administrative fees	\$221,500
Collectors	\$11,500,000
Transporters	\$1,100,000
Processors	\$12,800,000
Processors dropping out	\$50,000
Sampling	\$141,000
Plan development	\$100,000
Forms	\$15,000
Benefits	\$27,600,000
Reduced recycling costs	\$130,000
Willingness to Pay	\$27,500,000
Net	\$1,700,000

¹⁵ <http://www.ofm.wa.gov/economy/io/default.asp>

¹⁶ Frictional unemployment is those workers who are between jobs but who are waiting for the right job at the right salary. They may also be workers who are unwilling to move.

Least Burdensome Alternative Analysis

RCW 34.05.328(1)(e) requires Ecology to “determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection.”

Based on research and analysis required by RCW 34.05.328(d)(e) the Department of Ecology determines:

There is sufficient evidence that the proposed rule is the least burdensome version of the rule for those who are required to comply, given the goals and objectives of the law for Ecology to propose the rule.

Ecology considered a variety of approaches and ended with a rule that sticks very closely to the requirements in the law. Most of the costs of this rule are actually a transfer of costs from individuals, landfills, collectors, transporters, and processors to manufacturers.

The legislature chose to require the manufacturers to internalize the costs of the recycling program in their overall costs of doing business because it would have the least impact on in-state retailers and Washington citizens.

Sampling Savings

Ecology has designed the sampling process so that it avoids unnecessary costs in the following ways:

- Simplified the sampling to avoid over collection of data.
- Selected the minimum sample size that is statistically significant, which is the minimum required by law.
- Providing a list of approved third party sampling contractors, that the plans can choose from. The third party will become accustomed to the logos and this should speed up the sampling if questions arise.
- One major potential cost of the rule is the possibility of moving costs from one plan to other plans by manipulating the sampling data. If any plan controls more than 40% of the return share the potential gain to that plan, and cost to its competitors, could be over \$1 million per year. Thus, the integrity of sampling is critical. The sampling portion of the proposed rule gives the plans and processors only 24 hours notice. This should reduce the ability of the individual who controls throughput to the processor to game the system by manipulating the samples that arrive at the plant.
- The primary possible cost of this proposed rule for those who are required to comply derives from the \$0.50 cents per pound, which is in the law. \$0.45 of this is transferred to plans that do more than their equivalent share and \$0.05 is paid as an administrative fee. This creates a cap of \$.50 for companies that do less than their equivalent share and an incentive of \$.45 for companies that do more than their equivalent share.

It is unlikely that the actual cost of collection, transport, and processing will be this high. Therefore, the transfer payment has the potential to increase the cost of the rule to plans that under-perform. By submitting the data immediately after samples are

taken, and by having the third-party observer provide data to the Ecology and the plans, adjustments can be made by the plans to assure they meet their targets.

Direct processor performance standards

Performance standards evaluated early in the rule development process were very costly. These have been abandoned because most plans would probably have opted to export the waste to the less developed nations for recycling. The processor performance standards have been taken from the requirements in the EPA's Responsible Recycling Practices for Electronics Recyclers Facilitator Draft Straw proposal (version 15). This proposed rule is the first performance standards for electronic product processors being considered for adoption in the country. By using the EPA voluntary standards we anticipate that other states that follow in Washington's footsteps will adopt similar standards. This will allow Washington's processors to compete in the national market.

Collector performance standards

The primary location for sampling has been shifted from collection sites to processing sites.

Transporter standards

Transporter standards evaluated early in the rule development process were costly. These have been abandoned.

Exemption from dangerous waste requirements

Televisions and monitors, with cathode ray tubes (CRTs), would normally designate as dangerous waste. This would be costly. This proposed rule will allow an exemption for processors that recycle TVs and monitors with CRTs. These are granted using a federal exclusion and language from 40 CFR 261.4A, 261.39A, 261.40, 261.41, and 260.10 and will be adopted into chapter 173-303 WAC.

Transporters

Ecology considered several costly options for the transporter performance standards. As proposed the rule does not add any additional requirements.

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Appendices

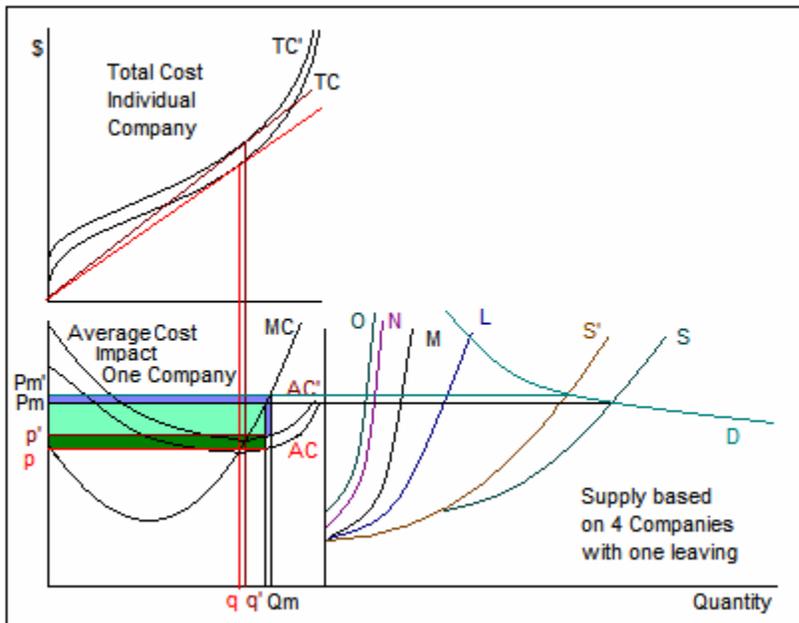
Appendix 1: Effects of a Competitive Market

In Phase 1, one commenter indicated that Ecology does not understand the market because manufactures are price takers (in other words, they have no control over market prices). The commenter described actions by other sectors and major retailers over which the company had no power. The law gives Ecology a model that places the cost on the manufacturer. However, *through the competitive market some of these costs will be shifted to the consumer.*

It is normal in a competitive market for an individual manufacture to experience market actions that indicate it has no market power. The electronics market is extremely fluid with multiple new entrants, new products, reduced prices for old products given market saturation, and major players merging every year. These factors generate significant price and quantity shifts in every reported time period.

