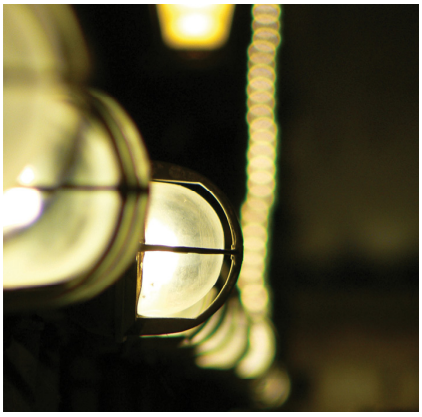
University of Saskatchewan

Smart Purchases Big Impact

Sustainable Purchasing Guide

Batteries

Sustainability... your university, your world



Batteries

Introduction

This section provides information on currently available options for ***batteries*** 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.

Purchasing Services

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Email: purchasing.services@usask.ca

Office of Sustainability

Tel: (306) 966-1236
Email: fmd.sustainability@usask.ca

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
• EcoLogo certified • Reduced use • Rechargeable/extended life • Recyclable batteries	

Option: Use EcoLogo Certified Products

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

Environmental Choice certified batteries are assessed based on their production methods and product contents, and are generally more sustainable than other alternatives. Selecting these products does not eliminate all sustainability impacts, but they are among the best options available on the market at present.

Option: Reduce/Eliminate the Use of Batteries

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

In some cases, it may be possible to eliminate the need for batteries for certain electronic devices and appliances. Consider whether the appliance using the batteries is truly necessary – and whether a plug-in option for the appliance would serve the intended purpose. If so, these are preferable options.

Option: Use Rechargeable Batteries

Strategy: Dematerialization – Less Waste (S0 1, 3, 4)

Rechargeable batteries reduce the number of new batteries required, and thus the amount of virgin materials and related sustainability impacts throughout the supply chain. Although recharging batteries still consumes energy which often has an associated sustainability impact, the net effect is still relatively positive when rechargeable batteries are used.

Option: Use Batteries with Longer Life

Strategy: Dematerialization – Less Waste (S0 1, 3, 4)

Long-life batteries reduce the amount of new batteries required, the amount of virgin materials required for batteries and all related sustainability impacts throughout the entire supply chain.

Option: Use Recyclable Batteries

Strategy: Dematerialization – Less Waste (S0 1, 3, 4)

Recycling batteries instead of disposing of them helps to reduce the rate at which relatively scarce metals are extracted from the Earth's crust. In addition, recycling batteries prevents them from ending up in landfill, which has negative sustainability impacts.

Arriving
at the currently preferred options

1. Identify the service

Batteries are used in a variety of equipment that requires portable or stored electricity and may be used for emergency back up or for energy storage as part of renewable energy system.

2. Assess the need

Meeting the needs of our campus requires portable and stored energy for back-up needs as well as ongoing uses. While accessing energy directly in some cases can minimize the use of batteries, they are useful devices that are currently needed to achieve our objectives.

3. Identify the contents

There are two general categories of batteries: ***Primary batteries*** can only be used once and cannot be recharged because the chemical reactions that supply the electrical current within them are irreversible. ***Secondary batteries*** can be recharged and reused as they use reversible chemical reactions. Both types are discussed in this guideline, and a distinction is made where appropriate. Generally, a battery consists of five components:

- ***Cathode*** – A positively charged electrode (potentially a heavy metal)
- ***Anode*** – A negatively charged electrode (potentially a heavy metal)
- ***Electrolyte*** – The electrodes must be separated by, and are often immersed in, an electrolyte that permits the passage of ions between the electrodes
- ***Separator*** – A separator electrically isolates the positive and negative electrodes
- ***Casing*** – The container that encases both the electrodes and electrolyte. For example, two common batteries are lead-acid and nickel cadmium batteries. In a lead-acid battery, lead dioxide is coated on the positive electrode, which reacts with the sulfuric acid electrolyte to form lead sulfate and water. Nickel-cadmium (NiCad) batteries contain a nickel hydroxide positive electrode plate, a cadmium hydroxide negative electrode plate, and an alkaline electrolyte. In each type of battery, different materials are used for these various components. The type of materials used and more importantly, how these materials are managed determines the sustainability impacts of specific batteries.

4. Identify sustainability impacts

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

- The most significant concern with batteries is the dispersion of metals used in the battery, in particular ***heavy metals***. Heavy metals are relatively scarce in nature and therefore accumulate and easily increase in concentration. Examples of heavy metals include lead (in lead-acid batteries) and cadmium (in nickel-cadmium batteries). Heavy metals contained within the battery's casing pose no real risks while the battery is in use. However, they are of concern when discarded with municipal solid waste to landfill or incineration. In landfills, especially those without liners and controls, heavy metals may leach slowly into soil, ground water, and surface water. Heavy metals are also released into nature during the mining and manufacturing process.
- Energy is consumed during the extraction of virgin raw materials, production of the battery, transportation, and use (in the case of rechargeable batteries). If the energy is generated using ***fossil fuels***, then carbon dioxide and other greenhouse gases are emitted and accumulate in the atmosphere.

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

- Batteries do not make a substantive contribution to this category

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

- ***Mining of virgin materials***, such as heavy metals, can contribute to systematic degradation of nature by physical means if mining practices do not have proper methods to eliminate environmental damage during production and fully reclaim and restore the land after use.

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

- Certain heavy metals can concentrate in the tissues of organisms and make their way up the food chain. In fact, several heavy metals, such as cadmium, are known ***carcinogens***. The possible health effects associated with ingestion or inhalation of water, food, or air that has been contaminated with high levels of heavy metals range from headaches and abdominal discomfort to seizures, cancer, comas, and even death.

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5. Envision sustainable batteries

Managing batteries in a sustainable manner would require that heavy metals and other substances from the Earth's crust not systematically increase in nature. This would require that batteries and their components be kept in technical cycles (i.e. recycled rather than treated as waste, ending up in landfills or incinerated). ***Recycling*** materials in batteries not only reduces the buildup of heavy metals and other persistent substances in nature, but also reduces the need for virgin materials and their associated production impacts (e.g. disruption of nature through mining, and energy consumption). In addition, the ***production process*** of batteries using recycled materials would be carbon neutral and use sustainable energy. Safeguards would need to be in place to ensure that heavy metals are not released into nature during the manufacturing and recycling process.

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. Rechargeable Battery Recycling Corporation
   www.rbrc.org

WHISTLER

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