

Traveling Light: Environmentally Friendly Transportation

Canadians spend a lot of time in their cars. Some commuters are in their vehicles up to four hours everyday, and much of that time they are sitting in traffic. More than a waste of time, it is also a waste of precious resources and a source of serious pollution. In fact, no other activity produces more atmospheric smog and climate-altering carbon dioxide than driving. Almost one-third of all air pollution in Canada is a result of motor vehicles.



Of all the air pollution in Canada, 30% is from motor vehicles.

Over the past 20 years, average vehicle fuel efficiency in North America has actually declined. This is because sales of minivans and sport utility vehicles (SUVs) have dramatically increased. These vehicles are classified as light trucks, thus excluding them from the stricter fuel efficiency standards that apply to other cars.



The sales of SUVs have increased dramatically, thus lowering the North American average vehicle fuel efficiency.

Exhaust from vehicles contains a variety of pollutants. Millions of tonnes of these pollutants are put into the atmosphere every year. Some of these pollutants contribute to global climate change. And, although it is difficult to prove with certainty, many health

experts believe that air pollution, mainly from automobiles, contributes to thousands of deaths in Canada and the United States each year.

Exhaust Pollutant

Carbon dioxide - Linked to global climate change.

Carbon monoxide - From the incomplete combustion of hydrocarbons in fuel. Highly toxic to plants and animals.

Sulfur dioxide - A potent greenhouse gas, toxic to organisms. Contributes to acid rain.

Lead oxide - Present in some transportation fuels, notably diesel. Highly toxic, linked to nerve and brain damage in children.

Benzene - From spilled fuel, and incompletely burned fuel in exhaust. A known cancer-causing agent.

Soot - Tiny particles of carbon. Contributes to lung damage, allergies, some forms of cancer.

Nitrous and nitric oxide - Produced when nitrogen from the atmosphere reacts with oxygen during combustion. Contributes to smog and acid rain.

Hydrocarbons - From spilled fuel and unburned fuel in exhaust. Poisonous to plants and animals. Contributes to global climate change.

Transportation has impacts that go far beyond climate change and air pollution. Building roads and highways uses up huge amounts of land. In Canadian cities, more land is devoted to roads than anything else, including parks, residences, commercial buildings, schools, and hospitals. This land can no longer support natural vegetation or farm crops.



As cities grow, greater and greater proportions of land are typically converted into roadways.

The actual manufacture of vehicles has its own serious environmental impacts. These include all the impacts associated with the mining of metals, and the manufacture of plastics, rubber, paints, chemicals, and other substances used to make cars and trucks. Some of the most badly polluted lands and rivers are those next to automobile manufacturing plants. The same is true of places where cars and trucks are scrapped. Chemicals and oils leaking from wrecked vehicles in scrap yards are significant and serious pollutants.

Going Green: Moving Towards Sustainable Transportation

We know about many of the problems associated with traveling by cars and trucks. So what are the solutions?

Driving Less

Several studies have determined that most Canadians drive short distances—that is, most trips taken in cars are 20 kilometres or shorter. This suggests that it might be possible to greatly reduce the use of cars, especially when alternatives such as walking and cycling are available. With a little planning, many families can easily reduce the use of their vehicles by one-third to one-half. This would also save them money, by reducing both fuel use and the need for repairs.



Bicycles are one of the most efficient machines ever invented.

Better Urban Planning

There are a lot of ways cities can be designed to reduce people's reliance on vehicles. One way is to provide better quality residential areas closer to where people work. By locating parks, shops, and grocery stores right in the neighborhoods where people live, and by locating places of employment nearby, people can shop and work close to home, reducing their need for cars. Also, better public transit systems can assist people in getting where they need to go when they have to travel.

Cleaner Cars

There are excellent choices for fuel-efficient vehicles today. Some conventional vehicles, such as the Volkswagen TDI Jetta, which operates on diesel, consume less than 5 litres of fuel for every 100 kilometres of highway driving (equivalent to greater than 60 miles per gallon). Compare this with a typical minivan, which consumes 8.7 litres per 100 kilometres (32 miles per gallon). Choosing a more fuel-efficient vehicle can save on both expenses and environmental impacts each year.



