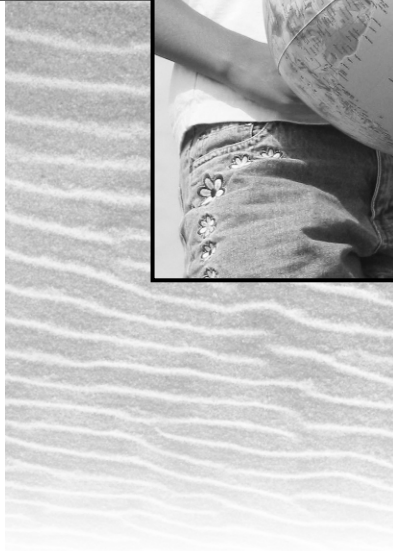
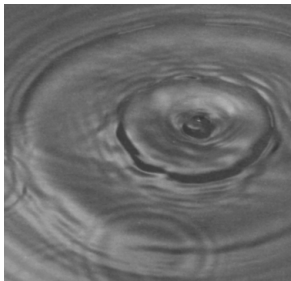


The Citizens' Guide to Pollution Prevention

P2



A PROJECT OF THE

CANADIAN INSTITUTE FOR
ENVIRONMENTAL LAW AND POLICY

L'INSTITUT CANADIEN DU
DROIT ET DE LA POLITIQUE
DE L'ENVIRONNEMENT



Since/depuis 1970

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Our mission is to provide leadership in the research and development of environmental law and policy that promotes the public interest and sustainability.



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Part I: Introduction

"You must be the change you wish to see in the world." – Mohandis K. Ghandi

The Purpose of this Guide

With the forty-year anniversary of Rachel Carson's *Silent Spring*, we are reminded that individuals can have a formidable impact on pollution prevention. The last four decades have seen many pollution prevention success stories, resulting in the reduction of several toxic pollutants in the environment (e.g., persistent organic pollutants like DDT and PCBs). We believe that Canadians can learn from and build on these successes.

The purpose of this guide is to harness the citizens' ability to prevent pollution. Citizens can prevent pollution through individual actions, consumer behaviour, and by applying pressure on industrial and commercial operations, and institutions (e.g., our governments) to practice the principles of pollution prevention (P2).

The Citizens' Guide to Pollution Prevention is designed to give citizens (you!) the knowledge to start realizing your P2 goals. And if you are already practicing P2, it will guide you to the next level, providing you with strategies to introduce the principles of P2 to your neighbourhood and work place. By understanding the principles of P2 that are applied by different industrial and commercial operations and institutions, citizens can begin to integrate those same principles of P2 into their ways of thinking and acting such as supporting sustainable production and consumption. For the reduction of significant pollution in the environment to occur, new ways of thinking about the production, transport and consumption of goods and services must take root in Canadians' awareness.

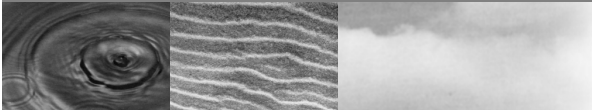
The scope of this *Guide* is toxic pollution (e.g., mercury, dioxins, volatile organic compounds (VOCs), etc.). Part VI of this *Guide* provides references to guidance information on preventing other types of pollutants like greenhouse gases (GHG: e.g., CO₂, methane). It should be noted that in many cases action to reduce GHGs also reduces toxic pollution (e.g., reduction in single occupancy vehicles will reduce both CO₂ and air pollution); however, the strategies to address GHGs are different than toxic pollution.

Why Should Citizens Care about P2?

Human Health and the Environment

Pollution affects us all. But most of all it affects the most vulnerable in our society: the young, the elderly and the poor. Pollution does not follow political or geographic boundaries, so regardless of where it was released, pollutants can end up in our soil, air, food and water. Some persistent organic pollutants (POPs) can travel thousands of kilometers, so pollution is never just someone else's problem.

Some pollutants are toxic in small quantities (e.g., low level ozone (O₃), a smog constituent) or can build up over time to levels of concern (e.g., lead, mercury). Daily, we are exposed a toxic soup of low levels of hundreds of pollutants. Scientists do not yet understand the effect of this toxic soup on our health and the health of our environment. Some scientists believe that the earth may be experiencing "a death by a thousand tiny cuts".¹



Some pollutants are endocrine disruptors (otherwise called “gender benders”) that can affect the development of a fetus, resulting in deformations and birth defects. There is evidence in the Great Lakes of these gender benders causing the feminization of amphibians and fish². The complexity of ecosystems is not completely understood and little is known of the effects of pollution on predator-prey relationships. We may not be able to completely understand the effects of pollution until well after the effects can be avoided or quickly remedied. The principles of P2 teach us that we can reduce pollution and save money by making our production and consumption of products and services more efficient and sustainable. P2 makes sense for our pocket books, our health and the health of our environment.

The Role of the Citizen: Individual Action and Catalyst for Change

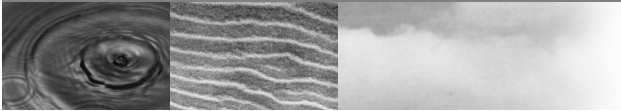
There are many pollutants that can be reduced by changes in our day-to-day activities. These include pollutants like the cosmetic use of pesticides, car exhaust, and components of household cleaning supplies. There are other pollutants that are emitted by industries and commercial operations in the production of consumer products. These are pollutants like VOCs from solvent usage in printing, surface coating and degreasing operations, flame retardants integrated into textiles and plastic products (polybrominated diphenyl ethers PBDEs), phthalates in plastic products, and dyes used in paper and textile production. Other pollutants are emitted by industries that produce energy and raw materials. Examples of these pollutants are radioactive waste from nuclear plants, emissions from waste incinerators, and byproducts from mining and smelting operations. There are also some toxic chemicals that are intentionally released into the environment. Examples include pesticides used in agriculture, forestry and aquaculture, and salt and other de-icing agents used in the de-icing of roads and planes.

Depending on the origin of the pollutant, citizens can practice P2 in a number of ways. Individual action can result in the reduction of some pollutants, and citizens can advocate for changes in industrial, commercial and institutional policies.

Harnessing Citizens’ Power to Prevent Pollution

“Never doubt that a small group of thoughtful committed citizens can change the world: Indeed it's the only thing that ever has” – Margaret Mead

Individual and community-based action is an effective way to address P2 and many other environmental issues. The *Guide* provides the necessary information for Canadians to identify pollution sources in their communities, practice P2 on a daily basis and pressure industry, companies and governments for the abatement of these emissions.



How to Use this Guide

The Guide is organized into the following 5 sections:

Part II: What is Pollution Prevention (P2)?

This section explains the basics of P2. It describes what P2 is, who the main players are and where you fit into the picture.

