University of Saskatchewan

Smart Purchases Big Impact

Sustainable Purchasing Guide

Writing Instruments

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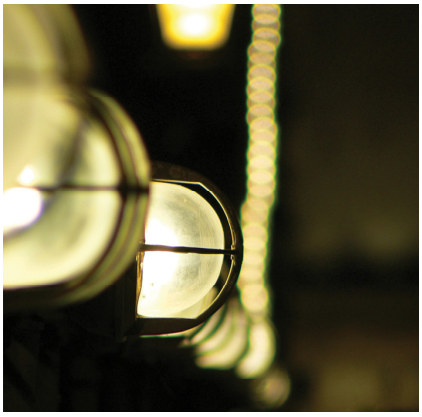

UNIVERSITY OF SASKATCHEWAN

Writing Instruments

Introduction

This section provides information on currently available ***writing instrument*** 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.

Purchasing Services

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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
• Reusable pens and pencils	• Petrochemical-based materials
• Recycled materials	• Inks containing heavy metals
• Soy-based or vegetable inks	• Solvent-based markers
• Fine points	• Ketone-based dry-erase markers
• Alcohol-based dry-erase markers	

Option: Choose Refillable Pens and Pencils

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

In refillable pens, pencils and markers, the pencil lead and/or the ink are the only consumable parts, while the barrels (usually made of plastic) are durable. Refillables therefore reduce the resources and energy used in manufacturing by avoiding the necessity for replacement of the whole unit. Refillables may cost more initially but they can be reused many times. Since the refills cost very little, the higher upfront cost is easily recovered over time, resulting in long term savings.

Option: Choose Recycled Content

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

Writing instruments can be easily manufactured using recycled materials. A pen's ink tube can be made from recycled plastic, the ballpoint made from recycled metal and the barrel made from a variety of recycled materials including unbleached paper, recycled plastic or rubber.

Pencils made of post-consumer recycled materials are also available. This reduces the amount of resources extracted from nature to manufacture this good. Pencils made from recycled materials also provide a good end-use for various kinds of waste newspaper, cardboard, and plastic materials, diverting them from landfills.

Option: Use Bio-based and Sustainably Harvested Materials

Strategy: Substitution (SO 1, 2)

A pen's barrel and ink tube can be made from biodegradable polymers, like cornstarch. These natural materials are harvested on the earth's surface, rather than extracted from its crust, and are biodegradable. Pencils made of sustainably harvested wood are also available. These pencils are made using resources from well-managed forest ecosystems according to recognized environmental criteria.

Option: Use Soy or Vegetable-Based Inks

Strategy: Substitution (SO 1, 2, 4)

In soy inks, a portion of the petroleum oil that serves as the writing medium has been replaced by soybean or other vegetable oil. Most soy inks still have some proportion of petroleum in them. However, soy inks reduce the amount of volatile organic compounds (VOCs) that are released by petroleum oil inks.

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Option: Avoid Ink Pigments Containing Heavy Metal

Strategy: Substitution (SO 1, 4)

Some ink pigment colours contain heavy metals such as barium, copper, and zinc, while others do not. Choosing colours whose pigments contain no heavy metals lessens the potential accumulation of heavy metals in the biosphere and the associated health impacts. For example, colours to avoid include fluorescents, warm red and metallic colours.

Option: Choose Water-Based Markers and Highlighters

Strategy: Substitution (SO 1, 2, 4)

While most highlighters are water-based, most permanent markers are solvent-based. However, some new water-based markers have been introduced on the market. Water-based markers eliminate the sustainability impacts associated with petroleum-based solvents, including health impacts. For most purposes, non-toxic, water-based markers can be substituted for permanent or waterproof ink. An additional benefit of water-based markers is that they are much easier than solvent-based markers to clean up from walls, woodwork, skin, or clothing.

Option: Choose Fine-Point Writing Instruments

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

Fine-point pens apply less ink to the paper and release less solvent into the air than wide-point markers. This means an overall reduction in sustainability impacts associated with the product, particularly if the ink and solvents involved are petroleum-based.

Option: Use Alcohol-Based Dry-Erase Markers

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

Dry-erase markers come in two types: alcohol- or ketone-based. Ketone is a volatile organic solvent. The more sustainable alternative is to choose alcohol-based markers.

Arriving
at the currently preferred options

1. Identify the service

Writing instruments such as pens, pencils, markers and highlighters are used to apply colour to a surface (usually paper) to produce words, symbols and/or images. Their primary function is therefore to support communication.

2. Assess the need

The University of Saskatchewan must be able to communicate, both internally and externally, to fulfill its functions. While writing instruments are used less frequently due to the increased convenience of computer technology, they are still necessary.

3. Identify the contents

Writing instruments consist of two primary components: ink/lead and the casing. The materials used for each of these components vary with different types of writing instruments.

