



# 2011. Design for Environment Report

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## MESSAGE FROM THE CHAIR

Electronics Product Stewardship Canada is pleased to release our *2011 Design for Environment Report*. This is our third report since being founded in 2003. From this report you will see that we are continuing to make significant strides in designing products with a lower environmental impact.

The benefits of these design innovations are felt throughout the industry at each stage of a product's life cycle. Consumers benefit from lightweight and more energy efficient and durable products. There are also tremendous benefits to the environment when fewer raw materials are used, CO<sub>2</sub> emissions are reduced and products become safer and more recyclable. Customers proactively seek out products with eco labels such as EPEAT, EcoLogo and Energy Star®. For instance, the sale of EPEAT (Electronic Product Environmental Assessment Tool) registered products in Canada, increased by more than 25% to over 3 million units between 2008 and 2009.

In the global context, Canada is a relatively small market with a limited ability to influence design changes; however, we are proud to demonstrate that we are contributing 'above our weight' to the global move towards responsible

handling of end-of-life electronics, including development, implementation and promotion of the EPSC recycling standard.

EPSC has worked to establish end-of-life management programs for electronics across Canada through provincial programs in British Columbia, Saskatchewan, Ontario, Nova Scotia and Prince Edward Island. These programs help to ensure that end-of-life electronics are managed in an environmentally-sound manner that safeguards worker health and safety, and the environment from the point of primary processing to final disposition.

The efforts detailed in this report illustrate areas of environmental improvement in every part of the product life cycle. This report captures a number of exciting trends and advancements that are yielding positive environmental benefits within Canada, all the while improving functionality for our customers.

Lloyd Bryant  
Chair  
Electronics Product Stewardship Canada

## ABOUT THIS REPORT

The design of electronic products is a dynamic process that has resulted in a large number of new products and major changes to existing products coming into the marketplace every year.

Design for environmental improvements is driven mainly by global markets. We benefit in Canada from the design changes that are having a significant and positive effect on the environment. Over the past 20 years we have seen significant 'lightweighting' of products, reduction in energy requirements, elimination of environmentally-sensitive materials, such as lead contained in cathode ray tube (CRT) televisions and monitors, and an increase in environmentally-preferable materials, such as post-consumer and bio-based plastics.

Since the previous two EPSC *Design for Environment* reports were published (2006 and 2009), the electronics industry has continued to improve its product designs and work with organizations, such as Energy Star®, EcoLogo

and EPEAT, to meet and exceed environmental voluntary and regulatory standards internationally. The most notable improvements have been made in technologies that will allow the industry to design products that are smaller and lighter, but have even more information and communications capabilities than previous products. These achievements have been made possible through developments in cloud computing, mobile applications, and future trends in white space networking.

This report addresses products throughout their life cycle, and the examples that have been highlighted, document some of the design for environment initiatives that our members have taken over the past three years. These examples have largely been drawn from members' annual reports and websites and are only a snapshot of the many achievements that have been made. Additional product details are available on our members' corporate websites.

## PRODUCT LIFE CYCLE

It is estimated that over 80% of all product-related environmental impacts are determined during the design stage of a product.<sup>1</sup> 'Design for Environment' (DfE) is the term used to describe the techniques used to incorporate environmental improvements into products before they are manufactured. Environmental impacts occur at all stages of a product's life cycle. Goals for DfE throughout the life cycle can include:<sup>2</sup>

- ✓ Eliminating or reducing environmentally-sensitive materials when alternative materials that offer the same functionality are available;
- ✓ Reducing or eliminating waste;
- ✓ Meeting or exceeding eco-label requirements, such as Energy Star® or EPEAT;
- ✓ Reducing energy consumption;
- ✓ Improving logistics and packaging to minimize transportation impacts; and
- ✓ Maximizing the use of recovered materials and energy.

Life Cycle Assessment (LCA) is a leading tool used to guide product design efforts. By using LCA, manufacturers are better able to assess the potential environmental impacts of their products throughout their life cycle and evaluate the benefits of different product designs. The product life cycle stages include sourcing raw materials, manufacturing, distribution, product use and end-of-life and reuse.





## SOURCING RAW MATERIALS

Electronic products are composed of many raw materials, some of which may require special handling at the end of their life. Materials that are safe during use may become harmful to the environment and human health when recycled or disposed. EPSC has worked to control these types of risks through our *Recycler Qualification Program* (RQP) for End-of-Life Electronics (EOLE), which defines the requirements for our processors and recyclers.