Part III: How Does P2 Work in the Industrial, Commercial and Institutional Sectors in Canada?

This section describes how P2 works in the industrial, commercial and institutional sectors. After reading this section you should have a good idea of the types of activities that are taking place, what sort of activities you should expect and can advocate for from industry, commercial operations and institutions.

Part IV: P2 and You!

This section is where the rubber hits the road! After reading this section you should have some tools to initiate P2 into your daily life, enhance your existing P2 activities, and advocate for P2 in your community and at work.

Part V: Conclusions and Next Steps

This section summarizes all the important points made throughout the Guide and describes some next steps for enhanced P2 activities in Canada.

Part VI: Resources

This section provides you with all the resources you need to start your P2 adventure!

¹ Professor E.O. Wilson, an evolutionary biologist, ecologist and professor at Harvard University.

² <http://www.ec.gc.ca/eds/fact/index.htm>

Part II: What is Pollution Prevention? (P2)

It might seem odd that we even have to ask the question “what is pollution prevention?” After all, everyone knows what pollution is. Everyone knows what prevention means.

Of course, we are taking the time to ask this question because there is a lot more to the idea of pollution prevention than is clear in the simple meaning of the words. Pollution prevention forces us to rethink how we do things; everyday things like washing the car, and not-so-everyday things like how we make cars.

First, let’s define pollution:

Pollution arises from human activities that put unwanted or waste substances in the environment – the air, the land, the water – that contaminate the surroundings, disrupt natural systems and make the environment less healthy for people and other living things.

Second, let’s define prevention:

Prevention is a process whereby proactive action is taken, this involves communication, planning and solving problems at the source of where they occur. Prevention also embraces the philosophy of continual improvement.

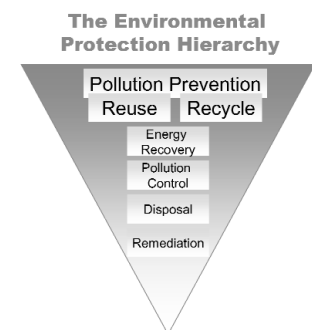
Now that we know what pollution is and what prevention is, we can look at the definition of pollution prevention.

Pollution Prevention: The use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and waste, and reduce the overall risk to human health or the environment.

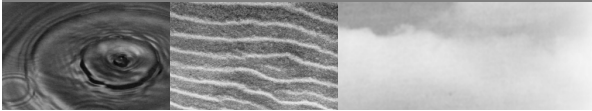
In other words, people can prevent pollution by changing how they do things, and by changing the materials they use. By making these changes you can eliminate or minimize the amount of waste you produce, which reduces or eliminates the chance that you will harm the environment.¹

Environmental Protection Hierarchy

Environmental protection activities are depicted as a hierarchy of practices, with pollution prevention at the top. Approaches that anticipate and prevent the creation of pollutants and wastes are preferred to other methods, such as treatment, re-use and recycling. The latter methods are still important in our overall environmental protection efforts, but even the best waste management practices are not the same as avoiding the creation of waste in the first place.¹



From: Environment Canada. P2 Planning Handbook, 2001:3



Pollution Prevention vs. Prevention of Pollution

Pollution prevention is more than capturing the pollution before it enters the environment: it seeks to eliminate the causes of pollution, rather than to treat the pollution once generated. It involves continual improvement through design, technical, operational and behavioral changes.

What is Not P2?

Controlling or treating pollution is NOT pollution prevention. For instance, when wastewater from homes or factories is treated, the water is cleaner, but the treatment facility is left with a sludge or by-product that must be disposed of. Another illustrative example is the use of scrubbers to clean the emissions coming out of smokestacks; the air coming out may be cleaner, but the facility is still left with dirty wastewater to dispose of. The result is that pollution and waste have been removed from the air (but not prevented at the source) and have been transferred to water (or land, depending on the outcome of scrubber waste).

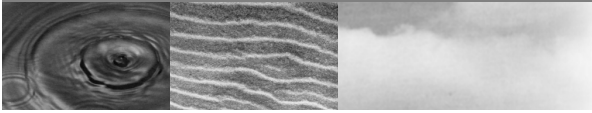
Pollution control and treatment often moves the pollution from one medium (air, water, land) to another medium. The same amount of waste is created, but we are simply moving it from one place in the environment to another. Pollution prevention aims to reduce the total amount of waste or pollutants created before they have to be treated or controlled.

In summary, pollution prevention is NOT:

- Off-site recycling
- Waste treatment or management
- Concentrating hazardous waste to reduce volume or toxicity
- Dilution of waste to reduce concentration
- Transfer of waste from one medium to another (i.e. wastewater contaminant becomes air emission problem)

Why is Off-site Recycling Not P2?

Off-site recycling still generates pollutants in the transportation of the material for recycling, and the process itself does not alter the life cycle impact of the material on the environment. For instance, off-site recycling such as sending used oil, antifreeze or other material to a separate facility for reclamation generates pollutants in transporting these substances, and does not reduce the potential impact these substances would have if released into the environment.



Highlight – Select Pollutants

Mercury

Mercury is a naturally occurring element. It is the only metal that is liquid at room temperature, and can easily change chemical states allowing it to circulate in air, water and soil. Mercury conducts electricity and expands at a constant rate in response to changes in pressure or temperature. Due to these properties, mercury has been widely used in household products – electrical switches, fluorescent lamps, old batteries, thermometers and thermostats – and has been commonly used in commercial, medical and industrial applications.

Elemental mercury is converted by microorganisms into methyl mercury, the most toxic form of mercury. Methyl mercury bioaccumulates in invertebrates and the fish that feed on them, which in turn allows methyl mercury concentrations to build up as it moves up the food chain in fish-eating mammals and other wildlife.^{2,3}

Mercury can be inhaled, ingested or absorbed through the skin, and can have severe health effects:

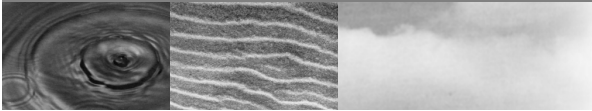
- High levels of acute mercury exposure can cause severe health problems; memory loss, heart disease, loss of vision, loss of sensation and tremors
- Accumulation of low quantities of mercury is a risk for future mothers, nursing mothers, babies and the developing fetus
- Mercury primarily affects neurological health, including the brain and central nervous system
- The kidneys and lungs are also at risk for serious damage from mercury exposure
- Methyl mercury can affect learning ability and neuro-development in children⁴

Mercury releases occur during manufacturing, when products break, and when they are disposed of in landfills, incinerators, and sewage treatment plants.

In terms of pollution prevention, the preferred option is to select alternative mercury-free products. For instance, substitute digital thermometers in place of mercury filled thermometers. In instances where no viable substitute exists, such as fluorescent lamps, use best practices. This would involve such things as selecting the product or device that contains the least amount of mercury, and also ensuring safe storage, handling, use, transport, spill response and recycling. For more tips on mercury pollution prevention please check out the resources section at the end of this Guide.

