

MAKING MONEY BY GOING GREEN

Introduction

Focus

North Americans seem on the verge of embracing a green culture—the understanding that dealing with climate change is not an option, but a necessity. This *News in Review* story looks at the economics of climate change: the potential costs of bringing climate change under control and the economic advantages to companies that do so.

Quote

“Carbon dependence has eroded our economic power, destroyed our moral authority, diminished our international influence and prestige, endangered our national security, and damaged our health and landscapes. It is subverting everything we value.” — Robert F. Kennedy Jr., commenting on U.S. energy dependency (*Vanity Fair*, May 2008)

We may finally be at a breakthrough point in the battle against greenhouse gases.

To date, North American (and especially U.S.) environmentalists battling to develop measures to lower levels of carbon dioxide in the atmosphere have largely fought on the grassroots level, encouraging individuals to personally find ways to lower their own carbon footprints. Federal governments in both Canada and the U.S., however, have been reluctant to enact tough measures to enforce emission limits. Both governments have argued that deep cuts would have too great an impact on the nations’ economies. Unfortunately, grassroots efforts, while desirable, cannot solve the problem on their own.

The problem of dealing with global warming is far more complicated than any environmental problem with which we have previously dealt. It is much bigger in scope and involves almost every country in the world.

“Even if every household in the U.S. screwed in an energy-efficient light bulb today, the savings in greenhouse gas emissions would be wiped out by fewer than two medium-sized coal plants – the kind of plant that is being built in China at the rate of one a week,” writes Colin Campbell in *Macleans* (April 7, 2008). “If everyone in North America started driving hybrid cars tomorrow, it would contribute just a fraction of the overall reduction needed to cut global emissions

50 per cent by 2050—a minimum target scientists widely agree we must meet.”

Fortunately, all three major presidential candidates in the 2008 U.S. election process are proponents of a cap-and-trade system to place a limit on carbon emissions in the United States, and to significantly reduce them by 2050. A bill is currently before the U.S. Senate proposing such a plan. And a strong initiative in this area by the U.S. will likely encourage Canada to take similar measures.

On a truly positive note, many corporations in both Canada and the U.S. have been anticipating government measures to put a price on greenhouse gas emissions and have taken steps on their own. As we shall see in the video and other sections of this guide, they are finding ways to reduce their own emissions and to help individuals and other corporations to do so as well. In other words, for innovative companies, global warming is as much an economic opportunity as it is a challenge.

Booming economies in developing countries will place yet more demand on traditional energy sources, even as they become scarcer and more expensive. Enterprising corporations in Canada and developed countries, working to develop new, energy-efficient technologies, will likely find themselves with huge new markets.

Going green can be the key to making even more green (money).

For Discussion

It is generally conceded that the U.S. and at least parts of Canada are now in an economic recession. How might a recession or a stagnating economy affect the battle to bring greenhouse gas emissions under control? What might environmentalists do to keep the issue an important one in the public eye?

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Video Review

Answer the following questions in the spaces provided. The questions are grouped to assist you in answering them.

1. Between 1990 and 2005, by what percentage did Canada's greenhouse gas emissions rise? _____ %
2. By what date does the federal government hope to reduce greenhouse gas emissions by 20 per cent? _____

Geothermal Energy

3. How long will it take for the Burlington, Ontario, homeowners to recover their investment in geothermal energy? _____
4. What percentage of Canadian homes is now using geothermal energy? _____ %
5. Compared with straight electric or oil systems, what percentage of greenhouse gases does a geothermal system produce? _____ %
6. What nation gets almost all its power from underground volcanic activity?

Paper Production

7. What makes Minas Basin Pulp and Power unique as a paper producer?

8. In addition to the source of raw material for paper production, what other features make this company especially green in the following areas?
 - a) Hydro _____
 - b) Heat Use _____
 - c) Fuel Sources _____

Zenn Electric Cars

9. What is the biggest problem faced in Canada by the Zenn electric car?

10. In what traffic conditions is the Zenn designed to operate?

11. Why does Transport Canada want to keep the Zenn from mixing with other traffic?

12. What province already allows low-speed vehicles to operate in mixed traffic?

13. What other province seems likely to do so soon?

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A Huge Challenge

Quote

"Green is everywhere, and the message behind it is as simple as it is attractive: change your day-to-day habits, consume less, and for a small price, you can save global warming. The only problem with it is this: you can't. In fact, you can't even come close."
— Colin Campbell, *Maclean's*, (April 7, 2008)

Did you know . . .