### Environmentally-sensitive Materials

Canadian and international regulations exist for the environmentally-sensitive materials (ESM) found in electronics. In addition to regulations, electronic manufacturers have been undertaking voluntary actions to reduce and eliminate the use of environmentally-sensitive materials. ESMs have the potential to pose problems in landfill sites and need to be handled with special care at end of life. The Electronic Product Environmental Assessment Tool (EPEAT) is a voluntary labelling initiative for manufacturers. EPEAT estimates that the amount of toxic materials were reduced by 1537 metric tons worldwide in 2009 by setting standards that place limitations on ESMs. (See page 14 for more information on EPEAT) <sup>3</sup>

### Environmentally-preferable Materials

Manufacturers are incorporating post-consumer, renewable and bio-based plastics into the design of their products. Post-consumer materials are plastics obtained from previously used items such as water bottles, PCs and TVs. By re-using the materials from these products, companies are able to

divert more waste from landfills, and reduce the use of fossil fuels and water. The following are some examples of how manufacturers are incorporating environmentally-preferable materials:

- In 2010, **Dell** achieved its goal to transition all of its new laptop displays to light-emitting diode (LED), which eliminates the use of mercury. <sup>5</sup>

- **Lenovo** sells a laptop computer that uses 30% post-consumer content, equivalent to 19 plastic drinking water bottles. <sup>6</sup> Renewable and bio-based plastics are also being considered in product designs.



These are plastics made with materials that can be grown, are renewable and may also be biodegradable.

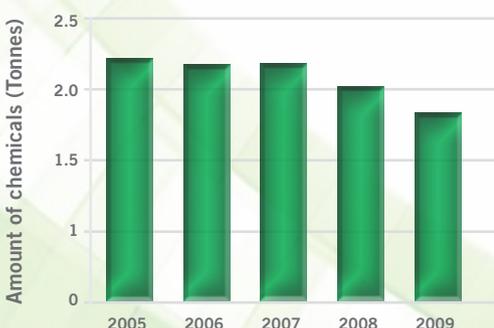
- **Panasonic** has developed an environmentally-preferable bamboo fibre speaker. <sup>7</sup>



- In 2009, **Lexmark** began utilizing post-consumer recycled (PCR) plastics in the manufacture of certain new toner cartridges. As of October 2010, the Lexmark toner cartridge product line contained, on average, 10% by weight of PCR plastic. In some models, the PCR content of newly-molded plastic components can provide up to 28% by weight of the plastic used. <sup>8</sup>

- **Hewlett Packard** has manufactured its billionth recycled ink cartridge using the “closed loop” manufacturing process, which uses recycled plastics, including HP ink cartridges and plastic water bottles, in Original HP ink cartridges to deliver an estimated 22% reduction in carbon footprint and a 69% reduction in total water use when compared with using virgin plastics. <sup>9</sup>

**Toshiba: Global Reduction of Chemical Substances in Products <sup>4</sup>**





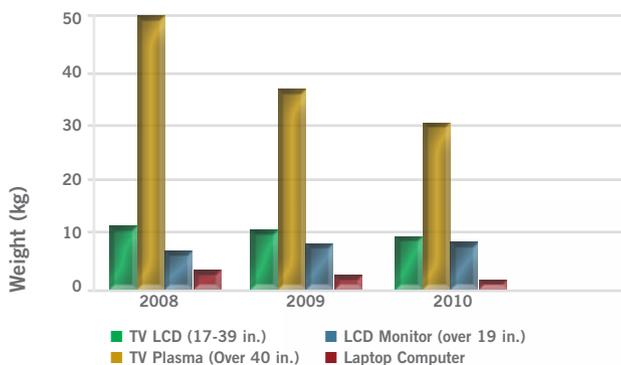
## MANUFACTURING

Manufacturing electronics is a resource-intensive process; however, manufacturers are redesigning products to decrease the amounts of raw material required, waste created, electricity consumed and greenhouse gases emitted during the manufacturing stage.

### Dematerialization and Lightweighting

Products are now being designed to be smaller and lighter with fewer parts. The Washington Materials Management & Financing Authority has compiled data on the average weight of electronics from 2008 to 2010 (see Figure below).<sup>10</sup> **Apple's** Mac Mini, for example, uses 68% less plastic than the previous generation as well it has a compact and highly recyclable aluminum enclosure.<sup>11</sup>

Average Weight of Electronic Products<sup>12</sup>



### Minimize Scrap and Waste Materials

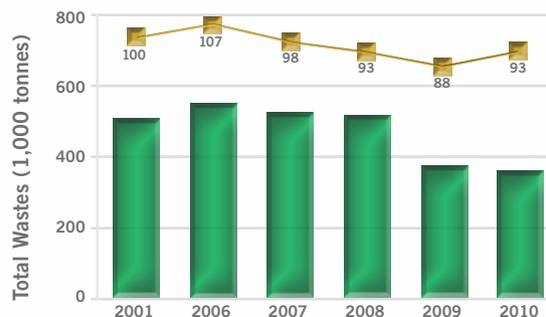
Achieving greater material efficiencies and minimizing waste generated during manufacturing is an important design goal. **Sony**, for example, has designed an internal closed-looped process to recycle optical film waste generated during the production of LCD televisions and now uses this material for digital camera components.<sup>13</sup>