- Pens generally consist of a barrel and cartridge that is made up of an ink tube and a point. Both the barrel and the cartridge are made from a variety of materials including a wide range of ***plastics, metals*** and ***bio-based materials***. An inexpensive ball point pen, for example, is comprised of a plastic barrel with cap and a cartridge, which is made up of a plastic ink tube, a ball (made of tungsten carbide powder) and a ballpoint (a brass housing to hold the ball).
- Pencils are made of a ***graphite*** and ***clay*** core in a ***wood*** housing. For mechanical pencils, the housing is typically made of plastic instead.
- There are three important types of markers: ***water-based, alcohol-based,*** and ***aromatic solvent-based***. Aromatic solvent-based markers use ***xylene*** or other aromatic solvents which are volatile organic compounds (VOCs). The casing for highlighters and markers is generally made from ***plastic***.
- The colour from a writing instrument generally comes either from ***pigments*** in the ink or from ***dyes***. Dyes tend to be preferred over pigments for writing inks because pigments cannot be dispersed minutely enough and tend to clog the pen tip. Water-based dye or pigment systems are still used for markers, highlighters, and roller ball pens but most pens use ***oil-based dye***.

4. Identify sustainability impacts

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

- Barium, copper, zinc, cadmium and other ***heavy metals*** are frequently used in ink pigments. Heavy metals have a propensity to bio-accumulate. When leached into the environment, heavy metals can also contaminate soil and groundwater.
- The ***feedstock*** for oil-based ink solvents and most plastics is generally derived from non-renewable petroleum resources.

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4. Identify sustainability impacts (con't)

- The ***metal components*** of some writing instruments are derived from the earth's crust. If they are not re-used or recycled, some of these substances may increase in concentrations in nature, for example in landfills, as litter, or through incineration.
- ***Fossil fuels*** provide energy during the extraction of raw materials, transportation, and the production of writing inks and instruments. The combustion of fossil fuels leads to an increase in concentration of substances from the earth crust in nature, in the form of carbon dioxide, carbon monoxide and sulfur oxide (CO2, CO and SOx). Increasing concentrations of these substances in nature can contribute to a number of negative effects such climate change, acid rain, as well as negative human health impacts.

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

- Petroleum-based solvents used in many types of ink are ***volatile organic compounds*** or VOCs, which off-gas when drying. When used indoors, VOCs are a problem for indoor air quality. Outdoors, they can contribute to problems such as the development of ground-level ozone (i.e. smog). VOCs can also contribute to water contamination if the inks are not handled properly or released in large quantities.
- ***Other chemicals*** used as additives or dyes in inks and/or in the plastic casings of writing instruments and printer cartridges may have the potential to systematically increase in concentrations in nature if they are difficult for nature to breakdown and if they dissipate in nature. As an example, some plastic additives release dioxins into the air if the plastic is incinerated.
- The combustion of fossil fuels for energy during raw material extraction, manufacturing and transportation produces a number of ***chemical compounds*** (e.g. nitrogen oxides) that build up in the atmosphere.

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

- Writing instruments, printer cartridges, and ink containers that go to ***landfill*** contribute to the physical degradation of nature that occurs through increasing amounts of land used for landfill.
- The extraction of fossil fuels and virgin metals/minerals may contribute to a systematic degradation of nature, especially in the case where ***land disturbed through mining*** is not reclaimed.
- ***Harvesting trees*** to make wood pencils may contribute to the systematic degradation of nature if the forest resources are harvested at a rate faster than they are renewed.

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

- A number of VOCs are ***harmful to humans***. For example, toluene (methyl benzene), which compromises approximately 70% of the total chemicals released by the printing industry, can affect the nervous system, kidneys, liver and heart. Formaldehyde, a suspected carcinogen (substance that causes or promotes the development of cancer), can irritate the eyes, nose and throat during short exposures.
- The ***bioaccumulation*** of heavy metals, such cadmium can cause serious health impacts. For example, many heavy metals are neurotoxins and can damage the liver and kidneys, among other known human health impacts.
- A number of the compounds produced by the combustion of fossil fuels (e.g. nitrogen oxides, carbon monoxide, sulfur oxides, particulate matter) also have a negative effect on ***human health***.

5. Envision sustainable small appliances

In principle a sustainable writing instrument 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 synthetic components that are persistent in nature, unless those substances are 100% captured and reused
- Only sustainable renewable energy or energy produced in a carbon-neutral manner is used in the production process
- No production practices which physically degrade the land or undermine the capacity of people to meet their basic needs

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:

1. Does the product or service move us in the right direction with regards to our four Sustainability Objectives?
2. Does the product or service create a flexible platform for the next step toward sustainability?
3. Is the decision financially viable?

Resources
and Additional Information

1. EPA: Waste Reduction Evaluation of Soy-based Ink
   www.greenpressinitiative.org/documents/EPAinkStudy.pdf

WHISTLER

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