

Waste Electronic and Electrical Equipment Study

Prepared for
The Honourable Minister of the Environment

Prepared by
Waste Diversion Ontario

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1.0 WEEE Study Process

By correspondence dated December 22, 2004, the Minister of the Environment requested that Waste Diversion Ontario (WDO) undertake a study on the state of Waste Electronic and Electrical Equipment (WEEE) management in Ontario. An addendum to the letter, provided in Appendix A, outlined the requirements of the study.

The addendum specified that a Terms of Reference be developed in co-operation with the Ministry of the Environment and the Industry Funding Organization (IFO) for WEEE.

WDO has established Procedures for IFOs which are being followed to cause the WEEE IFO to be formed. These Procedures require those who wish to form the IFO to submit information outlining their intentions for plan development and IFO governance to the WDO. If WDO accepts the information as the basis for plan development and IFO formation, WDO will enter into a letter of intent with those wishing to form the IFO and will cause the IFO to be formed. As this process takes a number of months, a WEEE IFO with whom to co-operate on the WEEE study did not exist during the WEEE study process.

In the absence of a WEEE IFO, WDO established a WEEE Working Group with representation consistent with the representation stipulated by the Minister for the WEEE IFO. The WDO WEEE Working Group included the following representatives:

- Household Appliances
 - Sarah Webb - Sears Canada Inc.
 - Greg Hopkins - Whirlpool Canada Inc.
- Information Technology Equipment
 - Frances Edmonds - Hewlett Packard (Canada) Co.
 - Garry Travers - IBM Canada Ltd.
- Telecommunications Equipment
 - Paul Frew - Motorola Canada Ltd.
 - Anthony Sesel - Telus Mobility
- Audio-Visual Equipment
 - Nick Aubry - Sony of Canada Ltd.
 - Mike Ota - Panasonic Canada Inc.
- Consumers
 - Mel Fruitman - Consumer Association of Canada
- Municipalities
 - Pat Parker, City of Hamilton
- ENGOs
 - Gord Perks, Ontario Environment Network
- Retailers
 - Ashley McClinton - Retail Council of Canada

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The Minister's program request letter specified that the WEEE IFO is to include representation from recyclers. Ontario processors of WEEE were invited to nominate a representative to the WEEE Working Group. As agreement on a single nominee could not be reached, WDO established a WEEE Recyclers Task Group to provide input into the WEEE Study process.

A Ministry of the Environment representative, Vince Sferrazza, participated in the WEEE Working Group as an observer.

Working with the Working Group, a terms of reference for the WEEE Study was developed that involved:

- Contracting for consulting assistance to undertake certain tasks including:
 - assessment of program funding through cost internalization and fees applied at the point of purchase
 - assessment of options with respect to cost internalization
 - authoritative estimates of material flow in Ontario
 - overview of the electronic and electrical equipment (EEE) industry; and
- Having the Working Group undertake the following tasks directly:
 - advice to the Minister on which program funding option is most appropriate
 - recommendations on additional products to be included in the program, adequacy of a 12 month timeline for program development, targets and adding industrial, commercial and institutional (IC&I) WEEE to the program.

A request for proposals was developed in co-operation with the WEEE Working Group for the contracted consulting assistance. The Working Group reviewed the proposals, interviewed respondents and selected a preferred consultant. The consultant presented information to the Working Group at regular intervals throughout the project and the Working Group reviewed and commented on various work-in-progress and draft documents.

The following three sections provide a summary of the results of the consultants work with direction and input from the WEEE Working Group on program funding (Section 2), authoritative estimates of material flow (Section 3) and an industry overview (Section 4). The WEEE Recyclers Task Group reviewed and provided comments on the processing aspects of the authoritative estimates of material (Section 3.4). The consultants report in its entirety is provided in Appendix B.

Section 5 summarizes the advice and recommendations from the WEEE Working Group.

Section 6 identifies key lessons learned from the WEEE Study project and Section 7 provides recommendations for further action.

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2.0 Program Funding

In completing this task the project team:

- completed a literature search for applicable research studies directly relevant to this task;
- researched and conducted interviews with:
 - North American WEEE management programs (Electronics Recycling Alberta, Maine Department of Environmental Protection, California Integrated Waste Management Board);
 - European WEEE management programs (SWICO – CH, Recupel – BE, El Kretsen – SE, NVMP – NL, ICT Milieu – NL, European Recycling Platform)
 - representatives of other Canadian product stewardship programs for paint, beverage containers, used motor oil and tires (Encorp Pacific – BC, Product Care – BC, Alberta Beverage Container Management Board – AB, Manitoba Product Steward Corporation – MB, Eco Peinture – QC)
 - potential WEEE stewards (Sony, HP)
 - government agencies and members of public interest groups with an interest in EPR issues (MOE Policy & Legal, Alberta Recycling Association, Recycling Council of Ontario);
- assessed the economic theory and practical marketplace issues related to cost internalization and visible fees;
- reviewed all draft material with the Working Group in three meetings; and
- sent draft reports to expert advisors for review and comment.