This Volkswagen sedan half as much fuel as many other vehicles of similar size and weight.]

Some new car models contain hybrid engine systems. These vehicles have both gasoline-powered engines and electric motors. The advantage they have over



The Honda Insight, with its hybrid drive system, uses only 3.3 litres of fuel every 100 kilometres (86 miles per gallon).

straight gas-powered vehicles is that their gasoline engines run only when necessary, mainly to supply extra power during acceleration and on long trips. The rest of the time power is provided by pollution-free electric motors.

Renewable Energy for Transportation

The photo below shows an experimental car that is powered solely by the sun using photovoltaic panels. It requires no fuel and produces no exhaust. The only trouble is that it doesn't work at night!

It is unlikely that the average family car will be powered directly by the sun. This is because cars require more energy than solar cells can normally provide. So does this mean that renewable energy is out of the question for transportation? Not at all!



Sunlight powers this experimental single-occupant car, but would be impractical for fueling a family vehicle.

University of Alberta Solar Vehicle Project.

Hydrogen

One of the most promising developments in transportation technology is the hydrogen fuel cell. A fuel cell is a device that combines pure hydrogen



Hydrogen fuel cells provide large amounts of electricity for powering vehicles without producing any pollution.

Daimler Chrysler.

with oxygen from the atmosphere to produce electricity, but with no pollution. The electricity is used in powerful electric motors that drive the wheels of the car. A hydrogen-powered car is quiet to drive and pollution free.

While hydrogen fuel cells themselves do not emit pollution, making the hydrogen they run on does. Currently, hydrogen is made from natural gas in a process that releases carbon dioxide. Only when hydrogen can be made in large quantities from water using solar or wind power will it be a truly clean fuel.

Biodiesel

Diesel is a common transportation fuel made from petroleum, a non-renewable resource. "Biodiesel" is similar, but is made from oil-bearing grains such as canola. To make biodiesel, used vegetable oil from fast food restaurants is filtered, treated with chemicals, and separated. The clear, oily liquid smells a bit like French fries when it is burned in the car. The vegetable oil is a renewable resource, provided the crop from which it comes is grown sustainably.



Biodiesel vehicles are powered by a fuel produced from used vegetable oil.

<http://www.mauibiodiesel.org/friends.htm>

Ride the Wind

In Calgary, Alberta, when you ride the "C-Train" public transit system, you are literally "riding the wind." The electricity used by the City of Calgary to power the C-Train comes from wind turbines located south of the city. The operation of the C-Train does not use any coal, oil, or natural gas—only the energy of the wind.



Calgary's C-Train is powered by non-polluting wind energy.

City of Calgary.

Summary: Making transportation more sustainable

Until we are using only renewable energy to power our vehicles, we will have to live with fossil fuels and the pollution that is produced from burning them.

However, there are ways we can drastically reduce our need for fossil fuels in transportation. These include

- making greater use of public transit and carpooling
- choosing to live closer to work and stores
- using bicycles and other non-motorized transportation when possible
- planning and building communities that minimize roads and maximize green spaces, placing residences in close proximity to stores and places of work

World Wide Web

Pembina Institute:

<http://www.climatechangesolutions.com>

Natural Resources Canada:

<http://oee.nrcan.gc.ca/vehicles/home.cfm>

Contact us: education@pembina.org

Notes:

Questions

1. *Despite the fact that hydrogen fuel cells emit no pollutants, why is hydrogen not currently considered a totally clean fuel or source of renewable energy?*
2. *City suburbs and "bedroom communities" create serious problems for urban planners trying to minimize the need for high-volume freeway systems. Why?*
3. *Describe four ways automobiles cause negative impacts on the environment.*
4. *Most commuters in Canadian cities drive vehicles to work. Often they are the sole occupant in their car. How could cities encourage more carpooling?*
5. *Why is biodiesel considered a renewable resource? What advantage does it have over the petroleum-based diesel it replaces?*