Canada's overall record to date is a poor one indeed. When Canada signed the Kyoto Protocol, it pledged to reduce its greenhouse gas emissions by six per cent below 1990 levels by 2010. The country now proposes to lower its emissions to 20 per cent below 2006 levels by 2020. Meanwhile, 2008 levels are 30 per cent higher than those in 1990!

There are very few people left who would argue that global warming is not one of the most serious issues facing the planet.

We are all aware of the basic facts:

- The planet is rapidly growing warmer.
- Human activity is responsible for a good part of this rapid warming, thanks to the emission of greenhouse gases.
- Greenhouse gas emissions are likely to double in just 21 years.
- We will have to take drastic action in order to stop—or at least slow down—climate change.
- Failure to deal with this issue will likely result in an increase in drought, storms, and violent weather in some of the most vulnerable areas of the planet.

As a result of this awareness, many individual Canadians are taking steps to reduce their environmental footprint and becoming more "green." This grassroots environmentalism has become a central part of the effort to reduce and control global warming.

In the April 7, 2008, issue of *Maclean's* author Colin Campbell examined the issue of global warming and what steps will be required to meet the challenge. His conclusion is sobering: it will take a lot more than individual efforts to make a real change.

"Fixing global warming requires nothing short of remapping energy infrastructures and economies all around the world," writes Campbell. "Instead what we're doing is reducing ecological footprints with light bulbs, awareness campaigns, and carbon offsets for the environmental sins of buying books and putting up Christmas lights."

Increased Demand

Most environmental scientists now argue that the minimum target we must meet by 2050 is a 50 per cent reduction in greenhouse gas emissions. This reduction has to take place at a time where energy demands, especially in developing countries, will be rapidly growing. Current trends indicate that worldwide energy use will rise over 50 per cent by 2030. China and India are expected to account for 45 per cent of this growth.

The International Energy Agency (www.iea.org), based in Paris, calculates that meeting this target requires that, worldwide, *all* the following new energy sources must come into operation:

- 30 new nuclear plants
- 17 000 wind turbines
- 400 biomass power plants
- 2 huge hydroelectric dams (the size of China's Three Gorges Dam)
- 42 coal or natural gas plants with carbon-capture technology.

Not only are all these new sources required, but they would also have to be built *every* year from 2013 to 2030.

To understand the stress that growth in developing countries will add to global warming, one need only look at the example of China. In 2008, China is expected to pass the U.S. as the world's largest emitter of greenhouse gases. About 70 per cent of China's energy is supplied by coal, the worst fuel for producing greenhouse gas. From 2007 to 2020 the country plans to spend another \$128-billion on coal-based fuels.

Quote

"There is now a growing awareness that global warming is really a fundamental economic dilemma: how to make it more expensive to emit carbon dioxide while dramatically reducing the costs of new, alternative energies to serve the world's growing needs."

— Colin Campbell, *Maclean's* (April 7, 2008)

An Economic Issue

Solutions to the global warming crisis are increasingly seen as economic ones. The most effective solutions require the involvement of governments—and some drastic approaches:

- Carbon emissions must be capped, and emitters charged for exceeding those caps.
- Trading schemes must be developed so emitters that are well below their caps can sell their credits to those who exceed their caps.
- Huge public investments in research and development need to be made on clean energy resources.

Analysis

What do you think of the work of the organization 350.org, which is described below? Be specific.

Some organizations do attempt to give grassroots environmentalism global clout. For example, scientists believe that the safe limit of CO₂ in the atmosphere is 350 ppm (parts per million). We are currently at about 380 ppm. The organization 350.org seeks the help of ordinary individuals to meet its goal: "We want to take this number, 350, and spread it all over the world. We want every human, if they know nothing else about global warming, to know that 350 represents safety. We want to use protest and music and art and video and the net to make that number inescapable, ubiquitous. Everywhere. If we do, it will help move the international negotiations in that direction—our target is the international community, which is spending the next 18 months negotiating a follow-up to Kyoto. We may not get another shot at this, so let's get to work on spreading 350." You can visit this group at www.350.org.