### Minimize Emissions

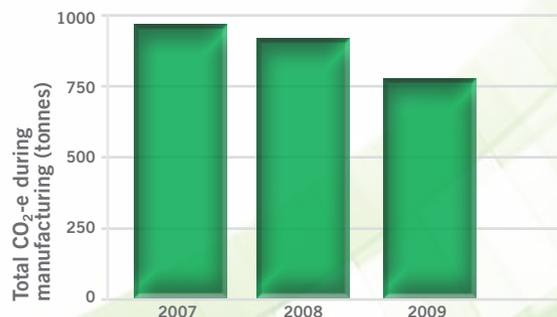
**Apple** calculates that the embedded carbon footprint of a product during the manufacturing stage accounts for approximately 45% of the total carbon footprint.<sup>14</sup> Because of the large role that manufacturing plays in generating greenhouse gas emissions (GHG), our members are working towards reducing this footprint. **Samsung**, for example, has initiated greenhouse gas emissions reductions at one of their major manufacturing plants where electricity consumption accounts for 92% of GHG emissions.<sup>15</sup> To use less energy, the plant improved the manufacturing process for board on chip (BOC) assembly of circuit boards by eliminating unnecessary steps, which led to a GHG reduction of 45% of annual emissions from the BOC process.<sup>16</sup>

**Dell** has also decreased their direct GHG emissions (emissions from sources that are owned or controlled by Dell) by more than 5 percent in 2010. Much of this was due to a reduction in the use of diesel-powered back-up generators.<sup>17</sup>

Panasonic: Amount of total wastes including revenue-generating waste and amount of total wastes per unit of sales<sup>18</sup>



LG: Total CO<sub>2</sub> Emissions during Manufacturing Stage<sup>19</sup>





## DISTRIBUTION

Distributing products to the customer has become a significant component of a product's environmental impact because products are generally manufactured overseas and shipped to multiple intermediary locations before they reach consumers and businesses in Canada. As previously stated, DfE initiatives have produced smaller and lighter products that help to reduce a product's footprint during the distribution as well; this, in addition to packaging changes, have further reduced transportation costs and impacts. It is important to note that packaging a product in a manner that ensures that it arrives undamaged has environmental benefits as well. If a product arrives damaged it will reach its end-of-life before ever being used and need to be replaced, nearly doubling the environmental footprint.

### Packaging Optimization

In addition to the environmental benefits that compact product designs produce, during the manufacturing phase, the packaging itself is also being designed to reduce the amount of material that is being used. The following are some examples of what our members have been doing to reduce packaging:

- **Apple** has reduced packaging by over 40% between 2006 and 2009 and now ships 50% more boxes in each airline shipping container, which saves one 747-flight for every 32,000 units shipped.<sup>20</sup>



- **Hewlett-Packard** has also redesigned its packaging for large products such as LaserJet printers, saving 147 tonnes of corrugated fiberboard per year in 2009.<sup>21</sup> By using its ClearView packaging to ship high-end printers, in

place of a corrugated cardboard box and foam packaging, Hewlett-Packard now uses minimal foam supports and wraps the product in widely recyclable film. This has reduced the volume and weight of packaging by 70%.<sup>22</sup>

- **Lenovo** established bulk packaging options for all products. This has helped reduce packaging used in large-scale rollouts to business customers and universities. For instance, bulk packaging saves more than 1.8kg of packaging material per PC which means, for example, that a 5,000 unit desktop deployment could save nearly 9,980kg of material, a significant reduction.<sup>23</sup>
- **Cisco** saved enough fresh water to fill 312 Olympic-sized swimming pools, saved enough electricity to light 5,079 homes for one year, and reduced CO<sub>2</sub> emissions comparable to removing 4,960 cars from the road for one year – just by reducing printed paper materials in packaging globally from 2008 through the beginning of 2010. This was achieved by moving to a smaller document size, referring to online content, or when necessary moving to CD/DVD format.<sup>24</sup>

### Environmentally-preferable Packaging

Alternative materials are now being used for product packaging, such as post-consumer recycled materials and biodegradable materials. These materials significantly reduce the impact that packaging has on the environment. In addition, packaging may be designed to be re-used by the consumer after shipping. The following are examples of environmentally-preferable packaging approaches being used by our members:

- In November 2009, **Dell** became the first technology company to offer bamboo packaging. Bamboo is fast-growing, it replenishes the soil and it makes for sturdy lightweight packaging material. Dell's bamboo packaging has been certified by the Forest Stewardship Council and has been certified as compostable per ASTM standards by an independent test laboratory. This certification ensures that the bamboo will compost satisfactorily and biodegrade at a rate comparable to known compostable materials.<sup>25</sup>

■ **IBM** developed 100% recycled thermoformed nestable cushions for various products across its server brands and retail store systems. By switching to this type of packaging, IBM has re-used an estimated 91 metric tonnes of polyethylene plastic and saved approximately \$1.9 million in material and transportation costs globally.<sup>26</sup> When these products are shipped, up to 10 times the typical quantity can be carried on a 40-foot truck.

■ **Hewlett-Packard** has been selling its Photosmart Printer using a reusable tote bags made from recycled plastic bottles since 2009. The bag protects the printers during shipping and on store shelves, and customers can use it to carry their new product home.<sup>27</sup>



## PRODUCT USE

Manufacturers are designing products to use less energy and to consume fewer materials during their use. There are a number of voluntary standards that have been created to help incent manufacturers to design greater efficiencies during product use.

### Energy Efficiency

According to a report from the research firm Gartner Group, organizations can save up to 50% of their energy costs and related CO<sub>2</sub> emissions on PCs alone by turning off PCs that are not in use.<sup>28</sup> A number of certifications have energy efficiency requirements, including Energy Star®, 80 PLUS® and EPEAT (see page 14 for more information on these certifications) to help build greater awareness of energy efficiency issues and to create requirements for the design of electronics that reduce energy consumption.