Costs imposed on industry, especially one this fluid, will tend to be shared with the consumer. It may not appear to be so, given that demand for old product drops each year with market saturation. However, the change does take place if demand is taken as a separate phenomena, that is quality driven and unaffected by the fee. Within the theoretical structure that supports this statement that the fee will be shared with the consumer, it is important to note that the fee is not a marginal cost. It is a flat amount of cost added to the total cost. This flat cost adds to the average cost but does not affect the marginal cost of any additional unit unless the manufacture grows sufficiently to shift into another fee tier. Thus, in the very short run, the profit margin for a given manufacture drops. Graphic A1 below represents one scenario.

Graphic A1: Theory of Cost Allocation and Price Changes



Note: If you print this in black and white, the bright green prints as light gray, the dark green prints as dark gray, and the purple prints as medium gray.

Key:

- Graphically the profit margin drops from the bright green plus dark green areas to just the light purple area. If all manufactures stay in the market then this is the primary effect.
- Manufactures represented by supply curves labeled “N”, “M”, and “L” have lower average costs and remain in the market. “O” represents manufactures that have an insufficient profit margin to pay the fee. These manufactures may decide not to sell their product in Washington. Ecology expects these manufactures will leave the market to produce something else, then the supply at each price level will decrease, shifting from S (the original total supply curve) to S' (the total supply curve after the one company leaves). This would cause a price increase (P_m to P_m'), giving the manufactures that remain a profit increase represented by the light purple area. In terms of the net profit impact for the individual firm represented in the graphic above, it would depend on whether the pale green area is larger than the dark green area. When this happens in a market that is experiencing falling prices, such as electronics, any price increase due to a fee would merely reduce the speed with which prices fall.

Appendix 2: Current Electronic Recycling Rates

2006 Rates	Locations	Monitors	Computers (Desktop PC's)	Laptops	TV's
King County website					
Trashbusters	Seattle	\$13.00	\$10.50	\$13.00	\$27.50
3RTech, LLC		\$15.00	\$3.00	\$0.00	\$15.00
Computer Bank Charity		\$10.00	\$2.00	\$10.00	
Computer Equipment Resources	Carnation	\$10.00			
Computer Giveaway Project		\$5.00	\$9.10		
George Electronix	Bellevue	\$7.50	\$10.00	\$0.00	\$37.50
Happy Hauler	Seattle	\$12.00	\$7.80		\$21.50
InterConnection	Seattle	\$10.00	\$5.00		
Micro-Recycle		\$10.00	\$10.00		
PC-Recycle	Bellevue	\$10.00	\$1.00	\$40.00	
PC-Salvage	Tacoma	\$10.00	\$9.10		\$14.70
Philip Services Corp	Seattle, Tacoma	\$12.40	\$10.40		\$19.60
Rabanco	Seattle	\$15.00			\$35.00
Re-PC	Seattle	\$10.00	\$2.50		\$30.00
	Seattle, Tacoma, Bellevue, Bothell, Issaquah, Redmond,				
Staples	Burien, Kent	\$12.00	\$8.00	\$8.00	
Total Reclaim	Seattle	\$10.00	\$9.10	\$2.80	\$14.70
Snohomish County website					
County Recycling and Transfer Stations		\$14.00	\$10.00	\$10.00	\$23.50
City of Tacoma website					
Centerforce		\$10.00	\$10.00		
Philip Services Corp	Tacoma	\$12.40	\$10.40		\$19.60
PC Salvage	Tacoma	\$10.00	\$5.00	\$5.00	\$10.00
Staples	Tacoma	\$12.00	\$8.00	\$8.00	
Spokane					
Earthworks Recycling	Spokane	\$15.00	\$10.40	\$3.20	\$34.00
Thurston County website					
Thurston County Recycling Days	Thurston County	\$10.00	\$10.00	\$10.00	\$10.00
Thurston County Waste and Recovery Center	Thurston County	\$15.64	\$15.64	\$15.64	\$15.64
Clark County					
CREAM Recycling Program	Vancouver, Washougal	\$0.00	\$0.00	\$0.00	\$0.00
Nationwide					

2006 Rates	Locations	Monitors	Computers (Desktop PC's)	Laptops	TV's
Apple Computers			\$30.00		
Dell			\$15.00		
HP			\$23.50		
IBM			\$29.99		
Average		\$10.84	\$10.20	\$8.97	\$20.52

Note: Landfills and transfer stations charge less on average.

2007 - Average charges at landfills and transfer stations¹⁷ to take CEPs

Type of CEP	Average cost	\$ per pound
Computers	\$7.67	\$0.64
TVs	\$13.81	\$0.25
Monitors	\$8.79	\$0.44

NOTE: This is a preliminary document. The \$/lb depend on assumptions regarding weight. There is a trend to weight through time. Thus the static numbers in the literature may be inaccurate for forecasting into the future.

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