Nonylphenol (NP) and its Ethoxylates (NPEs)

Products that contain NPEs are used in many sectors including textile, oil and gas recovery and power generation. They can also be found in paints, resins and protective coatings, and pest control products. NP and NPEs are mostly used in cleaning products, degreasers and industrial detergents, as well as in several consumer products such as cosmetics, cleaners and paints. Their presence in the environment is solely a consequence of human activity.



- Many toxic effects of NP have been reported in a variety of aquatic biota, including fish, invertebrates and algae. As well, NP and NPEs may interfere with normal endocrine system function in aquatic organisms by binding to the oestrogen receptor. However, the relative importance and significance of these estrogenic responses in aquatic organisms to the individual or population are not currently well-understood.

NP and NPEs enter the environment primarily via industrial and municipal wastewater treatment plant effluents (liquid and sludge), but also by direct discharge. NP and NPEs may also enter the environment from their application in pesticide formulations.^{5,6}

Environment Canada has prepared, with stakeholder input, pollution prevention planning requirements under Part 4 of the *Canadian Environmental Protection Act, 1999* for products containing nonylphenol and its ethoxylates and textile mills using wet processes.

In terms of pollution prevention, the preferred option is to identify those products that contain NP and NPEs and substitute them for NP and NPE-free products. For example, organizations can substitute cleaning products that contain NP and NPEs with safer, environmentally-preferable cleaning products. For more tips on NP and NPE pollution prevention please check out the resources section at the end of this Guide.

Synergy between P2 and other Environmental Objectives – Sustainability, Climate Change, Sustainable Consumption

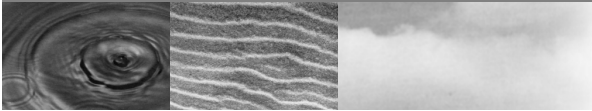
P2 and Sustainability – A Natural Fit

Our Common Future, also known as the Brundtland Commission Report, released in 1987, examined the question of how the world could maintain economic growth without seriously damaging the environment. The report proposed what is now the most popular definition of sustainability: “... development that serves to meet the needs of present generations but that does not jeopardize the ability of future generations to meet their own needs”.⁷ Every sector of society has a role to play if sustainability is to be attained.

So how do we use P2 to move towards attaining sustainability?

Pollution prevention evolved as a practical, easy to grasp concept – an industrial waste reduction strategy that focused further up the pipe, at the source of the waste. Over the years, advocates have broadened the meaning of pollution prevention to include pesticide management, energy efficiency, green transportation and product redesign, to name a few. At the World Summit on Sustainable Development in 2002, the terminology “sustainable consumption and production” was used to encompass pollution prevention activities.

Pollution prevention can play a lead role in attaining sustainability. Pollution is not only a detriment to the environment, it is also a sign of an inefficient process. P2 programs have always promoted resource conservation and production efficiencies that encourage sustainable industrial activities. Pollution prevention



is a concept that helps educate others about the principles of sustainability. Pollution prevention provides a practical set of useful tools to make corporate and community sustainability practical .⁸

Where do climate change and sustainable consumption fit in?

Many energy efficiency advocates have combated climate change by focusing solely on the energy savings aspects of their projects, and similarly, many pollution prevention practitioners neglected energy use as a pollution source. More and more, however, the synergies between these two approaches are becoming apparent. There are ways to reduce pollution while combating climate change. For instance, less energy used in the home results in reduced use of fossil fuels that contribute to greenhouse gas (GHG) emissions. GHGs trap heat in the atmosphere and increase the Earth's temperature, leading to unpredictable climate change. Less energy used also has the added benefit of reducing emissions related to smog, a leading cause of poor air quality.

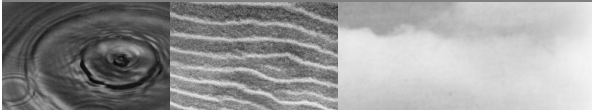
Sustainable consumption is “the use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations.”⁹ Pollution prevention is about making smart choices — both in what we buy and in how we use products. The less you purchase, the less waste and pollution you create, and the less energy and fewer resources you consume. By taking a pollution prevention approach, consumers can change their consumption patterns towards those products and services that have significantly lower impacts throughout their life cycle, thereby moving closer towards sustainable consumption.

Globally, if everyone were to consume at the rate of the average North American, we would need four Earths to sustain everyone's needs. The reality is that we only have one Earth. Many people fear that measures to scale back on our consumption will generate unemployment and inflict hardship on working people and their families. These fears are understandable, but making the transition to less wasteful, ecologically-sound ways of living will lead to an economy that generates green job growth.

Pollutants By Any Other Name

Pollution comes in a variety of forms from an array of sources. Becoming familiar with some of the common classification terms can help to reduce the risk of exposure and unnecessary harm to your health and the environment. For examples of how pollutants can affect the health of individuals, see highlight on select pollutants on page 9.

TOXIC substances are both found in nature and manufactured by humans. Toxicity is a measure of the biological strength of a poison. Some substances are only toxic if they are encountered in a specific volume or concentration; others are **LETHAL** and cause death in the smallest amount.



The dominant categories of potentially toxic substances are **ORGANIC**, **METAL** and **RADIOACTIVE** pollutants. Organic pollutants by definition contain carbon. They can be formed with natural products from plants, animals, coal and oil or synthesized artificially to produce such compounds as industrial solvents, pesticides, explosives, resins, plastics and fibers. Lead and mercury, metal pollutants, are the two most commonly found toxic metals in the home. Mercury is commonly found in thermometers while lead is common in older paints. Radioactive pollutants emit radiation (energy in the form of electromagnetic waves or moving particles) to the air, water or soil through improper disposal, accidents or explosions.

Many organic, metal and radioactive pollutants are also **PERSISTENT** pollutants. These substances are highly resistant to degradation by any means. They remain in the environment for extended periods of time and are able to accumulate in the fatty tissue of plants and animals faster than they can be eliminated. This process, called **BIOACCUMULATION**, permits persistent pollutants to be passed along a food chain from eaten to eater. Plants and animals, especially those at the top of the food chain, can contain these pollutants in harmful and lethal doses.

Pollution originates from various sources. **POINT SOURCE** pollution comes from a specific originating point – a pipe from a factory, or wastewater discharge from a treatment facility. **NON POINT SOURCE** pollutants mainly come from municipal and agricultural sources, but include a wide range of activities. These pollutants are carried by run-off and end up in rivers, streams and lakes in elevated concentrations. **AREA SOURCE** is a system used to report small pollution emissions by category rather than individual source. Examples include dry cleaners, gas stations, fuel combustion, landfills and wastewater treatment.¹⁰

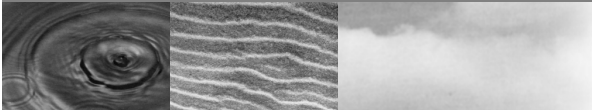
Who Contributes to Pollution Prevention?