■ **Sony** has introduced a Presence Sensor for televisions that automatically turns off the television picture when no one is present, which cuts power consumption by about 80%. Some of Sony's television models can even detect whether or not a person is actually watching the television through face detection technologies.<sup>30</sup>

■ **Canon** has improved the energy efficiency of its digital multifunctional devices during product use through proprietary technologies, such as induction heating and on-demand fixing. They estimate that these technologies have reduced CO<sub>2</sub> emissions by 9,920,000 tonnes from 2002 to 2009 globally.<sup>31</sup>

■ **Dell's** laptops and desktops are being designed to consume up to 25 percent less energy by the end of calendar year 2010 compared to systems offered in May 2008. Dell estimates that customers using desktop power management features and settings have saved a total of more than \$4 billion on energy costs.<sup>32</sup>

### Resource Conservation

Products – like printers – that require additional resources such as paper and ink cartridges, are now being designed to consume less. In 2008, for example, **Lexmark** was able to reduce material consumption in ink cartridges by a total of 26% by switching from the 21K Cartridges to the 32K Cartridges in one of their printer models.<sup>33</sup> **HP** has developed a software plug-in for web browsers (Smart Web Printing) that allows users to quickly 'Select & Clip' or 'Select & Print' web pages, which reduces the use of unnecessary ink and paper.<sup>34</sup>



## END-OF-LIFE & REUSE

In designing products, manufacturers have the opportunity to build in greater durability, the option to upgrade products or to be able to replace certain components. Inevitably, however, products will need to be responsibly recycled. Design for responsible recycling ensures products can easily be disassembled with ready markets for the end materials create greater efficiencies.

### Extending Product Life Span

Repair and remanufacturing programs allow consumers and businesses to return their products to the manufacturer in order to repair or upgrade them to extend their lifespan. Manufacturers may also be able to re-sell products that are returned if they are in good condition or require an upgrade or repairs. Design features have been incorporated into these products to make repair and upgrade possible.

Increasingly, our members are designing products to use snap in/snap out components, limited screws and fasteners and making replacement parts available for a minimum number of years after purchase in order to make it easier to replace and upgrade products. For example, **LG's**

Plasma TV has reduced the number of screws by 18% (220 to 180).<sup>35</sup>

**Microsoft** has developed a program that allows computers to be reused more effectively. In the past, the refurbishment of Personal Computer (PC) operating systems for reuse was a challenge. With the Microsoft Authorized Retailer program, refurbishers purchase Microsoft licenses at special prices and are able to install new operating systems on desktop and notebook computers that have a Certificate Of Authenticity<sup>36</sup>, which shows they were initially equipped with a Microsoft operating system. While manufacturers do some of the refurbishment and reuse in-house, there are also specialized reuse and refurbishment organizations in Canada that do this type of work. Computers for Schools, a national, federal government-led initiative, have distributed over 1,000,000 refurbished computers to schools since 1993.<sup>37</sup>

### Improving Electronics Recycling Standards

Products can be designed for disassembly and recyclability by implementing solutions that create greater efficiencies and safer disposal of environmentally sensitive-materials during disassembly. Manufacturers refer to standards, such as the ISO 11469 plastics labeling standard, to help guide the design of their products in order to ensure that they minimize the number of fasteners and the number of tools necessary for disassembly. EPEAT's criteria for design for end-of-life provides a number of design goals for manufacturers – such as eliminating paint coatings, requiring reusable/recyclable materials, marking plastics and materials with special handling needs – reducing the number of different material types and easing disassembly.<sup>38</sup>

In Canada, the provinces of British Columbia, Alberta, Saskatchewan, Ontario, Nova Scotia and PEI have developed Extended Producer



Responsibility (EPR) legislation that extends the traditional environmental responsibilities that producers and distributors have previously been assigned (i.e. worker safety, prevention and treatment of environmental releases from production, financial and legal responsibility for the sound management of production wastes) to include management at the post-customer stage. Management of end-of-life electronics are based on the following EPSC principles:

1. **Level playing field:** All obligated producers participate in an approved stewardship program to maintain a level competitive playing field.
2. **Harmonization:** To the greatest extent possible, harmonize with other electronics stewardship programs to achieve economies of scale.
3. **Appropriate standards:** All recyclers utilized in an electronics stewardship program must be audited to the EPSC recycling standard.
4. **Environmental improvement:** Use the program's influence on the market to drive environmental improvements such as proper reuse, responsible recycling, and enhanced resource recovery.
5. **No cross-subsidization:** Each product category is assigned only the costs of managing those products within that category.
6. **Operational efficiencies:** Drive operational efficiencies by leveraging competitive markets for services and streamlining administrative and governance processes to ensure financial resources are used effectively and efficiently.
7. **Collective or individual responses:** the program should allow the flexibility for either an industry collective response or individual company responses.