North America has been slow to act on this issue—and federal governments in Canada and the U.S. continue to express their reluctance. Europe, however, has a cap-and-trade scheme that sets compulsory limits. In Canada, only British Columbia has placed a price on CO₂ emissions—but these apply to everyone, with no loopholes. Current charges are \$10 per tonne; these will rise to \$30 per tonne in 2012.

In the "Responses" section (page 48), we will look more closely at the key methods governments must use to ensure a drastic reduction in emissions from fossil fuels—and the one country that is critical to any successful reduction.

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Responses

Quote

"The U.S. produces nearly a quarter of the world's greenhouse gases each year and has stubbornly made it clear that it doesn't intend to do a whole lot about it." — Bryan Walsh, *Time* (April 28, 2008)

Did you know . . .

British Columbia will soon become the first Canadian province to enact legislation to place a tax on carbon emissions. For information on the British Columbia carbon tax, go to www.sbr.gov.bc.ca/individuals/Consumer_Taxes/Carbon_Tax/carbon_tax.htm.

The argument against legislated reductions in greenhouse gas levels is invariably economic.

A total of 174 countries signed the Kyoto Protocol to reduce greenhouse gas emissions. Conspicuously absent from the signers is the United States, the world's largest emitter of these gases. There is universal agreement that without significant action by the U.S., no attempt to reduce these emissions will have the necessary impact.

The U.S. government has argued that because developing countries, especially China and India, are exempt from imposed reductions, the economic cost to the U.S. is too high for them to act. However, unless the U.S. does act, there is no incentive for countries like China and India to improve their emissions output.

Fortunately, the U.S. attitude toward emissions control is changing. All three major candidates in the 2008 election process for the presidency agree that action must be taken, though they disagree on exactly what action.

Bryan Walsh, the environment writer for *Time*, presented an action plan in the magazine's April 28, 2008, issue. Noting that, while there is no comprehensive plan yet developed, there is universal agreement on the necessary components. He suggested three areas of concentration.

1. Pricing Carbon Emissions

Walsh proposes a cap-and-trade system for carbon emissions, a system that is now widely used in Europe. Under this system, the government sets carbon output limits for companies; those who emit less carbon than their legal limit can sell the credit to other companies that exceed theirs. The result is that levels of

CO₂ fall and the greener companies make more money. More money is invested in energy efficiency.

There is a proposal before the U.S. Senate that would use cap-and-trade limits and would aim for a reduction in emissions to 2005 levels by 2012, then further reduce those levels by 70 per cent by 2050. The result has been a bitter argument on the cost of such a policy. On one side, the National Association of Manufacturers says that up to four million jobs would be lost by 2030, and there would be an annual loss of \$669-billion in the Gross Domestic Product (GDP). But the U.S. Environmental Protection Agency predicts that the cost would be no more than one per cent less growth in GDP between 2010 and 2030.

2. Increasing Fossil Fuel Efficiency

Walsh points out that, largely thanks to higher energy costs, Western Europe and Japan are already far more energy efficient than North America. Energy efficiency means less energy use, which in turn means fewer emissions.

Walsh suggests that North America needs to explore methods to increase energy efficiency. This would create what he calls an "energy surge," which would reduce emissions and help buy time for the development of carbon-free alternative energy sources.

Some of the steps taken could be as simple as turning off the lights in office buildings at night (the recent Earth Hour observance worldwide demonstrated its effectiveness in saving energy). Other measures could generate big returns for investors. A USD\$170-billion investment in green buildings and more efficient automobiles, for example, could result in USD\$900-billion in savings by 2020.

Further Research

An International Monetary Fund (IMF) study has indicated that, through international co-ordination, climate change can be controlled without any serious damage to the global economy (www.enr.com/climate/article/34121).

Quote

"Think tanks and war colleges have shown that the outcome of any crisis is usually determined by one dominant global player that has the innovators who can churn out the technology, the financiers who can back it, and the diplomatic clout to pull the rest of the planet along. That player, of course, exists, and it is, of course, America."

— Bryan Walsh,
Time (April 28, 2008)

3. Creating of a New Energy System

The ultimate key to effectively cutting greenhouse gases, however, is the creation of new clean-technology energy. So far, the private sector in North America has been far more involved in this process than has the public sector. In 2007, U.S. venture capital funding put \$5.18-billion into clean-technology research—up 44 per cent over 2006.

