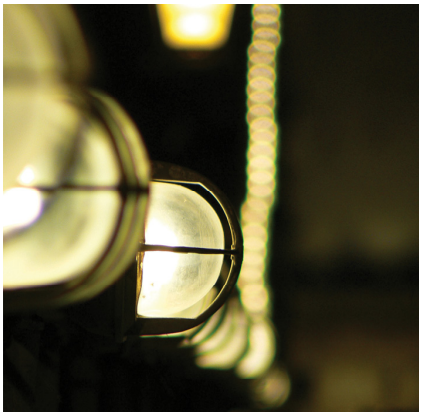
University of Saskatchewan

Smart Purchases Big Impact

Sustainable Purchasing Guide

Motor Vehicles

Sustainability... your university, your world



University of Saskatchewan

Motor Vehicles

Introduction

This section provides information on currently available **motor vehicle** 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
• High fuel efficiency • Designed for easy reuse or recycling • "Right-sized" vehicles	• Mercury in headlights and switches

Option: Use Fuel Efficient Vehicles

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

The combustion of fossil fuels is the most significant way a vehicle can move us away from our sustainability goals. These fuels increase the concentration of substances such as carbon oxides, sulfur oxides and nitrogen oxides in the atmosphere. Climate change, acid rain and human health risks are all potential consequences of that increase. Currently, some of the highest fuel efficiency is provided by hybrid vehicles that use both a combustion engine and electrical motor to propel the vehicle.

It is important to note that all vehicles, even the most preferable options, have negative environmental impacts. For example, electric vehicles still use energy generated by the burning of fossil fuels, just indirectly. Reduced vehicle use, driver training and no idling policies all contribute to fuel efficiency after the vehicle has been purchased.

Option: Use Vehicles Designed for Easy Dismantling, Reuse and Recycling

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

Parts that are designed for easy dismantling, reuse and recycling make it easier and less costly to keep materials within technical cycles and reuse the components. It is difficult to gauge the degree to which an automobile manufacturer has integrated this into vehicle design. However, strategic questions regarding goals for "vehicle recovery", or how much of the vehicle "is designed to be used again" may assist in evaluating this point.

Option: Maintain Proper Management of Components and Fluids

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

Many fluids (e.g. antifreeze, lubricant oils) and components (e.g. batteries, tires) are used in vehicles. If not properly managed, they can contaminate the environment and cause increases in the concentration of substances, both from the earth's crust (e.g. carbon dioxide and phosphorus from antifreeze) and produced by society (e.g. CFCs from air conditioning systems).

It is not really feasible to avoid the use of materials altogether, so ensure that fluids or components are recycled whenever possible. This will keep them contained within technical cycles so that they will not be released into the biosphere.

Option: Right-size Vehicles
Strategy: Dematerialization – less waste (SO 1, 2, 3, 4)

Right-sizing vehicles means choosing vehicles of an appropriate size for the task they will need to be used for. Not every job requires a full service van. A primary consideration in all vehicle purchasing should be to choose a balance of vehicle types so that less intensive tasks do not consume more resources than is necessary.

Option: Use Mercury-free Vehicles
Strategy: Substitution (SO 1, 2, 3, 4)

Some components in vehicles may contain mercury. This toxic substance builds up in nature, causing the most harm to the organisms at the top of the food chain. When vehicles are disposed of, the mercury often escapes into the environment during smelting or shredding. Currently, mercury is rarely recovered as a part of the recycling process so purchasing mercury-free vehicles is the preferred option. Mercury can be found in HID headlights, back-lit LCD displays and in fluorescent dashboard displays. Other uses, like mercury switches are less common since 2002 but positive inquiries about the use of mercury should still be made.

Arriving
at the currently preferred options

1. Identify the service

A motor vehicle provides transportation of people and goods.

2. Assess the need

The University of Saskatchewan requires various modes of vehicle transportation to transport people and goods, within the campus and to external locations.

3. Identify the contents

The operation of a motor vehicle requires both consumables (components that are needed to run the vehicle) and durables (the actual parts of the vehicle).

Consumables
Consumables are materials needed for vehicles to function properly. Examples include:

- Fluids – Fluids are necessary to ensure that the vehicle runs properly. They include fuel, antifreeze, engine oil, transmission oil, final drive oil, steering gear oil and chlorofluorocarbons (CFCs).
- Tires and Batteries – Parts that are consumed in the life of the vehicle include batteries and tires.