Under the Recycler Qualification Program, EPSC has developed a recycling standard to ensure that recyclers are recovering as much material as possible and reducing raw material extraction. In the provinces of British Columbia, Alberta, Saskatchewan, Ontario, Nova Scotia and PEI, the EPSC standard is used to ensure that recyclers and processors meet the stringent recycling qualification process.

#### Total End-of-Life Electronics Collected Through Provincial EPR Programs\*

Province	Organization	Total Annual Weight Collected (tonnes)	WEEE Collected/ Capita (kg)
Alberta (Apr 1, 2008 – Mar 31, 2009)	Alberta Recycling Management Authority	16,265	4.74
British Columbia (Jan 1, 2008 – Dec 31, 2008)	Electronics Stewardship Association of British Columbia	14,081	3.15
Nova Scotia (Jul 1, 2009 – Jun 31, 2010)	Atlantic Canada Electronics Stewardship	4,065	4.32
Ontario (Apr 1, 2009 – Mar 31, 2010)	Ontario Electronics Stewardship	17,303	1.31
Saskatchewan (Apr 1, 2009 – Mar 31, 2010)	Saskatchewan Waste Electronic Equipment Program	2,184	2.12
<b>Total/Average</b>		<b>53,898</b>	<b>3.13</b>

## THE FUTURE OF ELECTRONIC PRODUCTS

The industry is still in the early stages of a shift – one that will transform how we access information, share content and communicate. The Information Technology (IT) sector currently accounts for 1% of Canada’s total greenhouse gas emissions and 2% globally.<sup>39</sup> What is even more significant is that the IT sector actually has the potential to reduce the other 98% of industries’ emission rates significantly. The SMART 2020 report, developed in partnership between WWF and Bell Canada, estimates that Information Communications Technology-enabled technologies could deliver a reduction of emissions by approximately 15% in 2020 based on a ‘business as usual’ estimation.<sup>40</sup> Innovations in a variety of technologies, including cloud computing, white space networking and mobile applications allow for devices that can perform multiple functions and that are smaller and lighter than ever before.

### Communications Technologies

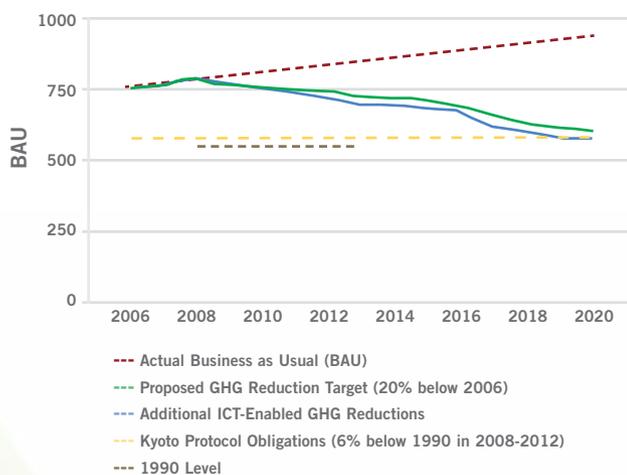
Communications technologies are opening the door for innovations in size and weight and how and where electronic products are used.

#### Cloud Computing

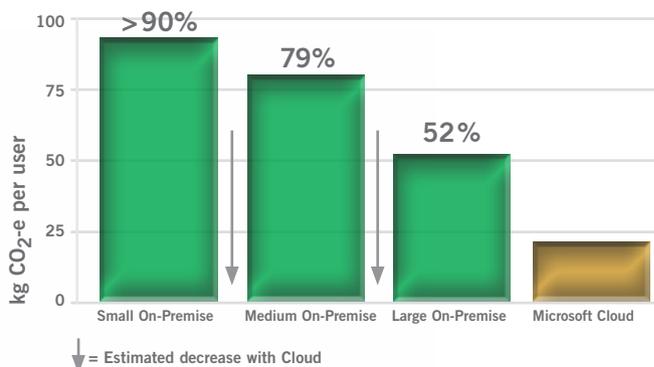
Cloud computing refers to large-scale, shared IT infrastructure available over the internet. Instead of installing packaged software applications on computers, people and businesses will use their web browsers to access a wide range of ‘cloud services’ available on-demand over the Internet.

The benefits of cloud computing are many. The ability to distribute computing across data centres should facilitate more efficient use of existing centres and reduce the need for more to be built. Ultraportable notebooks, smart phones, and the greater adoption of thin-client systems that connect to the web, will all be growth areas for the industry. The move to using central computing locations could provide additional environmental benefits in dematerialization and lower energy use.

**Information & Communications Technology (ICT) Enabled Reductions in Canada**<sup>41</sup>



**Microsoft Exchange On-Premise vs. Cloud Computing, kg CO<sub>2</sub>e per user**<sup>42</sup>



### White-space Networking

White-space networking refers to unused airwave frequencies that separate working television channels, as digital signals. These unused digital signals are essentially a “third pipe” for access to the internet that will rival cable and telephone broadband. This technology has been made possible through the switch from analog to digital television. The transition from analog television transmitters to digital broadcasting, takes effect August 31, 2011 in Canada.

