RESEARCH AND RECOMMENDATIONS FOR

PERFORMANCE MEASURES

For Regulated, Industry-led, End-of-life Electronics Recycling Programs In Canada

Commissioned By:

Atlantic Canada Electronics Stewardship (ACES)

Electronics Stewardship Association of British Columbia (ESABC)

Ontario Electronic Stewardship (OES)

Saskatchewan Waste Electronic Equipment Program (SWEEP)

Environmental Regulations Status

	BC	AB	SK	MB	ON	QU	NB	NS	PEI	NF
Phase I Electronics (displays, computers, printers)	●	●	●	● April 2011	●	★	★	●	● July 2010	★
Phase II Electronics (home, vehicle & portable Audio Video and selected telecomm)	● July 2010	■	● April 2010	●* April 2011	●* April 2010	★	■	●	● July 2010	■
Phase III/IV Electronics (photocopiers/printers, gaming consoles, servers, peripherals)	● July 2012	■	■	● April 2011	■	■	■	■	■	■
Batteries (rechargeable & non-rechargeable)	● July 2010	■	■	● April 2011	●	★	■	■	■	■

● **Regulations currently in place** (* includes floor-standing copiers/MFDs)

★ **Regulations drafted / expected for passage in late 2010 / early-2011**

■ **Regulations not until mid-2011 or later**

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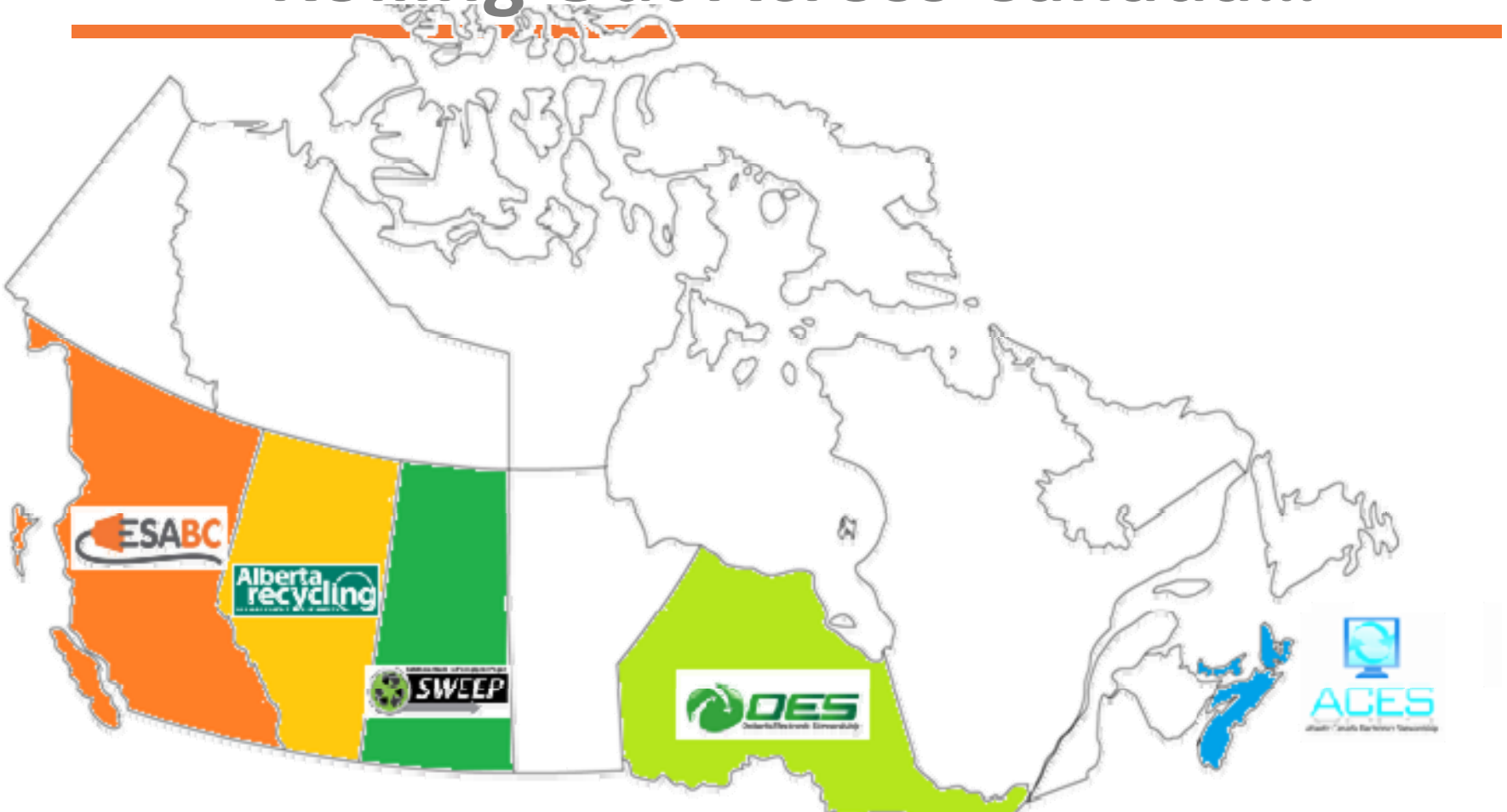
Electronics Stewardship Rolling Out Across Canada…