All types of individuals and organizations whether they be governments, industry, institutions or citizens, contribute pollution to the environment. The toxicity or volume generated may vary as for some, it may be only waste paper or dirty water; for others, it may be hazardous or toxic wastes that require special handling and disposal.

Below is an overview of operations within government, industry, institutions and households that contribute to pollution and how these groups have taken leadership in pollution prevention.

Government

The Government of Canada is committed to preventing pollution and protecting the environment as it carries out all its activities. The Sustainable Development in Government Operations initiative focuses on seven priority areas of operations: Energy Efficiency/Buildings, Human Resources Management, Land Use Management, Procurement, Vehicle Fleet Management, Waste Management as well as Water Conservation and Wastewater Management.



In 2003, the Federal House in Order initiative issued a leadership challenge to all federal departments, agencies and Crown Corporations to undertake a greenhouse gas reduction program in the areas of buildings, vehicle fleets, outside emissions (i.e. employee commuting and business travel) and energy efficient procurement.

As members of the Canadian Council of Ministers of the Environment, the provincial/territorial and federal governments released the *National Commitment to Pollution Prevention* in 1993. Several provinces/territories developed formalized Pollution Prevention Programs while others have elements of P2 in their existing environmental protection programs.

Municipal governments have significant influence over the environmental well-being of Canadians through municipal responsibility for water and sewage treatment, solid waste management, land use, transit, parking and municipal roads. Several municipalities have developed municipal by-law changes towards pollution prevention in areas such as sewer use discharges (City of Toronto Sewer Use Bylaw) and pesticide reduction (Halifax Regional Municipality Pesticide Bylaw).

Industry

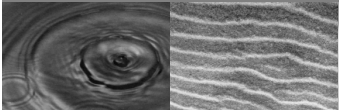
In Canada, there are several agreements between government and industry to facilitate voluntary action with a desirable outcome of reducing the generation of pollutants. The most notable agreements include those made with Canadian vehicle manufacturers, auto parts manufacturers, chemical producers, metal finishers, dry cleaners and the printing and graphics industry. These agreements address issues such as energy efficiency, smog, toxic emissions, wastewater effluents and greenhouse gas emissions.

Manufacturers of complex products, such as automobiles, aircraft, ships, electronics, and appliances, depend on a broad network of suppliers for parts and assemblies. Many of the suppliers in these supply chains are small and medium sized companies. When a company imposes environmental conditions on the products and processes of its suppliers, it is called Greening the Supply Chain.

Through the supply chain, many larger businesses are now mentoring smaller businesses in a manner that will significantly reduce the environmental impact and encourage innovation across a wider range of business activities in Canada. There is a range of opportunities for companies to green their supply chains, for example, requesting the certification of products and processes from their suppliers. Signals such as these within a large company's purchasing policies can stimulate suppliers to innovate and improve their environmental performance.

Institutions

Institutions such as schools, libraries, and hospitals are typically small quantity waste generators that have a high degree of influence in local communities. Wastes generated from schools and libraries include office paper, food wastes, laboratory wastes, and inefficient use of water and energy. These institutions are highly visible members of the community, and pollution prevention provides the opportunity to set an example for the community by establishing highly visible recycling, composting or green procurement programs.



Health care facilities generate a multitude of wastes: solid, hazardous, chemical, biomedical, and various levels of contaminated wastewater. Healthcare facilities are recognized community leaders and are powerful symbols of health. It is incompatible with the mission of health care that institutions devoted to healing be significant consumers of resources and sources of environmental harm. Thus, reducing health care's environmental impact has both a symbolic and practical significance. A number of leading healthcare facilities across Canada are incorporating pollution prevention measures in their operations (*see Canadian Coalition for Green Healthcare at <http://www.greenhealthcare.ca>*).

Citizens

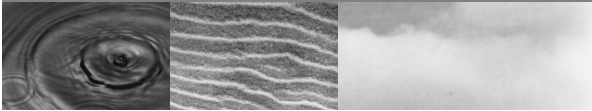
Although the quantities are very small, every citizen generates various wastes such as solid wastes (food, paper, packaging, etc.), hazardous wastes (paints, oils) and wastewater. Canadian households and businesses generated more than 31 million tonnes of non-hazardous solid waste in 2002.¹¹ Households alone produced 38% of these waste materials, on average 382 kilograms for each Canadian, which is 15 kilograms more per person than in 2000.¹²

How does that compare to other developed countries? The Organization for Economic Co-operation and Development (OECD), an international research organization, provides comparative economic and social statistics about its 30 member countries. These statistics help establish the relative position of Canada to other nations on a number of social and economic issues. In terms of hazardous waste, Canadians produce an average of 190 kilograms annually while only the United States, Hungary and Luxembourg generate more among OECD nations.¹³ Also, compared with other OECD nations, Canada's emissions of greenhouse gases per person are among the highest and Canadians rank second in the world for consumption of water per person.¹⁴

Evident in the above figures, action is needed. Community-based action involving ordinary Canadians is happening on issues such as water conservation, proper sewage disposal, air pollution, pesticide use, oil spill prevention, wood stove purchasing, vehicle idling and personal transportation choices.

When buying products, consumers should look for eco-labels such as Environmental Choice™ and Energy Star™. These labeling programs are helping individuals make informed purchasing decisions on products such as appliances, cleaners, electricity and paints, with the end objective of reducing their environmental impacts.

Mobility and convenience are two words that come to mind when thinking about personal transportation. Choosing to own a personal vehicle certainly achieves mobility and convenience. The choice of owning a car also comes with environmental responsibility. Driving a personal vehicle produces high volumes of GHGs from fuel combustion. Choosing a fuel-efficient vehicle that suits your everyday needs can reduce GHG emissions by up to one tonne a year. Driving just 10% less by choosing services close to home or work, carpooling, walking, cycling and using public transportation reduces your GHG emissions, and saves time, money and fuel. Having a fully tuned vehicle with correct tire pressure uses up to 50% less fuel and therefore produces 50% fewer emissions.



Highlight – Economic Sectors

Agriculture – Hog Farms

The mention of hog farms immediately brings thoughts of bad odour and tonnes of waste manure. Hog farms are an important part of the agricultural economy of Canada, and therefore need to operate with as positive a public perception as possible. The Canadian Pork Council together with the Canadian Standards Association have developed a federal standard (CAN/CSA Z771) for all types of hog operations in Canada. This standard outlines how hog operations can be improved to protect the environment.