White-space technology will open the door to future Smart Network applications by providing more real time information at a lower cost to consumers and the environment. Having been given the go-ahead by the U.S. Federal Communications Commission, equipment-makers now expect that the chips needed to make the technology work in phones, laptops, tablets and other gadgets will start being introduced over the next year.<sup>43</sup> White-space consumer products could then be introduced to the retail market by late 2012.<sup>44</sup> Some of the potential benefits of using white-space networking include:

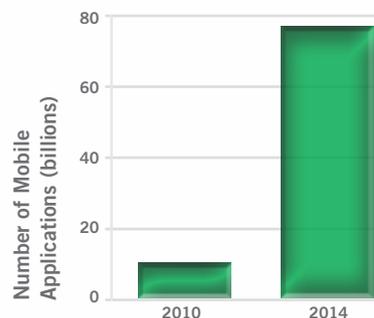
- An increase in network efficiency and capacity, which will limit infrastructure expansion requirements with the associated cost and environmental impacts;
- Deliver a PC-quality web and multimedia experience on any mobile device that will shift internet usage from large desktop devices to smaller portable devices, dramatically reducing energy use;
- Consolidation of products and applications into a core network will minimize the packaging and transportation required for delivering multiple data services; and
- The sharing of platform software, operating system software and hardware will reduce the amount of hardware and power and cooling systems required.

### Mobile Applications

Application developers have created more than 300,000 mobile applications in just over three years. In 2010, mobile apps made the leap from the smartphone to media tablets. In 2011 and beyond, mobile apps will find their way into even more devices, including televisions. According to a new International Data Corporation (IDC) forecast, the market for mobile applications will continue to accelerate as the number of downloaded apps is expected to increase from 10.9 billion worldwide in 2010 to 76.9 billion in 2014.<sup>45</sup>

Mobile applications can offer a wide variety of interactions and functions in both the physical and the digital worlds using just one device. For example, apps can turn a smartphone or a tablet device into a physical trainer that keeps track of exercise levels and even acts as a heart rate monitor, monitor a person’s driving and offer tips to improve gas mileage, turn a phone into a flashlight, automatically upload and share pictures, scan physical goods through barcode readers, wirelessly transfer files by physically bumping two devices together, and provide a whole range of business support from fleet management to payroll. This will significantly decrease the amount of separate units of equipment currently in use with the concurrent decreased footprint.

Increase in Mobile Applications



## THE FUTURE OF ELECTRONIC PRODUCTS

### Merging Technologies and Product Lightweighting

#### Multifunctional Devices

A key trend in electronics product design over the past ten years has been the convergence of multiple functions or new function into a single product. This functional convergence has been made possible by many factors, not the least of which is the driver of overall environmental improvements gained through energy use and resource reductions. Examples of new classes of products that now exist due to functional convergence include, but are not limited to:

- Multifunction imaging devices that print, copy, scan and fax documents
- Media or Entertainment PCs that combine the functions of a computer, DVR, and an HDTV
- Smart phones that combine phone functionality with Internet access - some also offer the functions of cameras, game players, portable video and/or music players
- Gaming systems that combine gaming with optical drives to play movies, have hard drives and Internet access that allows them to have some of the functionality of traditional computers

- Tablet Computers, which offer the services of a computer and Personal Digital Assistant (PDA)

While tablet computers have mainly been used as a “play” tool by consumers in 2010, a surprising number of businesses have adopted these devices at the executive level, and with those who work out of the office. These devices have spanned a number of industries ranging from healthcare to energy.<sup>46</sup> As these devices promise to extend worker productivity, the market will start to see models designed specifically with productivity and business functionality in mind. This fast-growing market is expected to ship over 500,000 devices in Canada by the end of 2010, and is expected to grow in the triple digits in 2011.<sup>47</sup> These products will reduce the size and weight of the current laptop computers they replace.

In addition, advancements in e-reader technologies are paving the way for innovative thin, flexible, large area electronic devices which can be produced in very high volumes at low cost and could replace a lot of the disposable newsprint and other printed products that currently require disposal or recycling.<sup>48</sup>

## TIMELINE

### 1990s Explosion of the internet

1981



IBM sets the industry standard for PC's with the 5150, weighing 11.5 kg and consuming 63.5 Watts of power

1987



Toshiba introduces the T1000 laptop (2.9 kg, 5.2 cm), making portable computing more widely available

1995



USB first released. USB drives are smaller than discs and are rewritable, so they can be re-used

The original HP LaserJet printer weighed 32.5 kg and consumed 170 watts during ready mode

1984



First digital cameras for the consumer-level market that worked with a home computer via a serial cable is released, weighing 0.5 kg

1994



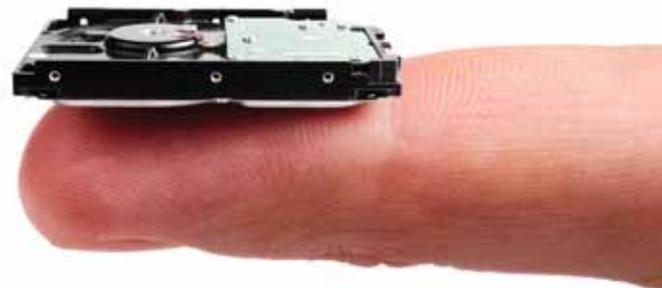
**Corning® Gorilla® Glass**

Corning® Gorilla® Glass is a new thin-sheet material that is being used in touchscreen and other display devices. Electronics manufacturers, such as **LG, Samsung** and **Sony**, have started using Gorilla® Glass because it is tough enough to resist the scratches, drops, and bumps of everyday use, and exceptionally thin.<sup>49</sup> The environmental advantages of using this material are that products are expected to have longer lifespans and be smaller and lighter.

