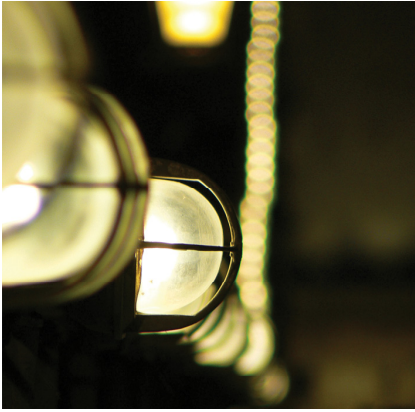


Smart Purchases Big Impact

Sustainable Purchasing Guide
Cell Phones

Sustainability... your university, your world

A stylized black silhouette of a tree with many leaves.

Introduction

This section provides information on currently available options for **cell phones** that can help to move the University of Saskatchewan toward its sustainability goals. Living within the boundaries of our sustainability objectives 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.

Purchasing Services

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Office of Sustainability

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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
<ul style="list-style-type: none"> Take-back programs Sustainable design innovations 	<ul style="list-style-type: none"> Paper billing

Option: Purchase Cell Phones with Take-Back Programs

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

The inclusion of a transparent take-back program is one of the best methods of ensuring that old phones are properly recycled or disposed of. If this is not an option, unwanted equipment should be recycled through a reputable electronics recycler. However, caution is needed; some recycling programs simply shift the environmental hazard by shipping the e-waste to developing countries where poorly trained and unprotected workers extract precious metals. The Basal Action Network advocates responsible toxic waste management with its e-Steward Certification program.

Option: Select Sustainable Design

Strategy: Substitution- Using Different Stuff (SO 1, 2, 3, 4)

Although the market for cell phones is relatively young, several companies have already come out with interesting and innovative design technologies and advancements. Some phones use biodegradable components, recycled materials or mono-material designs. Other phones can be charged using solar power, or eliminate harmful heavy metals (lead, cadmium and mercury) from their design.



Arriving at the currently preferred options

1. Identify the service

Cell phones facilitate communication, information transfer and education.

2. Assess the need

Use of cell phones provide a method of communication, coordination and information management, both within the University and with external partners and organizations.

3. Identify the contents

A typical cell phone is composed of **plastics, metals, ceramics, and flame retardants**. Manufacturing one cell phone requires numerous raw materials, including petroleum-based plastics, liquid crystal display materials, brominated flame retardants (BFRs) and toxic **heavy metals** including cadmium, lead, nickel, mercury, manganese, lithium, zinc, arsenic, antimony, beryllium, and copper.

4. Identify sustainability impacts

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

- Cell phones use **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 concentration of substances from the earth's crust in nature (CO₂, CO and SO_x). Increasing concentrations of these substances in nature can contribute to a number of negative outcomes such as climate change and acid rain as well as negative human health impacts. In Saskatchewan, most electrical energy is generated from the combustion of coal, a fossil fuel.
- **Fossil fuels** are also combusted to provide energy during the extraction of raw materials, transportation and the production of cell phones.
- **Heavy metals** such as mercury, lead, cadmium, and arsenic bio-accumulate if they are released into nature and not recycled. 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.

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 to prevent ignition or increase flame-retardant characteristics. Both can be found in printed circuit boards, plastic housing, buttons, and cabling. These substances are toxic and bioaccumulate. When incinerated, they contribute to the formation of dioxins and furans that are dispersed into the air and can be harmful to human health
- If the **plastic** used in cell phones casing 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.
- A number of sustainability impacts associated with **PVC** (found in the plastics of cell phones) can cause the generation of organochlorine substances through incineration.
- The combustion of fossil fuels used in the production of mobile devices produces a number of **chemical compounds** (e.g. nitrogen oxides) that build up in the atmosphere.

iii.systematically degrading nature by physical means?

- Cell phone use is growing at an enormous rate in North America. On average, cell phones are replaced every 1.5 years and about 100 million cell phones are discarded annually, most ending in **landfills**, displacing humans and nature.
- **Water** is used during the manufacturing process for cell phones. In particular, a substantial amount of water is used in the production of microchips (found in cell phones). If this source of this water is being exhausted and/or not being reclaimed in the manufacturing process, then this represents a substantial degradation of the water supply.
- The extraction of **fossil fuels** and **virgin metals/minerals** may systematically degrade nature, particularly where mining disturbs land that is not reclaimed and restored.

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

- **Heavy metals** such as mercury, lead, cadmium, and arsenic are known to be toxic to humans and cause various **nega-**

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tive 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. Arsenic can cause dermatitis, increase cancer risk, and possibly damage genetic material.

- Brominated flame retardants are added to plastics to reduce the risk of fire. Brominated flame retardants bio-accumulate and are suspected of being **endocrine disruptors** -- chemicals that causes 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**.
- E-waste, including cell phones, is sometimes sold or dumped illegally in **developing nations** where unprotected workers recover valuable elements such as lead, mercury and gold from the old equipment. In 2009, Time Magazine exposed a city in mainland China where workers with no protective equipment heat circuit boards over open fires and use acid to extract precious metals, releasing highly toxic gases into the air and liquids into the ground water and nearby rivers. Workers are exposed to harmful substances such as lead, cadmium, polyvinyl chlorides and mercury, many of which are known carcinogens. This area of China reports many health and environmental issues including high rates of lead poisoning in children, the highest concentration of dioxins in the world and an elevated miscarriage rate.

5. Envision sustainable cellphones

Sustainable cell phones would be produced with few or no harmful substances. In addition, all companies producing these products would be responsible for them at the end of their useful life, with a clear expectation for refurbishment or reuse of materials. Ideally, all materials would be recaptured and reused, therefore not producing any excess waste or environmental or health hazards.

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. 60 Minutes and 'The Electronic Wasteland'
<http://www.cbsnews.com/video/watch/?id=4586903n>
2. Basal Action Network
<http://www.ban.org/>
3. E-Waste Not
www.time.com/time/magazine/article/0,9171,1870485,00.html



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