Replacing carbon-based energy sources will not be easy. The key to the success of any of the new technologies—wind, solar, and hydrogen being three examples—involves dramatically

increasing their scale while equally dramatically dropping the cost. The effort required could equal or exceed that needed to put the economy on a war footing in the Second World War. It will also require a huge investment in research, involving enormous amounts of public as well as private funds.

Walsh estimates that the cost of this battle to develop clean energy could be as much as two or three per cent of the U.S. GDP. Failure to rise to the challenge, however, could very possibly result in the end of global prosperity.

For Discussion

1. Walsh's arguments are aimed at the U.S. government. Should the three-part plan he outlines also be part of Canadian policy? Why or why not?
2. How might Canada play a role in influencing the U.S. government to adopt a plan similar to that described by Walsh?
3. Canada's record on emissions is fairly dismal, with a 30 per cent increase of emissions in 2008 over those of 1990. How might Canada's performance influence any U.S. decision on cutting greenhouse gas emissions?
4. In general are you optimistic or pessimistic about the chances of the world cutting greenhouse gas emissions? Explain.

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Great Green Ideas

Further Research

To learn more about these innovative ideas, visit the following Web sites: Finavera and wave energy technology at www.finavera.com/en/home, Hycrete at www.hycrete.com, PetroAlgae at www.petroalgae.com and E-Flex at www.autobloggreen.com/2007/01/07/detroit-auto-show-general-motors-e-flex-platform.

In many cases it is corporate North America that is leading the way in developing new green technologies to lower greenhouse gas emissions. Both Canada and the U.S. continue to lack a comprehensive plan for their reduction. Recognizing this, some companies have stepped in to develop new technologies to reduce environmental impact. Here are four North American examples.

Finavera Renewables

Finavera is a Canadian company with wind energy and wave energy projects in several different parts of the world. Most innovative are their wave energy projects. The technology uses what the company calls AquaBuOYs, which are positioned several miles offshore where wave energy is greatest. Each AquaBuOY is an electrical turbine, and the electrical power it creates is transmitted to shore by an underwater power line. AquaBuOYs are designed to be clustered in order “to provide clean, renewable energy for large population [centres].”

Finavera believes that wave technology has the potential to provide as much as 10 per cent of world demand for electricity—comparable to the amount provided by hydroelectric dams. For a country like Canada, with its miles of coastlines, it would seem to be a natural fit.

Hycrete

Green buildings have become one of the most important pieces in solving the climate change puzzle. Modern buildings tend to be more energy efficient and are built to have a far smaller carbon footprint than older buildings.

Significant advances are now being made in the materials used for their

construction. One product that has especially caught the attention of the construction industry is Hycrete, a liquid solution of sand, aggregate, cement, and water that is used to waterproof concrete. Normally, concrete is waterproofed through the application of an external membrane that contains harmful chemicals. This concrete cannot be recycled or reused; it has to be sent to landfills. Concrete treated with Hycrete, however, is chemical-free. Hycrete can also be mixed into roofing materials to make green roofs or used to waterproof drywall.

PetroAlgae

Florida-based PetroAlgae is an interesting company. It is attempting to respond to the world’s increased demands for biofuels, and specifically biodiesel. It uses special strains of microalgae (developed by the Arizona State University) to obtain high yields of oil that can be processed into other products, especially biodiesel.

The company notes that biofuels have become an important part of many countries’ energy mix, and that land-based crops are insufficient to meet demands. The company also notes that its “patented algae strains are not only a great natural oil source, but also capable of being used to absorb carbon dioxide from the atmosphere and contaminants from waste water.” As a bonus, the leftover material after the algae has been processed for oil can serve as a protein source for animal feed, fertilizer, or biomass fuel.

At a time when there is increasing concern that food shortages are likely being heightened by the conversion of food crops into biofuels, PetroAlgae’s efforts seem especially significant.

General Motors E-Flex

General Motors doubts that any one energy source will be developed in the near future to power all the world's vehicles. GM itself is producing some hybrid vehicles and has an electric car called the Volt nearing production.