**Nanotechnology:  
Smaller, Lighter, More Energy Efficient Electronics**

Nanotechnology looks at the design, characterization, production, and application of structures, devices, and systems by controlled manipulation of size and shape at the nanometer scale (less than 1 nanometer to greater than 100 nanometers). Nanotechnology in the electronics industry (nanoelectronics) may help increase the capabilities of electronics devices while, at the same time, reducing their weight and power consumption.

In 2006, an estimated \$11.8 billion was invested in nanotechnology research and development globally.<sup>50</sup> That investment had grown to more than \$18 billion by 2008 and it is estimated that nanotechnology will impact more than over \$2.5 trillion worth of manufactured goods by 2015.<sup>51</sup> As with any new technology, our members are working to ensure that nanotechnologies do not negatively impact the environment.



1999

Wi-Fi Alliance was founded to drive the adoption of a single worldwide standard for high-speed wireless local area networking, reducing the need for excessive wiring and infrastructure and enabling the sharing of devices such as printers between a number of computers, thus reducing the need for multiple devices

2000s

First camera cell phone released, paving the way for a new wave of multi-functional devices, which incorporate the functions of PDAs, MP3 players and web browsing



2006

Blu-ray, a new optical disc that is capable of storing 10 times more data, is released



2009

Black and white LaserJet printer weighs 10.7 kg and consumes 8 watts during ready mode

1998

First Digital Television Broadcast, which opens the airwaves for white space networking



First MP3 Players released, which in comparison to CD players are more durable, smaller in size, have a larger storage capacity and can load content online (reduces the need for shipping and packaging CD's)

Sales of LCD TVs surpass CRTs, which means a steep reduction in power consumption and the amount of hazardous materials



2007

Apple releases the iPad, weighing 0.7 kg and consumes 2.9 watts of power, which is a bridge between a cell phone and a computer



2010

## ENVIRONMENTAL STANDARDS AND INITIATIVES

There are numerous environmental standards and initiatives that have been established throughout the world, and because of the global nature of electronics manufacturing, these standards and initiatives impact electronics products on a global scale. It would not be economical for a manufacturer to design a unique version (sometimes with conflicting requirements) of each product in every country in order to adapt to their standards. In fact, recent moves in the eco label industry have seen consolidation to achieve greater economies of scale.

Similarly, complying with different standards in each of the provinces and territories would not be cost effective for Canadian customers. While some standards have not been officially adapted in Canada, they are still relevant in the Canadian context because manufacturers are applying these standards to the products sold in Canada.

### Legislation and Regulations

**National Level: *The Canadian Environmental Protection Act, 1999 (CEPA)*** is the basis of Canada’s regulatory system for controlling exposure to toxic substances. CEPA requires that all substances used in Canada be assessed for environmental and human health impacts.

**Canada’s Chemical Management Plan** takes proactive measures to make sure that chemical substances are managed properly.

**Provincial/Territorial Level:** Provinces and territories are responsible for registration, collection, storage, transportation, treatment, recovery and disposal of non-hazardous and hazardous waste. Each of the provinces and territories has their own laws and regulations to address these responsibilities.

**International Level: *Reduction of Hazardous Substances (RoHS)*** directive. The European Union’s RoHS bans six types of hazardous materials that are commonly used in the production of electronic equipment.

Other global regulations and legislation targeting the use of certain substances in electronics include:

- China’s Management Methods on the Prevention and Control of Pollution Caused by Electronic information Products (Chinese RoHS)
- Japan’s Green Procurement Survey Standardization Initiative
- Korea’s RoHS
- Norway’s Hazardous Substances in Consumer Products
- Various U.S. state-level legislation incorporating restricted substance requirements