Hog operations are also typically involved with fertilizer, pesticide and petroleum handling and storage, as well as the creation of dust. Mishandling and poor management can lead to spills and effluent being released to the water, soil and air in toxic concentrations. To avoid and minimize these events there are several regulations in the federal *Fisheries Act, 1985* and the *Canadian Environmental Protection Act, 1999* that apply to hog operations.

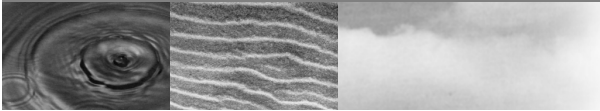
With the new standard it is now easier for hog operators to comply with the pre-existing regulations by identifying areas for improvement. The benefits achieved from a thorough examination of the practices and protocols of hog operations are numerous. Better awareness, understanding, control, monitoring and correction of pollution problems results in significant environmental improvements leading to better compliance, less clean-up, a positive public image and a healthier environment.

P2 in Canada

Introduction to the *Canadian Environmental Protection Act, 1999* (CEPA 1999)

The shift to pollution prevention began in Canada in the late 1980s with the introduction of the *Canadian Environmental Protection Act, 1988* (CEPA 1988). CEPA 1988 was the first piece of Canadian legislation that recognized the necessity of moving from what was primarily an end-of-pipe, control oriented approach to more preventive means of environmental protection.

In March 2000, the Government enacted a renewed and stronger *Canadian Environmental Protection Act, 1999* (CEPA 1999) with pollution prevention as the cornerstone. CEPA 1999 gives the government new powers to require pollution prevention planning for substances declared toxic under the Act. The tools provided by CEPA 1999 include new measures such as pollution prevention planning requirements, and range from regulatory action to voluntary instruments. The mandatory review of CEPA 1999 in 2005 will provide an opportunity to review progress, identify where modifications are warranted and identify opportunities for improvement.



CCME Commitment to P2

Within Canada, federal, provincial, territorial, municipal and Aboriginal governments share jurisdiction for the environment. The Canadian Council of Ministers of the Environment (CCME) is comprised of environment ministers from the federal, provincial and territorial governments. Its mandate is to improve environmental protection and promote sustainable development in Canada.

In 1993, the CCME contributed to the evolution of pollution prevention in Canada by releasing a *National Commitment to Pollution Prevention*. In May 1996, the CCME again addressed pollution prevention by releasing *A Strategy to Fulfill the CCME Commitment to Pollution Prevention*. This strategy sets out a shared vision, mission and goal statement as well as guiding principles for the implementation of pollution prevention by all provinces, territories and the federal government.

Other Policy Initiatives

The federal government's *Toxic Substances Management Policy* (TSMP) puts forward a preventive and precautionary approach to deal with substances that enter the environment and could harm the environment or human health. It provides decision makers with direction, and sets out a framework to ensure that federal programs are consistent with the objectives of the TSMP. This policy underscores the need to apply pollution prevention principles to programs administered by the government to reduce or eliminate the risks associated with toxic substances.

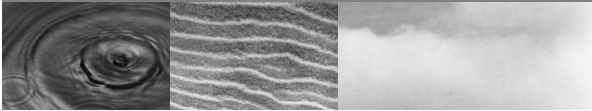
Another Environment Canada program is the National Pollutant Release Inventory (NPRI), which tracks and provides Canadians with access to information on the releases and transfers of key pollutants and related pollution prevention activities by industrial and commercial facilities located in their communities. Beginning in the 2002 reporting year, the NPRI reporting form now asks facilities to report on their pollution prevention planning activities. The promotion of pollution prevention through a mix of regulatory and non-regulatory means will continue as P2 entrenches itself as the environmental protection strategy of choice in Canada.

The Benefits of P2

More Economic and Efficient Production

Pollution really is just waste, and waste is expensive. Waste is something that you had to pay for at some point, and now you can't use. It costs money to take waste away. It costs money to store waste. And wastes, such as what's found in the landfill, continue to take their toll on the environment by, for example, leaking pollutants into water tables and emitting greenhouse gases such as methane.

Production methods that reduce the amount of waste generated mean that more raw materials are put to good use, and less waste needs to be hauled away, treated, transported and stored somewhere where it may damage the environment for years to come. In the Canadian Printing Industry there are many examples of



companies across the country taking the lead on waste reduction. Process modifications such as eliminating the use of solvents in pressroom clean-up routines, using electronic imaging to eliminate the need for film and film developing solvents, reusing inks, and training staff are just some of the ways companies are avoiding the generation of waste. Depending on the size of the company, savings from reduced purchases and reduced need for disposal and waste handling can range from just a few hundred dollars to many thousands of dollars.

The Benefits of Pollution Prevention (P₂)

As all good solutions to serious problems do, pollution prevention creates many benefits.

The Benefits of Pollution Prevention:

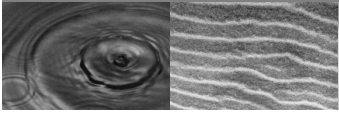
- *Minimizes or avoids the creation of pollutants*
- *Avoids the transfer of pollutants from one medium to another*
- *Accelerates the reduction and/or the elimination of pollutants*
- *Minimizes health risks*
- *Promotes the development of pollution prevention technologies*
- *Uses energy, materials and resources more efficiently*
- *Minimizes the need for costly enforcement*
- *Limits future liability with greater certainty*
- *Avoids costly clean-up in the future*
- *Promotes a more competitive economy*

From: The Canadian Council of Minister of the Environment, 1996

Reduced Impacts on the Environment

Waste is not always hauled away. Sometimes it enters the environment by escaping up a smokestack, or by being dumped into water. Air and water pollution cause many problems: smog, acid rain, closed beaches for swimming, lung-related health problems and climate change. Hormone-mimicking chemicals from processing plants and farm run-off disrupt endocrine systems, and can cause deformities in aquatic animals and birds.¹⁵

Reducing or eliminating emissions to the air and water by pollution prevention creates the benefit of reducing these and other impacts on the natural environment. Green dry cleaning operations have found unique ways to eliminate or greatly reduce the use of the hazardous air pollutant Perchloroethylene (Perc). Improved operating and maintenance procedures, more efficient equipment and a range of alternative cleaning products and methods result in less employee exposure to this toxic compound and fewer emissions to the environment.



Elimination of Toxic Emissions

The most serious form of pollution is toxic pollution which poses the greatest threat to the health of ecosystems and people.

Pollution prevention sets everyone the challenge to remove toxic substances from the things they do and make, either by using a non-toxic substitute, or by changing the process so the toxic material is no longer required. Prior to 2003 many vehicles manufactured in North America came with mercury containing light switches installed under the hood or in the trunk. Automotive recyclers traditionally crush vehicles without removing the mercury switches thus releasing the mercury into the environment. In Canada there are between 13 and 15 tonnes of mercury in vehicles on the road.¹⁶ Car manufacturers now use alternative light switches not containing mercury in their vehicles. This is a first step in making vehicles on our roads mercury free.

