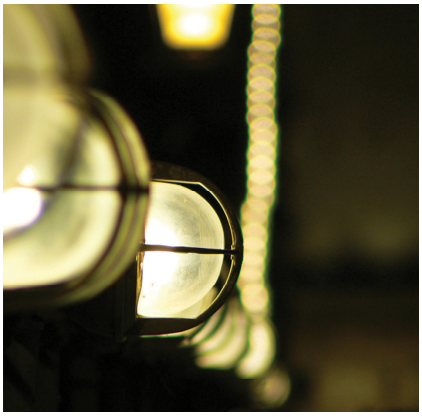
University of Saskatchewan

Smart Purchases Big Impact

Sustainable Purchasing Guide

Electronic Equipment

Sustainability... your university, your world



University of Saskatchewan

Electronic Equipment

Introduction

This section provides information on currently available ***electronic equipment*** options that can help to move the University of Saskatchewan toward its sustainability goals. Living within the boundaries of our sustainability goals requires us to apply two main strategies:

Dematerialization requires that we reduce the amount of materials as much as possible; and that we continually move toward the use of 100% recycled content.

Substitution requires that we find less harmful materials to replace those that currently damage and are not recyclable.

Sustainable purchasing is about including social, environmental, financial and performance factors in a systematic way. It involves thinking about the reasons for using the product (the service) and assessing how these services could be best met. If a product is needed, sustainable purchasing involves considering how products are made, what they are made of, where they come from and how they will be used and disposed.

Finally, remember that this is an evolving document – it will change with new information as our understanding of sustainability impacts and potential solutions improves.

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Smart Purchases Big Impact

Wherever possible **CHOOSE** products that employ a combination of characteristics listed in the left hand column, and **AVOID** products that demonstrate characteristic in the right-hand column.

CHOOSE	AVOID
• Eco-Logo, EPEAT or Energy Star certified • Recyclable products • Take-back programs • Leased electronics • Multifunctional devices	

Option: Purchase EPEAT Certified Equipment

Strategy: Substitution (SO 1, 2, 3, 4)

EPEAT is a system that helps purchasers evaluate, compare and select electronic products based on their environmental attributes. The system currently covers desktop and laptop computers, thin clients, workstations and computer monitors. Desktops, laptops and monitors that meet the required environmental performance criteria will be granted certification.

Option: Purchase Energy Efficient Equipment (Eco-Logo Certified, Energy Star Labelled)

Strategy: Dematerialization – Less Waste (SO 1, 2, 3, 4)

Some electronic equipment is manufactured with special features that reduce the amount of energy consumed by the machine. Many manufacturers participate in the Energy Star program, a voluntary leadership program established by the U.S. Environmental Protection Agency and the U.S. Department of Energy. This program requires machines to have power-management features like an automatic shut-off, or a "sleep mode", which dramatically reduces energy consumption. Machines that meet the requirements are given the Energy Star label.

Option: Choose Re-Manufactured Equipment

Strategy: Dematerialization – (SO 1, 2, 3, 4)

Some manufacturers design equipment to be more easily disassembled for recycling. The companies often take back units to recondition or remanufacture certain components for reuse. Such products reduce the sustainability impacts associated with the extraction of raw materials, production and end-of-life management of the electronic device.

Option: Purchase Electronic Equipment with Take-Back Programs

Strategy: Dematerialization – Less Waste (SO 1, 2, 3, 4)

A limited but growing number of equipment manufacturers and distributors are responding to the environmental and financial interests of their customers by offering to take back their equipment at the end of its service life. Where possible, such programs should be sought out and/or requested of manufacturers and distributors during the competitive bid process. This increases the pressure on manufacturers of electronics to design the products for re-use, disassembly and/or remanufacturing.

Option: Lease Equipment

Strategy: Dematerialization – Less Waste (SO 1, 2, 3, 4)

Utilizing leasing programs can also include the requirement for the retailer, distributor or manufacturer to take equipment back. This transfers the responsibility for the management of toxic materials to those who provide the equipment, and may ultimately inspire design changes and product innovations. Furthermore, depending upon the replacement schedule, your machines or their various components could have value for reuse.

Option: Choose Upgradeable Equipment

Strategy: Dematerialization – Less Waste (SO 1, 2, 3, 4)

More savings can be gained by buying with expandability that is reasonably expected over the life of the product, specifically memory and/or disk capacity. These choices can reduce the need for replacement equipment as well as the frequency of managing used equipment.

Option: Choose Multifunctional Equipment

Strategy: Dematerialization – Less Waste (SO 1, 2 3, 4)

Equipment that performs multiple tasks (e.g. printing, copying, faxing, and scanning) with a single machine is more efficient than buying numerous devices to perform each function. Such products reduce the number of machines purchased, thereby reducing overall energy and material used to perform the various functions.