2.1 Assessment of program funding through cost internalization by stewards and through fees applied at the point of purchase

The addendum to the Minister of Environment's program request letter specified that the WEEE study assess program funding through cost internalization by stewards and through fees applied at the point of purchase. The following key findings were determined:

- The research completed confirms that an IFO can only assess fees against the designated steward. In the case of WEEE, this is the Brand Owner/First Importer/Assembler.
- Neither the IFO nor the WDO has the authority under the WDA to assess a fee at the point of sale.
- Neither the IFO nor the WDO has the authority under the WDA, and the Minister does not have the authority under existing regulation, to require or to prevent making fees visible. This is a matter of commercial negotiation between individual stewards, companies in the product distribution chain and retailers.

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A review of economic literature suggests the following:

- If supply is relatively price responsive, fees will tend to be shifted forward to consumers.
- In the intermediate cases, a fee will be partly shifted forward to consumers through higher consumer prices and back onto producers through lower net-of-fee prices.
- Products that face import competition tend to be supplied at a price determined by world market conditions. As the fee would be applied to imported and domestically-produced goods in Canada sold to the Ontario market, the fee would be tacked on to the price paid by retailers. Given that Ontario is a small open economy, the imported price would determine the cost of the product with the fee added to the price and fully shifted forward to the consumer.
- Demand responsiveness to price for Schedule 1 white goods might be low in the long run, at least at the industry level. Costs common to all suppliers will typically, however, eventually flow through to higher prices for consumers.
- Producers in Schedules 2 through 4 may perceive a quite different pattern, at least for new products. With a short product development cycle and the ability to generate significant gross margins with product innovation, a significant degree of pricing power may exist in the short run. However, the availability of substitutes and the entry of competing products in the same market line will increase the price sensitivity of demand over a horizon beyond the very short run and fees will be shifted back to producers.
- A fee imposed on products to cover the cost of waste collection and treatment would be expected to affect behaviour no matter whether the fee is shifted forward or back. A fee increases the cost of production or consumption that will be absorbed ultimately in higher consumer prices or lower revenue for producers. Incentives therefore exist to reduce the impact of the fee on costs no matter how the fee is shifted.
- In terms of their impact on product prices and market prices, it does not matter whether fees are visible. Visible and invisible fees at a point of sale are likely to have the same effect. Invisible fees may give scope to producers to adjust production techniques and quantities, as with any other cost not quoted separately to consumers. However, the visibility of a fee might have more impact on consumers in adjusting their spending to reduce waste, simply because awareness of the fee modifies behaviour. Visible fees also allow producers to advertise prices separately across jurisdictions where fees may differ.

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(Note: This view was not supported by the representative from the Ontario Environmental Network on the WEEE Working Group.)

The survey of key stakeholders identified that:

- In operating WEEE programs, while WEEE management fees are commonly assessed against brand owners and first importers, these fees are in the majority of cases passed on to the consumer in the form of visible fees collected at the point of sale.
- Similar practices are found in the majority of Canadian stewardship programs for beverage containers, paints and household special wastes, though this varies by program and by individual company.
- NGOs surveyed in this study were mixed in their view about visible fees related to historic waste and strongly supportive of variable fees reflecting differences in environmental costs.

2.2 Options with respect to internalizing Program costs for the different product categories immediately and/or over time

The study identified a number of preferred financing system design features that may be applicable to WEEE program financing in Ontario, including consideration of:

- A “zero fee” for WEEE product management costs for stewards participating in a single IFO for products that are managed by the stewards directly, though fees proportionate to these products share of program administration costs would still apply.
- Providing for some amount of funding reserve cumulation in the fee calculations for some categories of wastes (both historic wastes and future wastes) may be appropriate.
- Utilizing fixed fees for some categories of historic waste and perhaps some limited use of this approach to finance management of future wastes.
- Utilizing variable fees to reflect differences in end-of-life management costs for different product categories and for different brands; and perhaps for other environmental considerations.
- Allocating WEEE management costs on the basis of the proportion of returned products for historic wastes where technically possible and economically efficient and on the basis of current market share (sales) for future wastes.