GM believes that in the future, energy sources will be based on what is available locally. In some parts of the world the internal combustion engine will continue to be important. In others hydrogen- or battery-driven cars will be most common.

E-Flex is a platform that assumes that electricity will play some role in the powering of most future automobiles. It includes a high-power lithium ion battery that can power the car for about 64 kilometres per charge. After that, a small engine is used to provide power for an on-board generator, which in turn provides a charge for the battery.

Depending on the local fuel source, the engine would run on gasoline, ethanol, propane, natural gas, or biofuel.

Unlike current hybrid gasoline-electric cars, the E-Flex automobiles are full-time electricity driven, since all power to the engine comes directly from the car's lithium battery. Eventually, GM believes, it will be fuel cells that drive the generator. Carbon-based fuel sources will be completely dispensed with.

GM hopes to have the Volt on the market in 2010. The company notes that anyone with a 64-kilometre-per-day commute or less would never have to buy gasoline as long as they own the car. On the other hand, it would only take about a litre of gasoline to use the Volt for a commute of 200 miles. The Volt will be the cleanest (and most economical) highway-suitable automobile on the market.

Analysis

1. Which of the above ideas do you believe is likely to be the most successful in the future? Why?
2. Which of the above ideas do you think is most likely to fail in the future? Why?

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Making Green by Going Green

Further Research

For a thorough description of the Top Runner program, go to www.eccj.or.jp/top_runner/img/32.pdf.

Quote

"Corporate greening is very much about profit. Forward-looking companies are beginning to see the writing on the wall when it comes to global warming and understand that they can invest now in green technologies and in many cases save money and win customers in the short term, or pay the price later."
— Colin Campbell, *Maclean's* (May 14, 2007)

As we have seen in other sections of this guide, going green is very much an economic issue.

The U.S. and Canadian federal governments have been extremely slow to respond to international demands that they reduce their carbon footprints. The U.S. refused to sign the Kyoto Accord, arguing that it would set its own emission targets; meeting Kyoto standards would have too great a negative economic effect. Canada signed the accord, but its overall emissions have risen rather than declined, and the current government has yet to enact a comprehensive plan for controlling greenhouse gases. Ethanol production, the keystone of the Canadian government's current proposals, is being increasingly condemned by economists and environmentalists alike.

Some jurisdictions have been quick to embrace stringent standards, and their economies have been strengthened, rather than weakened. Sweden, for example, has a carbon tax of \$150 per tonne (compare that with the B.C. tax of \$10 per tonne), and a per-person Gross Domestic Product (GDP) about three times that of the United States. Iceland, formerly totally dependent on foreign fuel sources, has made itself nearly 100 per cent energy self-sufficient through a combination of geothermal and hydroelectric power. It is now ranked fourth among the most affluent nations.

In North America, California is easily the most energy-efficient U.S. state, with the toughest emission standards on the continent. California also has the strongest economy in the U.S.

So going green can also be economically advantageous, especially if the economic sector is innovative in achieving green status. Japan, for

example, is one nation that has always realized this. One of their recent major government efforts is the "Top Runner" program for energy-efficient appliances. The government rates all appliances for efficiency, and the best model then becomes the industry standard that all manufacturers must meet. The result is a permanent competition to improve efficiency standards and a competitive advantage for Japanese appliances all over the world.

Many corporations realize that reducing greenhouse gas emissions is not an option, and that sooner or later they will be required to take drastic action. Forward-looking corporations are anticipating future regulations and taking steps that will help them profit in the future.

At NOVA Chemicals near Joffre, Alberta, carbon dioxide emissions are collected and pumped underground into a nearby, aging oil field. The CO₂ is used to push otherwise-unavailable oil deposits to the surface; the CO₂ remains trapped underground. The result will be one million tonnes of CO₂ sequestered (the same as taking about 220 000 cars off the road for a year). Four million barrels of oil will also be taken from what was until recently considered a useless field.

For many years Wal-Mart was a company despised by environmentalists. It is now well on its way to being the largest purchaser of green power in Canada. The company has long-term goals: to produce no waste, to be powered entirely by renewable energy, and to be a significant retailer of Earth-friendly products. Surveys and studies have demonstrated to the corporation that this is what its consumers demand.