Why More Organizations Aren't Implementing P2

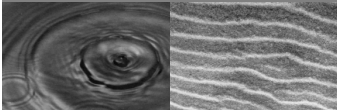
Here are some common barriers to pollution prevention that organizations face:

- **Economic:** A business case may need to be made where P2 measures require capital investment.
- **Administrative:** Without full and visible management support a P2 program or measure may have limited success.
- **Operational:** Implementation of P2 measures often requires time, technical expertise, money and personnel, all of which are in short supply.
- **Regulatory:** The activities of some organizations are not subject to regulations and therefore do not receive priority amongst management.

Overcoming Barriers to P2 – How you can bring about change

Although the benefits for pollution prevention are evident, implementation can be inhibited by certain barriers such as a general lack of concern or awareness. Engaging co-workers, colleagues, friends, and family in a discussion about pollution prevention is an important first step to positive change. The following are tips on what can be done to overcome common barriers and will help you to motivate others while avoiding potential conflict.

Obtained Information: Many organizations and individuals are skeptical about the potential benefits of pollution prevention. Become informed about the basic issues and always be ready to refer interested people to relevant books, websites, government offices and environmental organizations. In circumstances where pollution prevention measures require time and capital investment, be prepared to outline a business case highlighting long-term savings.



Develop Partnerships: Skeptics who are resistant to change will be difficult to deal with. Focus on the interests and concerns you share as a means to build respectful and productive relationships. For pollution prevention to work, people will have to look at the way they do things with a fresh eye. Forget that “it’s always been done that way.” You have to be willing to experiment a bit to get the kinks out, and test new ways of doing things.

Set Realistic Goals: Taking on too much at once may doom your momentum from the start. Set a goal and pace yourself. Try simple options first. As you gain experience and have some successful projects under your belt, look at more difficult options.

Build Support: Believe it or not, many people and groups share your interest and concerns. Joining forces with others results in shared knowledge and skills and intensified moral support. At the workplace, you can demonstrate management support by developing a written company policy on pollution prevention, setting goals for reducing waste, and publicizing and rewarding success.

If you are aware of the barriers and plan for them, your chances of preventing pollution will be greater.

¹ *Canadian Environmental Protection Act, 1999*

² *Pollution Probe. 2003. Mercury in the Environment. From: <http://www.pollutionprobe.org/Reports/mercuryprimer.pdf>*

³ *Environment Canada, Ontario Region. Pollution Prevention Fact Sheet #21. From: <http://www.on.ec.gc.ca/pollution/fpd/fsheets/4021-e.html>*

⁴ *Environment Canada. Mercury in the Environment. From: <http://www.ec.gc.ca/MERCURY/EN/index.cfm>*

⁵ *World Wildlife Fund. Nonylphenol Ethoxylates Briefing. From: <http://www.ngo.grida.no/wwfneap/Publication/briefings/Nonylphenol.pdf>*

⁶ *Environment Canada, CEPA Registry. Backgrounder: Nonylphenol Ethoxylates. From: http://www.ec.gc.ca/CEPARegistry/subs_list/NPE_BG.cfm*

⁷ *World Commission on Environment and Development, 1987*

⁸ *Geiser. K. (2000). The Role of Pollution Prevention in Achieving Sustainability. Lowell Center for Sustainable Production. Lowell, MA.*

⁹ *Symposium-Sustainable Consumption. Oslo, Norway: January, 1994.*

¹⁰ *Canadian Centre for Pollution Prevention. 2001. Pollution Prevention Program Manual: P2 Planning and Beyond.*

¹¹ *Statistics Canada. 2004. Waste management industry: Business and Government Sectors (The Daily, June 16, 2004).*

¹² *Ibid*

¹³ *Organization for Economic Cooperation and Development (OECD). 1999. Canada vs. the OECD: An Environmental Comparison (Downloaded at: <http://www.environmentalindicators.com>).*

¹⁴ *Environment Canada. 2004. EnviroZine Magazine (Downloaded at: <http://www.ec.gc.ca/EnviroZine>).*

¹⁵ *“The main effects of organochlorine contaminants are now thought to occur in the offspring of exposed individuals across a variety of species (Bishop et al. 1991; Wren 1991; Fox 1993), including humans. The observed effects in various species are thought to be the result of the ability of organochlorines and some other chemicals to modulate, mimic, or block activity of naturally occurring estrogen and androgen hormones (Colborn and Clements 1992; Colborn et al. 1993).” Environment Canada, The State of Canada’s Environment—1996.*

¹⁶ *“Mercury In Vehicles”. Clean Air Foundation Website. Retrieved on January 20, 2005 from: http://www.cleanairfoundation.org/switch_out/html/e_switchout_hgvehicles.asp*



Part III: How Does P2 Work in the Industrial, Commercial and Institutional Sector in Canada?

This section will describe the steps organizations follow to achieve pollution prevention. There are various means to achieve pollution prevention – P2 programs, P2 audits/assessments, P2 projects and P2 planning. For the purposes of this section, P2 planning will be highlighted. Various tools that organizations use to address environmental performance are highlighted as well. Finally, included are a number of pollution prevention success stories. They describe what was achieved by practicing pollution prevention.

The Elements of P2: Information and Action

There are three important parts to every pollution prevention plan: obtaining commitment, information gathering, and action.

The value and importance of management commitment to pollution prevention planning cannot be overestimated. Information is very important to pollution prevention. Organizations seeking to make changes that will improve environmental performance need to know what substances and processes they are using, costs, relevant legal requirements, community concerns, and the purpose the substances serve and the results they achieve. They also have to know what happens to substances during and after their use: how much of the substance is used, how much is left over as waste, where does the waste go, and so on.

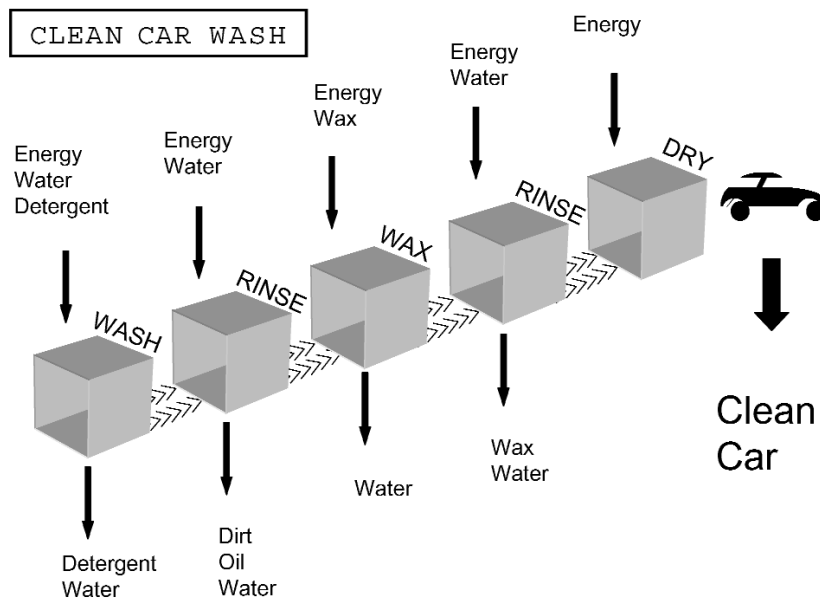
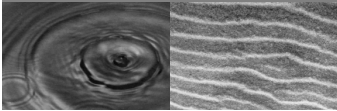
Without this information, it will be difficult to demonstrate to senior management that pollution prevention opportunities exist. Information also serves as a basis for demonstrating success, progress and accomplishments of the pollution prevention program.