Voluntary Eco-Labeling	Applicable Products
<b>80 PLUS</b> is an initiative to promote energy efficiency in computer power supply units (PSU). It certifies products that have more than 80% energy efficiency.	<ul style="list-style-type: none"> <li>■ Computers</li> </ul>
<b>Climate Savers Computing Initiative</b> is a non-profit group of consumers, businesses and conservation organizations whose goal is to promote development, deployment and adoption of smart technologies that can both improve the efficiency of a computer’s power delivery and reduce the energy consumed when the computer is in an inactive state. Computer and component manufacturers commit to producing products that meet specified power-efficiency targets, and corporate participants commit to purchasing power-efficient computing products.	<ul style="list-style-type: none"> <li>■ Computers</li> </ul>
<b>Electronic Product Environmental Assessment Tool (EPEAT)</b> is a system that helps purchasers evaluate, compare and select electronic products based on their environmental attributes. Products are also ranked in EPEAT according to three tiers of environmental performance: Bronze, Silver, and Gold. Unit sales of EPEAT registered products in Canada increased by more than 25% to over 3 million EPEAT registered units. <sup>41</sup>	<ul style="list-style-type: none"> <li>■ Desktop and laptop computers</li> <li>■ Thin clients</li> <li>■ Workstations</li> <li>■ Computer monitors</li> </ul>
<b>ENERGY STAR®</b> is an American standard for energy efficiency that has been adopted internationally. It is a voluntary labelling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions.	<ul style="list-style-type: none"> <li>■ Audio/Video</li> <li>■ Computers</li> <li>■ Cordless Phones</li> <li>■ Display Devices</li> <li>■ Televisions</li> </ul>
<b>Global Ecolabelling Network (GEN)</b> is a non-profit association of third-party, environmental performance labelling organizations. The following are registered countries: <ul style="list-style-type: none"> <li>• EcoLogo (Canada)</li> <li>• Terra Choice (Canada)</li> <li>• Blue Angel (Germany)</li> <li>• Nordic Swan Label (Nordic 5 countries)</li> <li>• TCO (Sweden)</li> <li>• National environmental labelling program (Czech Republic)</li> <li>• Europa (European Union)</li> <li>• Eco Mark Program (Japan)</li> <li>• Green Label Program (Hong Kong)</li> <li>• Singapore Green Label Scheme (Singapore)</li> <li>• Environmental Choice program (New Zealand)</li> </ul>	<ul style="list-style-type: none"> <li>■ Printers</li> <li>■ Photocopiers</li> <li>■ Ink cartridges</li> <li>■ Multifunctional copiers /scanners / printers</li> </ul>
<b>The Eco Declaration (TED)</b> specifies environmental attributes and measurement methods for ICT and CE products according to known regulations, standards, guidelines and currently accepted practices. It includes a company environmental profile, and environmental product attributes.	<ul style="list-style-type: none"> <li>■ All information and telecommunications products</li> </ul>

## Voluntary Recycling Standards

**Electronics Product Stewardship Canada's Recycling Qualification Program Standard** defines the minimum requirements for managing end-of-life electronics. This Standard is intended to assist in determining if these products are managed in an environmentally-sound manner that safeguards both worker health and safety and the environment, from the point of primary processing to final disposition.

**International Standards Organization (ISO) 14001** specifies the actual requirements for an environmental management system. It applies to those environmental aspects which the organization has control and over which it can be expected to have an influence.

## Voluntary Reporting Initiatives

**Electronic Industry Citizenship Coalition (EICC)** promotes a common code of conduct for the electronics, and information and communications technology (ICT) industry. The Code of Conduct provides guidelines for performance and compliance with critical Corporate Social Responsibility policies. EICC provides tools to audit compliance with the code, and helps companies report progress.

**Global Reporting Initiative (GRI)** is a network-based organization that has developed a sustainability reporting framework. The framework sets out the principles and indicators that organizations can use to measure and report their economic, environmental, and social performance.

## Product Collaborations

**Bluetooth Special Interest Group (SIG)** is a privately held, not-for-profit trade association of companies in the telecommunications, computing, automotive, music, apparel, industrial automation, and network industries. SIG members drive development of Bluetooth wireless technology, and implement and market the technology in their products.

**Digital Living Network Alliance (DLNA)** is a collection of companies from around the world that have agreed that they all make better products when those products are more compatible with other products. DLNA member companies seek to create new products that are compatible by using open standards and widely available industry specifications.

**Green Grid** is a global consortium of IT companies and professionals seeking to improve energy efficiency in data centers and business computing ecosystems around the globe. The organization seeks to unite global industry efforts to standardize on a common set of metrics, processes, methods and new technologies to further its common goals.

**Universal Serial Bus Implementers Forum (USB-IF)** was formed to provide a support organization and forum for the advancement and adoption of USB technology. The Forum facilitates the development of high-quality compatible USB devices, and promotes the benefits of USB and the quality of products that have passed compliance testing.

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Electronics Product Stewardship Canada (EPSC) is a not-for-profit, industry-led organization created to design, promote and implement sustainable solutions for the recycling of end-of-life electronics. Its membership is comprised of 24 leading Canadian electronics manufacturers. EPSC members have taken an environmental leadership role by working with stakeholders to create effective industry-led environmental stewardship programs across Canada, by investing in design for environment improvements to their products and processes, and by establishing an innovative vendor qualification program for the responsible recycling of end-of-life electronics.

## EPSC MEMBERS

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Apple Canada Inc.  
Brother International Corporation (Canada) Ltd.  
Canon Canada Inc.  
Ciaratech  
Cisco Systems Inc.  
Dell Canada Inc.  
Electro-Federation Canada  
Epson of America Inc.  
Getac  
Hewlett-Packard (Canada) Co.  
IBM Canada Ltd.  
Information Technology Association of Canada  
LG Electronics Canada Inc.  
Lenovo Canada Inc.  
Lexmark Canada Inc.  
MDG Computers Canada Inc.  
Microsoft Corporation  
Northern Micro Inc.  
Oracle America Inc.  
Panasonic Canada Inc.  
Philips Electronics Ltd.  
Samsung Electronics Canada Inc.  
Sony of Canada Ltd.  
Toshiba of Canada Ltd.



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