Option: Choose Automatic Duplexing and Multi-Page Printer

Strategy: Dematerialization – Less Waste (SO 1, 2, 3, 4)

Printers and photocopiers are responsible for the most paper use in a typical office setting. Be sure to purchase printers and photocopiers that can duplex and/or multipage print, and then set them to do so automatically.

Option: Buy Appropriately Sized Equipment

Strategy: Dematerialization – Less Waste (SO 1, 2, 3, 4)

Buy no larger (size and weight) than will meet the required needs over the expected life. The excess is wasteful in both power and material consumption.

Option: Consider Re-Manufactured Toner Cartridges and Recycle Used Cartridges

Strategy: Dematerialization – Less Waste (SO 1, 2, 3, 4)

Discarding toner cartridges because the toner powder contained in them has been used up is unnecessary. Discarded printer cartridges take up valuable landfill space and result in the accumulation of plastics, metals and chemicals in the environment. These impacts can be avoided by the purchase of remanufactured toner cartridges and recycling spent cartridges. Some manufacturers allow toner cartridges to be returned to them for recycling so be sure to inquire about available options at the time of purchase.

Arriving
at the currently preferred options

1. Identify the service

Electronic Equipment (EE) is a term used to categorize a wide range of electronic products that includes computer equipment, telephones, printers, scanners, televisions, household appliances and more. These devices use electric currents or electromagnetic fields to deliver a wide variety of services, including communication, digital information management, education, entertainment, office management, as well as other functions.

2. Assess the need

The University of Saskatchewan requires EE to facilitate teaching, research, administrative and operational activities.

3. Identify the contents

The material content of EE varies from product to product, but generally consists of:

- ***Plastics*** - Plastics are widely used in the electronics industry for such components as housings, keyboards or printer cartridges. Several dozen types of plastics, including high-density polypropylene (HDPE), low-density polyethylene (LDPE) and polyvinyl chloride (PVC) can, in varying proportions, all be found in EE. Substances such as heavy metals in pigments, stabilizers, and flame-retardants are also added to the plastics.

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3. Identify the contents (con't)

- ***Ferrous metals*** - Along with plastics, ferrous metals (i.e. containing iron) make up the largest proportion of materials (with respect to weight) in most electronic equipment. They are used primarily for structural purposes, such as within the housing of a computer.
- ***Non-ferrous metals*** - The main non-ferrous metals in EE are copper, used for cables, and aluminum, used for structure and conductivity. Other metals in EE include:
    - ***Lead*** is used in cathode ray tubes in computer monitors, tin-lead solder, cabling, printed circuit boards, and fluorescent tubes.
    - ***Cadmium*** appears in nickel-cadmium (Ni-Ca) batteries and cathode ray tubes as well as in plastic stabilizer and colour pigments.
    - ***Mercury*** is found in laptop display screens, monitors, mobile phones, and in batteries.
    - ***Hexavalent chromium*** is used as a hardener or stabilizer for plastic housings and as a colorant of pigments in PCs and monitors.
    - ***Arsenic*** is found in microelectronics, various alloys, and as an additive in plastics.
    - Other metals that provide such functions as radiation shields, metal joining, conductivity, and structure in electronic equipment include nickel, zinc, tin, cobalt, manganese, gold, silver, and selenium.
- ***Glass*** - Glass is present in the lamps, video and sound equipment, and data processing equipment of electronics. High proportions of the glass in electronic equipment are mixed with metal oxides, which cause problems for recycling.
- Other materials such as liquids, wood, paper or rubber may be used in EE, but generally in very small proportions.

4. Identify sustainability impacts

i. ....systematically increasing concentrations of substances from the earth's crust?

- EE uses electricity to operate. If the electricity used to operate the device and equipment is derived from the combustion of fossil fuels, it leads to an increase in the concentration of substances from the earth's crust in nature (CO2, CO and SOx). This can contribute to a number of negative outcomes including climate change and acid rain, as well as negative human health impacts.
- Fossil fuels are also combusted to provide energy during the extraction of raw materials, transportation and the production of EE.
- Heavy metals such as mercury, lead, cadmium, chromium compounds, and arsenic are toxic to humans and (bio) accumulate if they are released into nature and not recycled. Since many of these metals appear in relatively small traces in very complex EE products, they are difficult to recapture for recycling and there is a high risk of release into nature through EE waste. Other metals, such as nickel, antimony, silver, aluminum, copper or zinc can also have diverse negative impacts on the environment and human health.
- The petroleum or natural gas used as feedstock for most plastics is extracted from the earth's crust at a rate much greater than it is re-deposited back into the earth's crust.

ii. ...systematically increasing concentrations of substances produced by society?