Durables
Durables are materials that stay with the vehicle throughout its life. They can generally be divided into two groups: metals and non-metals.

- Metals – Seventy percent of a typical vehicle is made of ferrous metals (such as sheet steel, steel, cast iron) and 6% is made of non-ferrous metals (such as aluminum, copper and zinc). The majority of the metal in vehicles can be recycled.
- Non-Metals – The remainder of a vehicle consists of plastics, foam, textiles, glass, and rubber. When a vehicle reaches the end of its life, reusable parts are removed and metals are chopped-up and recycled. The remaining non-metal materials pose an environmental concern as they usually end up in landfills or are incinerated.

4. Identify sustainability impacts

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

- The vast majority of motor vehicles currently in use rely on fossil fuels for energy to provide their transportation function. The combustion and evaporation of fossil fuels leads to an increase in concentration of substances extracted from the earth crust in nature (e.g. CO2, CO and SOx). Increasing concentrations of these substances in nature contribute to climate change, acid rain and smog, leading to ecological and human health problems. In addition to energy use from operating vehicles, their production and transportation also consumes large amounts of energy, much of which is from fossil fuels.
- Oils, lubricants, and antifreeze that disperse in the air or are improperly disposed of (e.g. poured into the sewer) enter into the biosphere, break down, and lead to the accumulation of CO2 in the atmosphere or phosphorus in aquatic environments. For a discussion on proper management of these materials, please refer to the corresponding product assessment.

continued on page 3 . . .

4. Identify sustainability impacts (cont'd)

- Mercury, found in light switches, antilock braking systems and some headlights, is not recovered during the recycling process. Mercury is a bio-accumulative and persistent toxic that threatens the health of humans and wildlife, even in very small quantities.

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

- The high temperatures in internal combustion engines cause the oxygen and nitrogen in the air to form nitrogen oxide (NO), which is a persistent human-made compound. Nitrogen oxide combines with oxygen in the air to form NO2, better known as brown-air smog.
- **Automobile shredder residue** (ASR) is the non-metal material removed from automobiles during recycling. This residue contains many persistent chemical compounds that are commonly found in plastics, foam, textiles, glass, and rubber.
- Most commercial **car washes** have on-site technology to recover contaminants from the car washing process before the wastewater finds its way into the municipal sewer. However, when cars are washed outside of a controlled environment (such as an owner's driveway), the cleaning products and other contaminants that are washed off the vehicle can drain off and pollute ground or surface water bodies.
- **Hydro chlorofluorocarbons** (HCFCs) have replaced CFCs in air conditioners, but can still deplete the ozone, especially if used in large quantities. HCFC is also a known greenhouse gas.

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

- Vehicles require **road systems** and infrastructure. Road infrastructure involves the systematic increase in the use of land and disturbance of natural systems.
- The **extraction of raw materials** (for metals and petrochemicals) negatively impacts the environment in the form of mining, processing and transportation activities, especially where land is not managed properly and not reclaimed after use. For this reason, it is extremely important to use the materials extracted as efficiently as possible and to increase the proportion of recycled waste.

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

- The **use of fossil fuels** in cars produces a number of chemical compounds (nitrogen oxides, carbon monoxide, carbon dioxide, sulfur oxides, particulate matter), which have a negative effect on **human health.**
- Excessive reliance on car transportation can contribute to an inactive lifestyle, which is one of the factors in the emerging crisis of **obesity** in society. This is a significant human health issue and an increasing economic problem as health care costs are becoming unaffordable.
- Vehicles create **noise pollution,** compromising the quality of life of both users and those who live by roadways.

5. Envision sustainable motor vehicles

The combustion of fossil fuels is the primary impact associated with vehicle use. A sustainable vehicle would use new sources of energy where the emissions are minimal and can be assimilated by nature.

Sustainable management of vehicles requires that materials be kept within **tight technical cycles.** These vehicles would be designed to allow most parts to be reused indefinitely and most materials recycled.

Some materials that currently make up **ASR**, would substitute natural materials while others would be made with materials that can be reused.

The fluids required to maintain and operate vehicles would also be managed sustainably, either by keeping them within tight technical cycles, or by substituting these materials for more natural alternatives.

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. Mercury-free Vehicles: http://www.informinc.org/fs_P3vehicles1.pdf
2. Right-sizing Your Fleet: http://www.toolkit.bc.ca/tool/vehicle-and-fleet-right-sizing
3. Natural Resources Canada Fleetsmart: http://oee.nrcan.gc.ca/home

WHISTLER

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