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A number of evaluation criteria were developed for use by the WDO WEEE Working Group to assess each of these design features. These included whether the design feature is likely to:

- impact on design for the environment
- support diverting waste in an environmentally beneficial manner
- deliver net benefits relative to the costs of administration and compliance
- successfully capture and manage historic and orphan waste in an environmentally beneficial manner
- be administratively complex or costly
- result in reasonable compliance costs
- minimize the number of free riders
- support consumer engagement in the program
- encourage system innovation
- minimize distortions in the marketplace
- raise sufficient funds to cover program costs

In addition to these considerations, important constraints under the Waste Diversion Act (WDA) will come to bear on determining the most appropriate WEEE program funding mechanism in Ontario including:

- Consideration of variable fees for new product sales must focus on criteria directly related to the product itself and could include both end-of-life management costs and environmental costs directly related to use of the product In Ontario.
- Extending consideration to criteria not directly related to use of the product in Ontario (i.e. up-stream resource extraction, air emissions in other jurisdictions, etc.) is not likely acceptable under the WDA.
- Application of variable criteria to historic waste *may not* be acceptable given that these differential fees would not *directly* influence behaviour change of the steward (i.e. the product has already been made and discarded). There may, however, be circumstances in which a steward continues to manufacture the designated product in the same manner and therefore there may be a case for influencing that steward's ongoing behaviour.
- The basis for setting variable fees must be practical, transparent and verifiable within the timeframe of the Plan.

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3.0 Authoritative Estimates of Material Flow in Ontario for the Four Priority Categories of WEEE

For the study, four categories of EEE were addressed:

- Schedule 1 – Household Appliances
- Schedule 2 – Information Technology Equipment
- Schedule 3 – Telecommunications Equipment
- Schedule 4 – Audio Visual Equipment

The RIS WEEE Flow model has been used in a number of electronics projects to estimate the amount of WEEE discarded each year, taking the weight of each electronic product, as well as the lifespan (in years) into account. The model was expanded to include all of the products in the four schedules identified in the Minister's program request letter.

Inputs to the model include:

- Unit sales data into the Ontario residential market for as many years as data are available
- Lifespan of products
- Weight of products
- An estimate of the amount of products which are stored or reused when discarded by their first owner

Unit sales data were obtained from ElectroFederation of Canada and the Association of Household Appliance Manufacturers for Schedule 1 and 4 products.

Data on Schedule 2 products were purchased from a data research firm, IDC.

Sales data for Schedule 3 products were obtained from Electro-Federation of Canada and other sources. Cellphone data were obtained through a member survey carried out by Canadian Wireless Telecommunications Association.

Weight and lifespan assumptions were documented from various existing reports and were circulated to the WEEE Working Group for comment.

Information on imports and private label sales of some products were obtained from the Retail Council of Canada.

All of the data on sales, unit weights and lifespans were entered into the model to estimate the amount of EEE product sold into the Ontario market in 2004 and discarded into the Ontario waste stream in 2004.

Information on current recovery of WEEE in Ontario was predominantly taken from the 2004 WDO municipal datacall; virtually no information on the amounts collected by other means (return to retail, etc.) exists at this time.

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Information on the processing infrastructure and end markets for WEEE was obtained through a survey of the WDO WEEE Recyclers Task Group members. However, because vendor standards have not been identified, it is not possible to comment on how this capacity will meet future needs in Ontario.

Information on the current refurbishing infrastructure was collected through a series of interviews.

3.1 Quantity of WEEE that is currently available for collection, collected, diverted and disposed

Table 1 summarizes the figures for units sold for the four Schedules, and the conversion of sales data to tonnage data. The table shows that Schedule 1 and 4 (Household Appliances and Audio Visual Equipment) account for 72% of the units sold, and 90.5% of the tonnage sold.

In the case of Schedule 1 products (Household Appliances), 2.5 million of the 8.9 million units sold per year into the Ontario residential market are white goods (heavier household appliances such as fridges and stoves). White goods account for 86% of the Schedule 1 tonnage sold into the Ontario residential market (146,163 tonnes out of 170,680 tonnes total).

In Schedule 4, televisions account for 77% of the tonnage sold into the Ontario residential marketplace (48,826 tonnes out of 63,695).

Table 1. Electronic and Electrical Equipment Sold in Ontario in 2004

	Units Sold (000s)	Tonnes Sold
Schedule 1: Household Appliances	8,906	170,680
White Goods	2,485	146,163
Portables and Floor Care	6,421	24,518
Schedule 2: Information Technology Equipment	1,783	23,203
Schedule 3: Telecommunications Equipment	4,208	1,307
Schedule 4: Audio-Visual Equipment	6,813	63,695
Total	21,710	258,886

Table 2 summarizes the preliminary estimates of units and tonnes discarded, recycled and disposed by Schedule.