- ***Brominated and halogenated flame-retardants*** are compounds or mixtures of compounds that are added to a polymer. Both can be found in printed circuit boards, plastic housing, motherboards, keyboard buttons, and cabling. These substances are toxic and tend to bioaccumulate. When incinerated, they contribute to the formation of dioxins and furans that are dispersed into the air and which can be harmful to human health.
- If the ***plastic*** used in electronic equipment is not recycled, it usually ends up in landfills or incinerators. The plastic persists in the environment after it is used and discarded, contributing to an increase in concentration of complex human-made substances in nature. While it is true that over time and under the right conditions plastics will oxidize, fragment and disintegrate – with continued strong growth in the use and disposal of plastics, the timeline is too short to prevent their accumulation in nature.
- A number of sustainability impacts are associated with Poly Vinyl Chloride or ***PVC***, one type of plastic. Among them, the generation of organochlorine substances through incineration is a particular cause for concern when dealing with EE waste.
- The combustion of fossil fuels (see above) produces a number of chemical compounds (e.g. nitrogen oxides) that build up in the atmosphere

iii. ...systematically degrading nature by physical means?

- ***Electronic waste*** is a growing problem in North America. When these devices are discarded they will be dumped, incinerated, or shipped as waste exports.
- ***Water*** is used during the manufacturing process for most EE. In particular, a substantial amount of water is used in the production of microchips. If the source of this water is depleted at a rate faster than nature replenishes it, then nature is being degraded.
- The extraction of fossil fuels and virgin metals/minerals (for EE components) may systematically degrade nature, particularly where ***mining*** disturbs land that is not reclaimed and restored.

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4. Identify sustainability impacts (con't)

- Printers and photocopiers are of particular concern because of their potential impact on ***paper use***, and on the forest resources used to harvest the pulp for the paper.

iv. …systematically undermining people's ability to meet their basic human needs?

- Many of the heavy metals (e.g. lead, mercury, cadmium, etc) listed above are known to be toxic to humans and cause various ***negative health effects***. For example, lead is known to cause damage to the nervous, endocrine, and cardiovascular systems and to the kidneys. Cadmium has an acute as well as chronic toxicity. Chromium compounds can cause allergic reactions and are potentially DNA-damaging. Arsenic can cause dermatitis, increase cancer risk, and possibly damage genetic material.
- Brominated flame retardants are suspected of being ***endocrine disruptors***. These are chemicals that cause a hormone imbalance by out-competing or mimicking the body's natural hormones. Dioxins and furans are also released when PVC and other plastics containing brominated flame retardants are incinerated. These are also harmful to human health.
- A number of the compounds produced by the combustion of fossil fuels (e.g. nitrogen oxides, carbon monoxide, sulfur oxides, particulate matter) have a negative effect on human health.
- Millions of ***obsolete computers***, mainframes, and televisions are sent to India, Pakistan and China every year. In many such locations, poor migrant workers are employed in breaking apart and processing obsolete computers imported primarily from North America. Investigative reports claim that many of the operations involve men, women and children toiling under primitive conditions, often unaware of the health and environmental hazards involved in operations that include open burning of plastics and wires, riverbank acid works to extract gold, melting and burning of toxic soldered circuit boards and the cracking and dumping of toxic lead laden cathode ray tubes. The processing releases carcinogenic fumes and pollutes rivers and ground water with heavy metals, potentially causing respiratory problems and cancer in local populations. Furthermore, tonnes of ***electronic wastes*** are dumped along rivers, in open fields and irrigation canals dispersing toxic chemicals.

5. Envision sustainable electronic equipment

In principle, the sustainable management of electronic equipment would feature:

- No components that are derived from the earth's crust (e.g. petrochemicals and metals), unless those ingredients are 100% captured and reused.
- No components that are persistent in nature, unless those substances are 100% captured and reused.
- A production process that:
  - Does not contribute to the increased concentrations of substances from the earth's crust or the build-up of persistent compounds in nature
  - Uses only sustainable renewable energy or energy produced in a carbon-neutral manner
  - Does not rely on practices that systematically physically degrade land and ecosystems
  - Does not rely on practices that undermine people's capacity to meet their basic needs.
- Electricity derived only from sustainable renewable energy or energy produced in a carbon-neutral manner to power the device or equipment while it operates.

6. Identify and prioritize alternatives

Step 6 helps identify the product or service that offers the best pathway toward meeting all four of our Sustainability Objectives by using the following three criteria for assessment:

a) Does the product or service move us in the right direction with regards to our four Sustainability Objectives?

b) Does the product or service create a flexible platform for the next step toward sustainability?

c) Is the decision financially viable?

Resources
and Additional Information

1. EPEAT
   http://www.epeat.net/
2. Electronics Product Stewardship Canada
   http://www.epsc.ca/
3. Saskatchewan Waste Reduction Council
   http://www.saskwastereduction.ca/resources/e-waste/ewaste-index.html
4. 60 Minutes and 'The Electronic Wasteland'
   http://www.cbsnews.com/video/watch/?id=4586903n

WHISTLER

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