Developing a Pollution Prevention Plan

A pollution prevention plan is an organized, comprehensive and continual effort to reduce or eliminate pollutants and wastes at the source, throughout an organization or at a specific facility. Pollution prevention planning varies between facilities. However, all pollution prevention plans have several key elements in common such as planning, budgeting, resource allocation, implementation, monitoring and evaluation.

Step 1: Creating Organizational Commitment to P2 and a Dedicated P2 Team

For P2 plans to be successful, an organization needs strong commitment from senior management and a dedicated team. Senior management support is needed to ensure that pollution prevention becomes an organizational goal and that appropriate resources are allocated. P2 plans work best with participation and commitment from people at every level of a company: senior executive, management and staff. Organizations select a champion from each of these groups to comprise the P2 team.



Step 2: Baseline Review

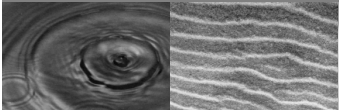
Every P2 plan begins with a baseline review to understand an organization's most significant sources of pollution and waste. The review focuses not only on toxic and hazardous materials used in or produced by in-facility processes, but on facility-wide processes themselves. The P2 team takes an inventory and draws a big picture of a facility's input and output. The data collected during the review will help to establish priorities for the P2 program. An example of a process flow diagram, a key component of the baseline review, for a car wash facility is illustrated in Figure 1. Eco-mapping is another type of tool which is a visually creative process of "scanning" environmentally relevant topics and practices directly on the "shop-floor" of a small business. This tool would also be helpful in a baseline review.

Step 3: Initiate planning

Once the review has been completed, the P2 team identifies priority sources of pollution, assesses priorities, establishes objectives/targets and develops a set of possible pollution prevention options. The next phase involves evaluating each option based on technical, environmental, economic, social and corporate criteria. Criteria for setting priorities range from "what is obvious" to "what are the substances of greatest concern". Obvious choices for priority action are regulated substances or those identified for future regulatory initiatives such as the *Canadian Environmental Protection Act, 1999* – Toxics Substances List.

Step 4: Set Goals/Timelines and Implementation

Once planning activities have been established, the P2 team sets implementation goals and timelines, assigns responsibilities and allocates resources for achieving the goals. Quantifiable goals are preferable because they are specific, measurable and provide a clear guide for the program's expectations. The goals can cover areas such as waste quantities and waste toxicity reduced, waste reused or cost savings. Once in place, the team



implements the changes required to meet the goal in the given time, including implementation strategies such as training and integration with existing systems.

Step 5: Measurement and Communication

Another important task of the pollution prevention team is to measure the progress and success of the pollution prevention program. As the result of leading legislation such as the City of Toronto's Sewer Use Bylaw and Part 4 of the *Canadian Environmental Protection Act, 1999*, reporting the results of pollution prevention strategies is becoming more commonplace. Reporting results informs people—workers, shareholders, executives, the community and the government—of a company's performance. Most importantly, reporting helps build the momentum of pollution prevention efforts. For instance, communicating cost savings and reduced chemical use will advertise success. Reporting to the public and/or customers can improve an organization's image and demonstrate a commitment to environmental responsibility.

Step 6: Evaluation and Review

Pollution prevention planning is not a linear process, but rather an ongoing cycle of continual improvement. In order to make progress on pollution prevention, senior management must review pollution prevention achievements, determine whether objectives are appropriate and determine what improvement is necessary.

How Organizations and Facilities Take Action on Pollution Prevention

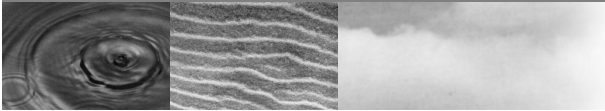
There are many different techniques that can be used to achieve pollution prevention. Industries may focus on:

- Eliminating or reducing their use of substances of concern;
- Achieving efficient use and conservation of natural resources;
- Emphasizing reuse and recycling of materials on site;
- Substituting materials and feedstock;
- Increasing operating efficiencies;
- Improving staff training;
- Changing purchasing techniques;
- Changing product design;
- Changing production processes;
- Reformulating products;
- Modifying equipment;
- Achieving clean production.

Refer to P2 Success Stories later on in this section for examples of some of these different techniques.

Tools and Techniques

These short highlights introduce some of the tools available to the industrial, commercial and institutional sectors in Canada. These tools are used to improve products, processes, services and management with consideration for the environment.



Design for the Environment

Design for the Environment (DfE) is a powerful tool for affecting environmental improvements throughout a product's life cycle. DfE is based on the philosophy that additional effort invested to address specific issues at the design stage results in the elimination of numerous problems further downstream. DfE is a proactive approach to integrating pollution prevention and resource conservation strategies into the development of more ecologically and economically sustainable products.¹

DfE can involve reducing the toxicity of a product, extending the life of a product, extending the life of the material used, improving the selection of materials, reducing the energy and material intensity required to produce, use and dispose of the product.²

Interface Flooring in Belleville, Ontario adopted a DfE approach for the nylon carpet tiles that they manufacture. They reduced the backing weight of the tiles, which resulted in improved product quality and performance; reduced material and energy costs in manufacturing and transportation; fewer air emissions and less solid waste. Interface's DfE allows them to practice product responsibility by leasing their carpet tiles to customers and completely reusing the returned product at its end of life. This way the company, customer and the environment all benefit from their new design.³

Life Cycle Assessment (LCA)

Life cycle assessment (LCA) is a technique for systematically identifying, quantifying and assessing the potential environmental impacts of a product, process, or service throughout its entire life cycle; from the point of extraction from the earth to return to the earth, i.e. "cradle-to-grave".⁴

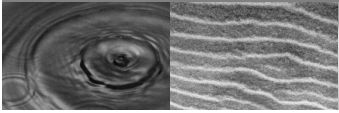
LCA is one of a range of tools that support life cycle management. LCA can help evaluate options to ensure that material substitution or process changes do not shift environmental and financial impacts to another stage along the life cycle.⁵