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Table 2. Electronic and Electrical Equipment Summary for 2004

	Units Sold (000s)	Tonnes Sold	Units Discarded (000s)	Tonnes Discarded	Units Collected for Processing (000s)	Tonnes Collected for Processing	Units Disposed (000s)	Tonnes Disposed
Schedule 1: Household Appliances	8,906	170,680	6,131	127,733	1,159	92,445	4,971	35,288
White Goods	2,485	146,163	1,331	110,972	1,105	92,107	226	18,865
Portables and Floor Care	6,421	24,518	4,800	16,761	55	338	4,745	16,423
Schedule 2: Information Technology Equipment	1,783	23,203	1,530	19,290	46	579	1,484	18,711
Schedule 3: Telecommunications Equipment	4,208	1,307	2,531	1,074	76	32	2,455	1,042
Schedule 4: Audio-Visual Equipment	6,813	63,775	4,394	50,295	44	503	4,350	49,792
Total	21,710	258,966	14,586	198,393	1,325	93,559	13,261	104,834

The table shows that most EEE waste is disposed from Schedule 4 (Audio Visual Equipment), because televisions which have been in the market for a number of years are now being discarded and replaced with new televisions. The RIS WEEE Flow model assumes that 70% of televisions are reused after their first life (for an additional 2 years); 15% are stored (for an additional 2 years) and 15% are discarded directly to the waste stream. However, because TVs have been sold for many years, the TV discard rate has reached a fairly steady state, so that a similar amount, including TVs that eventually are discarded from storage, is discarded each year.

This is followed by Schedule 1, where the disposed material is split reasonably evenly between white goods and portables and floor care products. White goods have a high recycling rate (assumed at 83%, based on CAMA, 2002), but account for a large tonnage of the collected material. Other household appliances contribute a much smaller weight, but have a low recovery rate, due to the lack of current collection and processing infrastructure.

Schedule 2 accounts for 14,590 tonnes disposed in 2004. The material being discarded in Schedule 2 is mostly older PCs and about 1 million CRT monitors which were initially purchased 6 to 8 years ago. Because there is very limited recycling of residential IT units at this time, most of this material is assumed to be discarded.

Schedule 3 (Telecom Equipment) accounts for by far the smallest amount of material (only about 1,000 tonnes for all of Ontario).

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Table 3 presents preliminary estimates of the amount of the collected WEEE which is recycled, used as fuel or landfilled in Ontario in 2004. For white goods, the average of the range identified in the CAMA 2002 report (83% being the mid-point between the range of 74% to 92% reported in the CAMA research) has been used. For IT and other consumer electronics in Schedules 1 to 4, the only available data are the amounts reported as collected through municipal systems from the 2004 Municipal Datacall. No estimates were identified of the amount collected through retail (no records are maintained or were identified through the survey carried out by Retail Council of Canada in support of this study) or through other drop-off and recovery programs. Our best professional judgment is that small amounts, additional to the Municipal Datacall, are recovered. In the absence of data, we have assumed that 1% to 3% of the amount discarded is actually collected, depending on the product.

Table 3: Estimated Diversion of WEEE in Ontario in 2004

	Units Discarded in 2004	Tonnes Discarded in 2004	Tonnes Collected in 2004	% Collected in 2004	Tonnes Diverted in 2004¹⁾	% Diverted in 2004
Household Appliances						
white goods	1,331,000	110,972	92,107	83%	69,080	62%
portables	4,800,000	16,761	338	2%	237	1.4%
IT Equipment	1,530,000	19,290	579	3%	405	2.1%
Telecom Equipment	2,531,000	1,074	32	3%	22	2.1%
AV Equipment	4,394,000	50,295	503	1%	352	0.7%
Total	14,586,000	198,392	93,559	47%	70,096	35.3%

¹⁾ Includes tonnes directed to 3Rs but excludes tonnes directed to fuel and residue directed to incineration or landfill

¹⁾ Assumes 75% of white goods collected and 70% of all other products collected are diverted to 3Rs

Based on the limited data identified through the research tasks for this study, refurbishing and reuse make up a very small component of the management infrastructure for WEEE in Ontario. It is not anticipated that this situation will change in the foreseeable future, particularly for small household appliances in Schedule 1, and most audio visual material in Schedule 4.

3.2 Quantity of orphaned and historical WEEE

While it will be necessary for the WEEE IFO to define ‘orphan WEEE’ and ‘historical WEEE’ for the program plan, the following definitions have been assumed for this section:

- Orphan WEEE is a WEEE product for whom a steward cannot be identified, either because the steward is no longer in business or the condition of the product does not allow for identification of a steward.
- Historical WEEE is a WEEE product sold prior to a specific date. A number of options may be considered by the IFO for selecting the specific date, for example:

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the date of WEEE designation under the WDA; the date of commencement of a WEEE program under the WDA; or, a date defined by the WEEE IFO as the date on which EEE products sold prior to that date are considered historical waste and EEE products sold after that date are considered future waste.