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Snapshot of Regulated Electronics Recycling Programs in Canada

Collection Data to April 2010 (* 2009 data only)

Program	Registered Industry Members	Permanent Collection Sites	Product Phase Launch Dates	Tonnes Collected
British Columbia	1,534	105	P1: Aug. 2007 P2: April 2010	30,270
Alberta	1,762	309	P1: Oct. 2004	56,907
Saskatchewan	630	71	P1: Feb. 2007 P2: April 2010	6,003
Ontario	671*	293*	P1: April 2009 P2 April 2010	9,126*
Nova Scotia + PEI	555	38	P1: Feb. 2008 P2: Feb. 2009	6,480
TOTALS	5,152	816	***	108,786

Background and Objectives

- ACES, ESABC, OES and SWEEP have each developed stewardship plans which form the commitment of the program to deliver services in compliance with the provisions of the plans and regulation.
- Each plan includes provisions for ***performance reporting***.
- While plans and regulations are different in each jurisdiction, the programs recognize there are advantages to a coordinated and harmonized approach.

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Background and Objectives (II)

Objective of this study – to analyze and make recommendations for a core suite of performance indicators for the programs to adopt.

Primary purpose of the core indicators:

- To allow each program to track its own performance over time;
- To facilitate comparisons and benchmarking between jurisdictions;
- To communicate performance accomplishments and targets to government and other stakeholders.

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Background and Objectives (III)

Study Advisory Committee

- Executive Directors for ACES; ESABC; OES and SWEEP
- Resource Recovery Fund Board (RRFB)
- Encorp Pacific
- StewardEdge
- Product Care Association
- SARCAN Recycling
- Harmonization staff
- InterGroup Consultants

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Performance Measures Guiding Principles

In order to develop a preferred set of core indicators, it is necessary to have a series of guiding principles to evaluate different options.

#1. Representative of Performance – It should convey something meaningful about the program's performance. It should be responsive to change and within the program's capacity to influence over time. It should also be reflective of the key policy reasons for implementing the programs.

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Performance Measures Guiding Principles

#2. Easily communicated to and understood by stakeholders – The indicator should be intuitive to understand and easily communicated to stakeholders.

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Performance Measures Guiding Principles

#3. Data accessibility and reliability – The indicator should be based on data that is feasible for the program to collect, maintain and report with accuracy. Where estimates are used they should be clearly stated. Ideally data could be independently surveyed and verified by a third party. Estimates produced through modelling techniques cannot be independently reviewed and verified and therefore should not be used.

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Performance Measures Guiding Principles

#4. Cost effectiveness – The indicator should be cost effective to collect and report.

#5. Comparability across programs – The indicator should facilitate comparisons across programs and with other jurisdictions.

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NOTE: *It is understood that not all performance indicators will satisfy all the guiding principles equally. The principles were used to develop a suite of core indicators that each of the four programs can implement. It is recognized that each program may have additional specific performance measures required by their regulators.*

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Case Study Program Criteria

- **Geographic location** – selection of programs within Canada, USA and Europe.
- **Program duration** – those operating for a longer period of time assumed to have better established data collection methods and reporting mechanisms.
- **Reputation** – leading edge electronics recycling programs as per an assessment of relevant literature and communications with key industry personnel.

A total of 13 program case studies were completed. Data collection was also undertaken regarding the WEEE Directive. The research team discovered that across these programs performance indicators fall into one of 5 groups of indicators.

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International Case Studies

PROGRAMS / JURISDICTIONS EXAMINED:

CANADA	UNITED STATES	EUROPE
ACES (Nova Scotia)	California	El Kretsen (Sweden)
ESABC (British Columbia)	Maine	Recupel (Belgium)
OES (Ontario	Minnesota	SWICO (Switzerland)
SWEEP (Saskatchewan)	Oregon	WEEE Directive
ARMA (Alberta)	Washington	

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Case Study Findings

Indicators

- **Financial indicators** – reflect program performance in financial terms, including costs associated with transportation, collection, processing and communication.
- **Operational indicators** – seek to characterize program performance based on recycling and collection volumes or rates (and other related processes).

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Case Study Findings

Indicators

- **Awareness indicators** – measures, often obtained through public surveys to characterize program success in terms of public awareness and engagement.
- **Accessibility indicators** – to describe the ease or convenience associated with collection and recycling.

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Case Study Findings

Indicators

- **Environmental Impact Measures** – to characterize or measure actions undertaken to reduce the environmental impacts of electronic products including design for environment, mass balance, recycling efficiency and others.