Further Research

For more on how NOVA Chemicals manages greenhouse gas emissions, see www.novachem.com/socialresp/docs/GHG_2007.pdf. For more on Wal-Mart's environmental policies, see www.newswire.ca/en/releases/archive/June2007/07/c9848.html. For GE's Ecomagination program, see ge.ecomagination.com/site/#vision/commitments. For PlascoEnergy, see www.plascoenergygroup.com.

Quote

"Whether for altruistic reasons or not, (companies) realize that our sort of 19th-century energy economy that we are currently running on is coming to an end," says Josh Dorner, spokesman for the Sierra Club. "It's to their advantage—to their business advantage—to start gearing up for a low-carbon economy." — www.msnbc.msn.com/id/17969124/page/2/

General Electric, convinced that high oil and gas prices are permanent, has developed a corporate program it calls "Ecomagination." It believes that high fuel prices will cause corporations and consumers to invest in efficiency and alternative energy. A General Electric product certified for Ecomagination has to offer customers both environmental benefits and lower operating costs. These products are also expected to pay back any capital investment in an average of two years or less. In 2007, GE's revenues from these products were up 20 per cent over 2006, at USD\$12-billion. GE expects this to be USD\$20-billion by 2010.

Discussion

1. Why do you think private corporations are going green faster than many governments?
2. How might you try to convince the Government of Canada to "go green" faster?

PlascoEnergy Group is an innovative Canadian company that takes garbage and turns it into energy. Plasco has built a demonstration plant in Ottawa, where it takes 85 tonnes of garbage per day (seven per cent of Ottawa's household waste) and uses it to generate four megawatts of electricity. Plasco now has a tentative agreement to build a 300 tonne plant near Red Deer, Alberta.

More and more, the international consensus is that the time has come for governments and companies to go green. As the examples above and in the video have shown us, going green is also becoming a very good way to make more green.

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Activity: Greening Your World

Part 1: Greening at Home

Going green and saving money is something that individuals can do, too. *National Geographic* recently published the first issue of a new magazine called *Green Guide*. In it they suggest seven steps—some obvious, some less so—that would save the average four-person household at least \$60 per week while they saved energy, saved water, and reduced waste. (*Green Guide* has a companion Web site at www.thegreenguide.com.) Some steps are simple; others would require more thought.

To Do

Review the list with other members of your family to determine which steps you have already taken and those that you might also take. Are there other steps you have already taken that would be good additions to the list?

1. Switch to cloth napkins (saves trees, cuts down on garbage).
2. Turn down the thermostat when you are out or in bed (reduces CO₂ and pollution).
3. Eat what you buy (the average American—and likely Canadian as well—household throws out about 14 per cent of its food purchases. The most obvious impact is on landfills).
4. Eat home-cooked food, especially avoiding fast-food restaurants (covers a multitude of sins—the meal is cheaper, no drive to a restaurant is necessary, and there is less packaging to throw out).
5. Rebalance your plate—less meat, more produce and grains (animal protein takes far more resources like water, feed and fertilizer than does vegetable protein).
6. Shorten your showers (a two-minute reduction saves 19 litres of water plus the fuel it takes to heat the water).
7. Group your errands and do them in one place at the same time (this saves on driving costs and means fewer emissions and less pollution).

Part 2: Greening at School

To Do

Is your school or school board doing everything it can to reduce its environmental impact? Here are some questions to ask the appropriate school authorities. A small group of students should take on each question and do any follow-up research deemed necessary.

1. For your computer specialist: What happens to old computers? Are they thrown in the trash, passed on to other users, or sent to computer recycling specialists? If they are sent to landfills, could they be redirected for proper recycling?

2. For your caretakers: What cleaning products are used in the school? Do they have hazard symbols on their labels? If the staff is not already using green cleaners, would they consider trying them out? (The CBC has a helpful article on green cleaning at www.cbc.ca/news/background/consumers/green-clean.html.)
3. For your principal: Does your school or school board encourage naturalizing schoolyards? How might a group of interested students plan and develop a naturalized garden at your school? (A good article on naturalized schoolyards is available at www.elements.nb.ca/theme/education/fallsbrook/edu.htm.)
4. For your cafeteria: Does the cafeteria compost food scraps and leftovers? If not, would they be willing to do so? Would they be willing to try a variety of methods, including vermiculture (using composting worms) to demonstrate to others the various types of composting available?