All of the WEEE currently being discarded in Ontario is historical WEEE as they are products purchased from 2 to 25 years ago, depending on the lifespan of the product. In 2004, an estimated 197,500 tonnes of historical WEEE were disposed.

Information on the amount of orphan WEEE products discarded is very scant, as it requires sorting a statistically significant quantity of recovered WEEE products by brand. A number of studies have been carried out which suggest that orphan products can make up at least 10% of some categories of WEEE (in particular IT and peripherals in Schedule 2) and perhaps more than 10% in some cases. Electronic Product Stewardship Canada carried out detailed sorts of IT materials recovered in a program in Kitchener-Waterloo in 2004. This information is expected to be available in August, 2005.

No data on orphan products are available for Household Appliances, Telecom Equipment and Audio Visual Equipment.

On the basis of the 10% value (measured in one Florida program in 2004 for IT waste only), a figure of 10% should be used for planning purposes. On the basis of this limited data, about 10%, or 20,000 tonnes of the historical WEEE disposed in Ontario in 2004 may be orphan products. The actual numbers may be much higher, as the percentage of orphan products is likely to vary substantially by schedule.

Actual orphan percentages for all four priority WEEE categories need to be identified through statistically valid brand sorting. This research will need to be undertaken by the WEEE IFO.

3.3 Description of current collection and processing infrastructure for WEEE

Municipal programs have different collection methods for collecting WEEE:

- HSW Permanent Depots;
- Special Event Days;
- Landfill/Transfer Stations; and
- Recycling Depots.

About 15,600 tonnes of WEEE were collected through municipal programs in 2004. In 2003, Ontario municipalities handled collected WEEE in the following manner:

- 27 programs sent their WEEE material to a recycling processor and/or a scrap metal dealer;

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- 5 programs were stockpiling material until they had enough material to fill a full load for shipment;
- 4 programs gave their WEEE material to residents to repair;
- 4 programs sent their material to another municipality;
- 2 programs sent their material to disposal; and
- 1 program gave their WEEE material to a not-for profit organization.

A survey of the WDO WEEE Recyclers Task Group was carried out as part of this study with a 50% response rate. Members of the Task Force expressed doubt about the validity of some of the information submitted, particularly on WEEE processing capacity availability and residue rates.

Whereas the survey results would indicate sufficient capacity for Ontario WEEE, vendor standards have not yet been set by the WEEE IFO and it is therefore not possible to comment on the extent to which the survey respondents would meet these vendor standards. A critical first need for the IFO is to set vendor standards for WEEE processing, and then carry out site visits and audits to confirm how the materials are handled and where the materials are sent.

WEEE products contain a range of plastics, metals, glass and other materials, some of which are hazardous. A number of WEEE products contain small amounts of mercury. Products such as TVs and CRT monitors contain large amounts of lead. Limited data are available on the composition of most WEEE products. Some of the respondents reported they do not handle hazardous products suggesting they either do not disassemble WEEE products (the point at which they become a hazardous product) or are unaware that WEEE products contain hazardous substances which require special handling to meet Ontario health and safety as well as environmental legislation. AHAM is currently completing a tear-down analysis of Schedule 1 products in the US. This will be a useful data source for the Ontario program.

Also, a number of the respondents give materials to brokers and do not know the final destination of the products. Therefore the final destination could be a third world country where processing standards would not likely meet Ontario regulatory standards or the WEEE IFO's vendor standards.

3.4 Descriptions and demand of markets for all diverted WEEE

End markets used by Ontario WEEE processors are global in scope, with material going to Asia (South Korea), Africa and Europe, as well as the US and Canada (particularly Quebec).

Processed WEEE consists of glass, mixed plastics and a range of metals, ferrous as well as non-ferrous and precious.

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Metals are sold to metal smelters, with the value varying depending on market conditions. Facilities such as the Rouyn Noranda smelter in Quebec are interested in copper for the copper smelter, and various other precious metals are extracted from WEEE material as a side-process to the copper smelting business. Steel companies use the ferrous metal, and lead smelters can recycle lead from WEEE.

Some vendors currently send metals blended with plastic components to metal smelters which use the plastics as a fuel source. Smelters also accept plastic from processed WEEE and use this material as a fuel, typically firing it directly into the furnace.

Glass from CRT monitors can be used by lead smelters as a flux material in lead smelters.