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Recommended Performance Indicators

Operational Indicators ✓ Total WEEE Collected (tonnes) ✓ Total WEEE collected per capita (tonnes)	**Financial Indicators** ✓ Total program costs per tonne ✓ Operational costs per tonne ✓ Overhead costs per tonne
Accessibility Indicators ✓ Per cent of population covered by collection sites ✓ Total collection sites ✓ Total collection events	**Environmental Impact Indicators** ❖ *Total weight of material recycled as percentage of material collected (by weight)* ❖ *Greenhouse gas emissions* ❖ *Mass balancing* ❖ *Trends in processing*
Awareness Indicators ✓ Percentage of population aware of the program	

✓ = Immediate Collection & Reporting
❖ = Future / In Development

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Summary of Recommended Performance Measures (I)

Indicator	Description/Background	Implementation
Operational Indicators		
Total WEEE collected (tonnes)	Phases of obligated products must be taken into account here	Immediate
Total WEEE collected per capita	Most often compared measure	Immediate
Financial Indicators		
Total program costs per tonne	Using program fiscal year	Immediate
Operational costs (collection, consolidation, transportation and processing) per tonne	Further work required to ensure that input data for each program is comparable	
Overhead costs (administration, communication, outreach, etc.) per tonne)	Further work required to ensure that input data for each program is comparable	Immediate

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Summary of Recommended Performance Measures (II)

Indicator	Description/Background	Implementation
Accessibility Indicators		
Per cent of population covered by collection sites	Diverse geographies covered, "coverage" is determined locally	Immediate
Total collection sites	Total number of publicly accessible permanent sites	Immediate
Total collection events	Only those events which collect obligated products to be managed through the program	Immediate
Awareness Indicators		
Percentage of population aware of the program	Through public opinion surveys, work required on timing/wording harmonization	Immediate

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Summary of Recommended Performance Measures (III)

Indicator	Description/Background	Implementation
Environmental Impact Indicators		
Trends in processing	Include information on trends in enhanced processing and material recovery of end-of-life electronics in Canada	Within 12 months of initial implementation of core performance measures – 2011
Mass balancing	Calculating total weight of regulated products collected and reporting on weights by recovered materials after processing	Within 12 months of initial implementation of core performance measures – 2011
Total weight of material recycled as percentage of material collected by weight	Varying definitions of what qualifies as "recycling", work required to define nationally	Near term (by 2012)
Greenhouse gas emissions	Defining and calculating the environmental "footprint" of our programs	Future (beyond 2012)

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SWEEP Performance Indicators for 2009/10

Program Costs

Professional	$163,403	$75/tonne
Communication	$342,720	$157/tonne
Administration	$661,332	$303/tonne
Operating	$2,845,745	$1,303/tonne
Overall	$4,013,200	$1,838/tonne

% of population covered by depots	Collection sites	Collection events
94%	71	26

WEE collected kg per capita	Tonnes collected	% of population aware of program
2.12 per capita	2,184	84%

Population - July 2009 : 1,030,100

OECD Recognition for our Approach

- OECD's Environment Directorate 2010 working paper on management of waste materials profiles our Canadian approach as a private-sector case study.
- As *demonstrated in Canada...there are programmes which have encouraged improved performance in a variety of areas without national targets...it appears that leveraging industry's preference for results-based management over regulation led to partnerships achieving what would have traditionally been stipulated in national targets...*

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Capture Rates & Electronics (I)

- Capture rates are utilized in a wide variety of recycling programs, and may be characterized as collection rates, recycling rates, recycling efficiency rates, market shares or recovery rates.
- While the concept of a capture rate is attractive, our research shows extending the method to recycling programs that manage durable products such as electronic products raises serious analytical problems.
- Electronics products are durable goods that have much longer and more variable life-cycles than non-durable products such as beverage containers.

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Capture Rates (II)

- In order to develop an estimate for the “material available for collection” (the denominator in the capture rate calculation), one of two approaches is generally used:
  1. In some cases, the calculation uses an estimate based on the actual number of products sold in a particular period compared to the number of units collected.
  2. In other cases the calculation uses an estimate based on a model that attempts to predict the amount of material available to be collected based on product.

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Capture Rates (III)

- Each of these approaches has serious analytical limitations. For either of these measures, the estimate of units collected does not correlate to the sales data as programs do not have a monopoly on collection and can provide estimates only of the units they collect.
- Regardless of the sales data source, a capture rate based on any estimate of units sold in a particular period does not accurately represent the amount of material available to be collected, due to the long and variable service lives of electronics products.

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Capture Rates (IV)

- With respect to capture rates based on estimates prepared using a model, the following is noted:
  - These models attempt to predict the amount of material available to be collected based on product weights, life cycle estimates and sales information.
  - Where these models have been developed, they are extremely data intensive to produce, expensive to develop and maintain and impossible to independently test and verify.

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Capture Rates (V)

- As a result of these limitations, neither approach provides a credible estimate of the material available to be collected in a given period that can be reliably measured and independently confirmed.
- Given these limitations, a capture rate is not a meaningful performance measure for durable goods such as electronics products

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