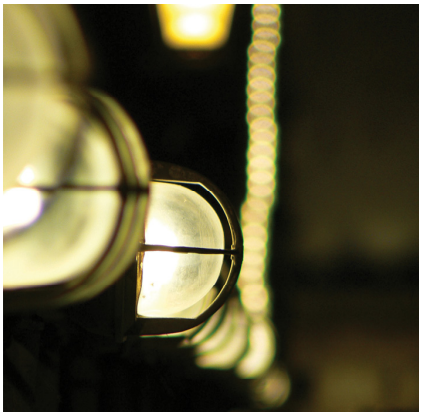
University of Saskatchewan

Smart Purchases Big Impact

Sustainable Purchasing Guide

Tires

Sustainability... your university, your world



University of Saskatchewan

Tires

Introduction

This section provides information on currently available options for **tires** 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

Tel: (306) 966-6704
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
• Low resistance tires • Eco-Logo certified • Retread tires • Reduce the need for tires • Long life and wear performance	• High resistance tires

Option: Reduce the Need for Tires

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

Tires are required for various types of vehicles. Reducing the number of vehicles in a fleet or managing the fleet to reduce vehicle use reduces the wear and replacement rate on all components, including tires. This reduces all of the associated sustainability impacts.

Option: Use Eco-Logo Certified Products

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

Eco-Logo certified tires have been assessed and certified to be less harmful to nature and human health than alternatives. Selecting a brand certified by Eco-logo ensures that your product meets sustainability standards across many criteria.

Option: Retread Tires

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

When vehicle tires become worn, many can be refurbished with new tread. Retreading bonds new treads to the tire body, similar to the process used when manufacturing a new tire. Tire casings can be retread many times. Retread tires can be used under the same conditions as new tires without loss in safety, comfort or speed. They meet the same quality standards as new tires and have manufacturer warranties. These products are also much more cost-effective than buying new tires. Retreading tires uses less energy than manufacturing them from virgin material and helps conserve the petroleum and metals used for raw materials.

Option: Low Resistance Tires

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

Tires which are built to have a lower resistance create substantial fuel savings. Between 10-15% of fuel consumption is directly linked to overcoming the resistance of tires on small passenger vehicles. For heavy trucks and vans that percentage may rise to as much as 30%. Low resistance tires reduce that number and conserve fuel better as a result.

Increased fuel savings decrease the usage of non-renewable resources, as well as reducing the volume of smog forming emissions and greenhouse gases. This also results in direct cost savings on fuel purchases.

Option: Use Long Life and Wear Performance Tires

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

Some tires are designed to minimize wear and therefore to last longer. This lessens the frequency with which new tires must be purchased, thereby reducing the amount of petroleum, energy and other resources that must be used in tire manufacturing and reducing costs.

Option: Recycle Tire Material

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

Many sustainability impacts can be reduced by appropriately recycling a tire at the end of its useful life. The largest single recycling/reuse market for scrap tires is ground rubber used in rubberized asphalt. Other uses for scrap tires include:

- Chipped tires – can be used when building over soft ground or compressible soil, or as backfill for retaining walls.
- Ground rubber – can be recycled into rubber products such as highway noise barriers, flooring material, and playground surfaces.

Saskatchewan has an excellent network of tire recycling facilities run by the Saskatchewan Scrap Tire Corporation.

Arriving
at the currently preferred options

1. Identify the service

Tires are necessary for the operation of vehicles to provide the service of transportation. The performance of a tire can affect the length of a vehicle's useful life, fuel efficiency, and passenger safety.

2. Assess the need

The University of Saskatchewan requires the ability to safely transport people and goods to, from and within the campus.

3. Identify the contents

Tires are categorized into two types: radial and bias ply. Radial tires are constructed in such a way that the belts, to which the rubber and tread are attached, are radial to the cross section of the tire. This designs means that radial tires deform less than bias ply tires when rolling, which in turn causes them to heat less, wear out more slowly, and provide higher gas mileage. Radial tires are appropriate for use on paved surfaces and for wheels less than 19 inches. Bias ply tires are constructed so that the belts are wound on a bias to the cross section of the tire. They provide much greater sidewall strength than radial tires and are most appropriate for off-road use or where travel is frequently "over curb." Bias ply tires are typically better suited for high impact uses.

Rubber is the basic component of a typical passenger car tire. Although these products are made of hundreds of materials, natural and synthetic rubbers represent a substantial portion of the tire.

- **Natural rubber** is still an indispensable material for the tire industry, which consumes a majority of worldwide natural rubber production. Latex, the base substance of natural rubber, is collected by tapping the rubber (hevea) tree.
- There are a wide variety of formulations for **synthetic rubber,** developed during wartime to offset a shortage of natural rubber. Synthetic rubbers are made of **elastomers** that are derived from petroleum, and that make it possible to improve certain tire characteristics, particularly grip quality and service life.