No information is available on the exact size of the markets for recovered WEEE materials; the markets fluctuate with the general health of the economy. When market operators are asked to characterize and quantify the market, they generally state that they can take whatever material is available, but the price will vary. Market capacity information is typically not provided for commercial reasons.

3.5 Projected infrastructure requirements to achieve the targets

As the WEEE Working Group was unable to identify targets due to the absence of WEEE IFO vendor standards by which to assess the compliance of existing processing capacity (refer to Section 5.4), it was not possible for the consultants to comment on infrastructure requirements in relation to targets.

3.6 Sales from direct and indirect vendors

Authoritative estimates on sales from direct and indirect vendors were not available within the timeframe of the study.

In summary, EEE products sales for AV, appliances and telecom are sold predominately from retailers to residential consumers. Direct sales for these products are very small.

Direct sales are much higher for some IT products, including personal computers, monitors and printers.

Information provided by some producers surveyed was considered commercially sensitive. The information provided is summarized in Section 4 as aggregated estimates.

4.0 Overview of the EEE Industry

In completing this task the project team:

- completed a literature search for applicable research studies directly relevant to this task;

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- researched and conducted interviews with:
 - North American EEE product manufacturers
 - Canadian retailers who sell EEE products
 - third party contractors that provided product flow information for selected products
 - industry associations
- reviewed all draft material with the Working Group over three meetings; and
- provided draft reports to expert advisors for review and comment.

The survey of key stakeholders identified that:

- The vast majority of designated WEEE products sold in Ontario are manufactured outside of Canada. Exceptions include “white box” assemblers of IT products and some major appliance manufacturers.
- In mapping the product flow for the four priority product groups, the IT sector is seen to be more complicated than other designated products given the role of assemblers (e.g. white box manufacturers); the much higher percentage of direct sales via telephone and the internet, and the prominent role played by distributors and value added resellers.
- The IT sector is also unique in that more than an estimated 60% of all products sold are used by commercial users, with the balance used by residential users. For the other three priority product groups, the vast majority of products are sold into the residential sector.
- At this time, brand owners can accurately measure and account for the quantity of product sold to retailers, distributors or other parties (e.g. value added retailers) located in Ontario. However, these products may subsequently be sold by the retailers, distributors or other parties to customers throughout Canada. Product sales to a distributor in Ontario can also be directed to retailers who in turn distribute the product throughout the country.
- The complexity described above means that a brand owner may not be able to accurately track product sales within Ontario at this time. Greater cooperation and exchange of information between retailers, distributors and producers would be required to provide accurate product flow information to the brand owners.
- Sales of product directly from the brand owner to the consumer by telephone or internet sales are a relatively small percentage of the sales for all EEE priority product groups except for IT products. For the IT sector, direct sales are significant and ensuring a level playing field for stewards in this sector is a greater concern than for the other product categories.

5.0 Advice and Recommendations

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5.1 Advice on which funding option is most appropriate for Ontario

After lengthy discussions, the WEEE Working Group determined that the following program funding options should be considered by the WEEE IFO:

- A “zero fee” for WEEE product management costs for both historical and future products that are managed by stewards directly.
- Reserve cumulation for historic wastes and future wastes, where appropriate. Examples of appropriate situations include where products are being replaced in the marketplaces and will not be sold into the future (e.g. fax machines) and for products where a significant proportion of orphan waste is anticipated due to the typical lifespan of companies.
- Fixed fees for some categories of historic waste and perhaps some limited use for financing management of future wastes.
- Variable fees to reflect differences in end-of-life management costs (and perhaps other considerations) for different product categories and for different brands, where data are available to support fee differentiation.
- Allocating WEEE management costs on the basis of the proportion of returned products for historic wastes where technically possible and economically efficient and on the basis of current market share (sales) for future wastes.

5.2 Additional equipment in the priority categories that should be included in the Program

i. Five additional Household Appliances

The Canadian Appliance Manufacturers Association and Electro Federation of Canada have recommended, through members on the WEEE Working Group, that all small household appliances listed in Schedule 1 sold into the residential market be included in the Program. It was noted that the products may be added to the WEEE diversion program in groups and over time to facilitate promotion of the program to the public.

ii. Other categories

It was noted by the WEEE Working Group that terminology has resulted in some duplication of products. For example, while ‘microcomputer’ is listed in the regulation, it is not specifically listed in the addendum to the program request letter outlining program requirements but is covered by the terminology used in the addendum to refer to various types of computers.

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The WEEE Working Group also pointed out some overlap among product categories and noted that many of the products listed in the regulation for the four priority WEEE categories but not listed in the program requirements addendum are products not sold into the residential market (for example bar code scanner, mainframe computer, point of sale terminal etc.).

Of the products listed in the regulation for the IT, Telecom and AV categories but not listed in the addendum that are sold into the residential market, the following additional products sold into the residential market could be added to the program:

IT	calculators, joysticks, routers
Telecom	antennas, GPS, infrared wireless device, intercom systems
AV	headphones, microphones, musical instruments

5.3 Adequacy of a 12-month timeline for developing the Program

The WEEE Working Group has reported to the WDO that 12 months is adequate to develop the Program.

5.4 Annual collection and diversion targets

For the purposes of discussions on collection and diversion targets, the WEEE Working Group adopted the following definitions:

- Collection includes all materials collected including those directed to 3Rs, fuel, EFW and landfill.
- Diversion includes materials directed to 3Rs but excludes materials directed for fuel and residue directed to incineration or landfill.

The WEEE Working Group discussed various issues related to setting collection and diversion targets including:

- How to measure progress against targets by WEEE category if products from a number of categories are collected in a single system;
- The potential for setting targets for historical/orphan waste as well as targets for new products sold over the life of the Program;
- The role of audits in measuring progress against targets, depending on the manner in which the target is set;
- How to determine the quantity available for recovery, against which recovery would be assessed, in any given year as quantity available is dependent on estimates of product lifespan;
- What is the most appropriate source of current and reliable data for number of households or population if the targets are set on a per household or per capita basis; and
- Accommodating the expected one-time surge of historical WEEE immediately following Program implementation as residents take advantage of the program to discard stored WEEE in setting WEEE targets.

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Following consideration of the final authoritative estimates of material flow, the WEEE Working Group noted that:

- Availability of Ontario processing capacity to support increased recovery of WEEE can only be determined following development of vendor standards by the WEEE IFO and auditing of Ontario processors to determine their compliance with these standards. Until the audits are completed, processing capacity capable of meeting a defined performance standard is uncertain.
- While processors provided data for future processing capacity expansions, these data and the ability of these processors to meet yet-to-be-defined vendor standards are uncertain.

The Working Group agreed that aggressive targets are required to support effective WEEE program implementation.

The ENGO representative on the WEEE Working Group suggested that the Group should commit to targets so that targets will drive the diversion program plan design and recommended 60% targets for each product category with a timeframe to be determined by the IFO.

In the absence of reliable data regarding processing capacity that will meet IFO vendor standards, the WEEE Working Group was reluctant to recommend collection and diversion targets.

The WEEE Working Group agreed to support increasing WEEE diversion rates and to commit to continuous improvement year over year. The WEEE Working Group referred the following tasks to the IFO:

- Validate processing capacity data;
- Establish vendor standards;
- Audit processors against standards; and
- On the basis of the results of these audits, determine appropriate targets for collection and diversion.

5.5 Possible options and timelines for introducing a waste diversion program under the WDA to deal with WEEE generated by industrial, commercial and institutional sources

The WEEE Working Group has recommended that the IFO require stewards to report both residential and IC&I sales from the date of Program commencement. After stewards have reported a full year of sales data for the IC&I sector, the IFO will begin to develop a plan for IC&I in year two of the Program.

6.0 Key Lessons Learned

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Completion of the WEEE Study has identified a number of key lessons that may be applicable to the further development of a WDO WEEE program, or indeed for the development of a program plan for any designated waste under the WDA:

- The five months provided by the Minister (from the program request letter of December 22, 2005 to the WEEE Study submission deadline of June 1, 2006) was not sufficient time to:
 - organize the stewards and stakeholders to participate in the process (through the WEEE Working Group),
 - work with these organized stewards and stakeholders to develop a Terms of Reference,
 - identify and retain consulting assistance, and
 - complete a study of this complexity
 - with sufficient opportunity for key stakeholders to adequately review and provide input to the final report.

As a result, some aspects of the report could not be completed in depth.

- The multi-stakeholder structure of the WEEE Working Group added complexity to the discussions given that:
 - Participants bring radically different points of view to the table, based upon their philosophical and ideological perspectives and their practical knowledge of EEE, WEEE, economic and business factors.
 - Considerable time and effort was required to establish even a limited common baseline of language and knowledge.
 - The four months over which the Working Group functioned did not provide sufficient time for members to completely overcome the initial lack of trust apparent in a multi-stakeholder process dealing with controversial issues. As a result, it is likely that views were not fully expressed by all members of the Working Group.
- Beginning with an assessment of WEEE program funding options in isolation from design of the program plan itself made it difficult for the WEEE Working Group members to provide productive comments and led to uncertainty in the evaluation of funding options.
- A comprehensive list of WEEE producers, assemblers and first importers can only be accurately compiled with the complete and full co-operation of all retailers of EEE products. This will be a key task for the future WEEE IFO and it will be important to begin the process of developing a secure data management system as early in the IFO planning process as possible.
- There is a considerable body of operational experience, verifiable data and know-how within existing WEEE management programs. While the majority of this resides within European programs operated under significantly different geographic, social, waste management and regulatory conditions, an Ontario

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WEEE program would benefit from fully exploring this knowledge base when designing and implementing a program.