Reinforcements provide the structural framework and help extend the service life of a tire. Both metal cords and textile cords are used. The metal cords are typically made of steel while the textile cord reinforcements are commonly made of rayon, which is derived from the cellulose fibre in wood.

The interaction of reinforcement fillers with the elastomer chains in rubber is a major factor in tire performance, particularly in areas such as rolling resistance, grip, and length of service life. Carbon black and silica are two common reinforcement fillers. **Carbon black** is obtained by the combustion or partial thermal decomposition of natural gases or heavy hydrocarbons. Combining **silica** with synthetic elastomers makes it possible to develop

continued on page 3 . . .

tires with both low rolling resistance and good grip on cold surfaces without losing their resistance to wear.

4. Identify sustainability impacts

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

- The vast majority of vehicles used today rely on the combustion of fossil fuels. Tire performance affects the vehicle fuel economy, so purchasing decisions about tires have a direct impact on the amount of fossil fuels used by vehicles. The combustion of fossil fuels leads to an increase in concentration of substances extracted from the earth crust in nature (e.g. CO2, CO and SOx) and contribute to a number of negative effects such climate change and acid rain, as well as associated negative human health impacts.
- Fossil fuels are also combusted to provide energy during the extraction of raw materials, transportation, production, and installation of tires.
- In the course of their use, tires experience abrasion and wear from extensive contact with the road surface. The tire abrasion is first spread temporarily over the road surface and dispersed into nearby soil and water when it is washed off the road by rainwater. Tire abrasion is composed of rubber, carbon black, and mineral oils, all of which contain substances originally extracted from the earth's crust.
- Tires are often stockpiled, sent to landfill, or incinerated, frequently as feedstock for cement kilns. Since many of the components of a tire are materials from the earth's crust, all three disposal methods contribute to a systematic increase of concentrations of substances from the earth's crust.

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

- Many of the chemical additives in tires are persistent synthetic compounds that are not easily broken down by natural systems.
- The combustion of fossil fuels produces a number of chemical compounds (e.g. nitrogen oxides, carbon monoxide) that build up in the atmosphere.
- Tires experience abrasion and wear from contact with the road surface. Tire abrasion is composed of rubber, carbon black, and mineral oils, all of which contain substances originally extracted from the earth's crust, plus the chemical additives in the tire. While many of the organic components of the tire decompose within approximately two years, traces of many of the inorganic components (e.g. zinc oxide, cadmium oxide, lead oxide) are left behind long after.

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

- Water is required to acquire raw materials for tires as well as for their production. If the source of this water is depleted at a rate faster than nature replenishes it, the water source is degraded.
- When land disturbed in mining is not reclaimed, the extraction of inputs to tires, such as fossil fuels and virgin metals/minerals, leads to degradation of nature.
- The use of tires and vehicles requires road systems and infrastructure. Continual expansion of roads and related infrastructure physically destroys nature.
- Tires that go to landfill or are stockpiled contribute to the physical degradation of nature by displacing increasing amounts of land.

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

- A number of the compounds produced by the combustion of fossil fuels (e.g. nitrogen oxides, carbon monoxide, sulphur oxides, particulate matter) have a negative effect on human health.
- The potential incineration of tires at the end of their useful life causes releases many persistent and potentially toxic substances into nature, resulting in similar human health concerns as the combustion of fossil fuels as well as additional concerns related to the raw materials and chemical additives in tires.
- Stockpiles of tires present two additional health risks. Disease carrying pests such as rodents may live in tire piles and mosquitoes may breed in the stagnant water that collects inside the tires. Several varieties of mosquitoes can carry diseases such as encephalitis, dengue fever, and West Nile virus. Another concern is fire, as tire fires are difficult to extinguish. They also release thick black smoke and can contaminate the soil and compromise air quality.

5. Envision sustainable tires

In principle, sustainable small appliances would feature:

In principle, sustainably managed tires would be made of materials other than persistent substances that are derived from the earth's crust (e.g. petrochemicals and metals), or produced by society, unless those substances are 100% captured and reused. The production process also would not contribute to increasing concentrations of materials from the Earth's crust or materials produced by society, and would use only sustainable renewable energy that is produced in a carbon-neutral way. The process would avoid physically degrading land and ecosystems on an ongoing basis, and would not harm the health of workers, users or other people.

The tire wear that results from abrasion with the road surface means that, unless a tire is designed not to wear off on the road, recycling 100% of the materials in tires is unlikely. Therefore, a truly sustainable tire should be made with biocompatible materials so that the wear effect feeds rather than pollutes nature.

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. Retreading Tires
   http://www.retread.org/
2. Low Resistance Tires
   http://www.afdc.energy.gov/afdc/vehicles/fuel_economy_tires_light.html
3. Saskatchewan Scrap Tire Corporation
   http://www.scraptire.sk.ca/

WHISTLER

This guide was made possible through the generosity of the Whistler 2012 project, which shared its template and much of its research.