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7.0 Recommendations for Further Action

Recommendations for further action related to program financing include:

1. Priority should be given to development of the WEEE IFO program plan and to resolving the issue of appropriate program targets before further work is undertaken on assessing possible program funding options.
2. Combinations of preferred program financing design features should be assessed for each product category once this program design work and definition of appropriate targets has been completed.
3. More detailed legal analysis should be completed on issues related to the powers of a WEEE IFO to assess fees for the management of orphan and historic waste (once appropriate definitions of these terms have been clarified within the plan).
4. Strongly held views by key stakeholders in regards to the potential impact of alternative financing mechanisms on design for environment, consumer behaviour, and potential market impacts, should be tested against actual operational experience in other jurisdictions.

Recommendations for further action related to authoritative estimates of material flow include:

5. The IFO is required by the Minister's program request letter to establish vendor standards for WEEE processing. Development of these standards should be a priority for the IFO so that processors can be audited against the standards to determine actual processing capacity available to the IFO. Site visits and audits will be required to identify the WEEE processing capacity in Ontario which will be suitable for use in the program.
6. The IFO should undertake statistically valid brand sorting of recovered WEEE to determine actual orphan percentages for all four priority WEEE categories.
7. There are very limited data currently available on the hazardous components in WEEE. If needed by the MOE or IFO to prioritize actions, new tear-down analysis (similar to that being carried out on Schedule 1 products by AHAM in the US) is needed.

Recommendations for further action related to the overview of the industry include:

8. Developing a comprehensive list of potential stewards is a primary task of the WEEE IFO and is best addressed during program implementation.
9. More effort needs to be spent investigating assemblers in the province. In many cases these tend to be small stand alone operations and their market share is not

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known. It is clear, however, that some assemblers in the province have grown over the years to become large market players.

10. While gray market (products brought into the province without the producers' Canadian operation being aware) was not identified as a major issue by interviewees, it is something that needs to be taken into consideration when a provincial WEEE program is developed.
11. Inter-provincial cooperation on tracking of product sales for this sector is likely to be required to ensure a level playing field. One option to explore may be reciprocal agreements among stewards and stewardship organizations.

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Appendix A

Addendum to Minister's Letter, December 30, 2004

1. WDO in cooperation with the IFO and the Ministry prepare Terms of Reference for a study on the state of WEEE management in Ontario.
2. WDO shall conduct the study in cooperation with the IFO in accordance with the Terms of Reference.
3. The study shall assess Program funding through cost internalization by stewards and through fees applied at the point of purchase. At a minimum, the study shall assess these approaches with respect to the following areas:
 - a. Design for the environment
 - b. Program effectiveness and efficiency
 - c. Historic and orphan WEEE
 - d. Administrative complexity
 - e. Free riders
 - f. Impact on the marketplace
4. The study shall review options with respect to internalizing Program costs for the different product categories immediately and/or over time, and provide advice on which option is most appropriate for Ontario.
5. The study shall include authoritative estimates of the material flow in Ontario for the four priority categories of WEEE, including the following:
 - a. Quantity of WEEE that is currently available for collection.
 - b. Quantity of WEEE that is currently collected, diverted and disposed.
 - c. Quantity of orphaned and historical WEEE.
 - d. Description of current collection and processing infrastructure for WEEE.
 - e. Descriptions and demand of markets for all diverted WEEE.
 - f. Projected infrastructure requirements to achieve the targets.
 - g. Sales from direct and indirect vendors.
6. The study shall include an overview of the producers affected by the Program and describe how the industry operates.
7. WDO shall submit the study to the Minister by June 1, 2005.
8. The study shall include recommendations for the following areas:
 - a. Additional equipment in the priority categories that should be included in the Program.
 - b. Adequacy of a 12-month timeline for developing the Program.
 - c. Annual targets for the quantity of each category of WEEE that the program will collect and divert.
 - d. Annual targets for the percentage of WEEE generated that the Program will collect.
 - e. Annual targets for the percentage of WEEE collected that the Program will divert.

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9. The study shall recommend possible options and timelines for introducing a waste diversion program under the WDA to deal with WEEE generated by industrial, commercial and institutional sources.