In 2003 the North American automotive industry stopped using mercury switches in new cars. This prevents End of Life Vehicle (ELV) handlers such as scrap metal dealers and smelters from releasing mercury into the environment during the reprocessing of old cars.⁶

Green Procurement

Green procurement means purchasing products or services that have a reduced environmental impact. Considering products that are energy efficient, limit the use of toxic elements and reduce waste are some of the criteria for buying green. A consumer must also consider the pollution generated by making and transporting the product, the packaging, ultimate disposal, resource use, recycled content, reusability, and durability.⁷

Increasingly, corporate and institutional consumers are incorporating environmental requirements into their product and packaging specifications. These specifications can relate to a wide range of attributes, including



product or packaging content, labeling, design features, reusability of the product and take-back of off-spec or spent products.⁸

Eco-Labeling

Eco-labeling is a communication and marketing tool for industry which uses labels to distinguish products and services meeting established environmental criteria. Eco-labeling has a dual purpose; one, to encourage manufacturers and suppliers to select environmentally preferable products and two, to help consumers make informed purchasing choices.⁹

Products and services that meet the environmental criteria are credited by an insignia from a benchmark organization such as the EcoLogo™ from the Environmental Choice Program and the EnergyStar™ symbol managed by Natural Resources Canada. The Environmental Choice Program is recognized in Canada and the United States and certifies products and services ranging from adhesives to food packaging to vehicle dismantling services.¹⁰ The EnergyStar™ label also recognized in Canada and the United States marks products such as refrigerators and office equipment that are the most energy-efficient on the market.

EMS-ISO 14001

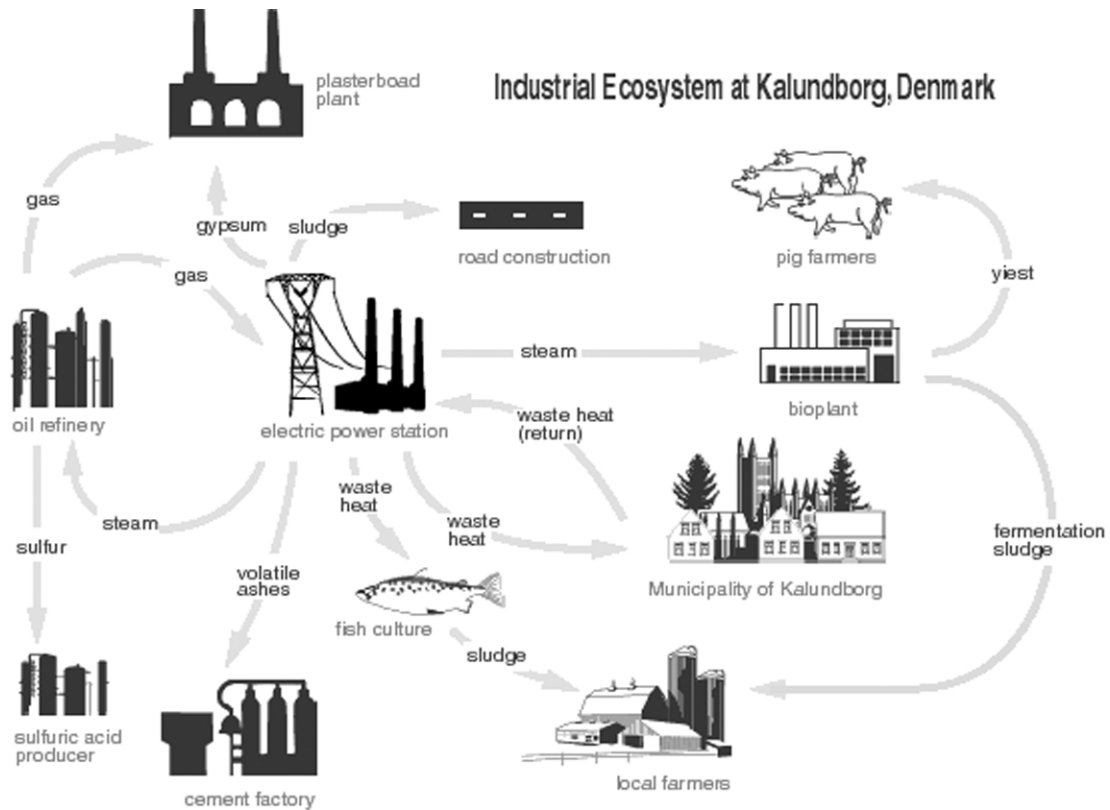
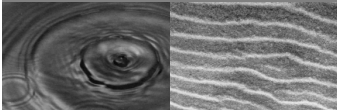
An environmental management system (EMS) enables facilities to systematically control the impact of their activities on the environment. An environmental management system is a structured systematic approach used by organizations to identify, prioritize and manage the environmental aspects associated with their operations, products and services. An environmental management system is a tool that helps engage management in recognizing that managing environmental issues can be accomplished strategically.

As of December 2003, over 1200 Canadian facilities have adopted and successfully implemented an environmental management system based on the International Organization for Standardization (ISO) 14001 environmental management standard.¹¹ The ISO 14000 standards are designed to provide an internationally recognized framework for environmental management, measurement, evaluation and auditing.¹²

Industrial Ecology

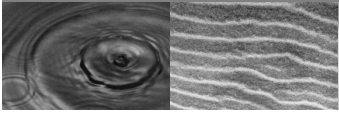
Industrial Ecology is a discipline which focuses on the design, development, operation, renewal and decommissioning of industrial facilities as ecological systems, with an emphasis on the optimization of resource efficiency.¹³

By looking at the industrial process through an ecological lens, wastes become resources and all components of the system must work together to thrive. An example of industrial ecology in action is the creation of eco-industrial parks where various industries work together to minimize their individual impacts on the environment by working in a collective. Wastes from one process are used as inputs elsewhere throughout the entire system.



This diagram shows the material and energy flows joining an industrial ecology network in Kalundborg Denmark. Some of the network partners include a gyproc factory, a pharmaceutical firm, a fish farm, a coal-fired electrical power station, a refinery and the municipality of Kalundborg.

Kalundborg has the world's oldest and most elaborate industrial ecosystem. Some of the energy exchanges include: excess gas from the refinery supplied to the gyproc factory, excess steam from the power station supplied to the municipality, the pharmaceutical firm and the refinery, hot water produced as a byproduct from the cooling process at the power station is supplied to the fish farm. Some of the material flows in the network include; sludge and yeast from the pharmaceutical firm are supplied to farmers for fertilizer and pig food respectively, and fly ash and gypsum from the power station are supplied to the cement factory and the gyproc factory.¹⁴



P2 Success Stories

FEDERAL GOVERNMENT – Progress in Pollution Prevention

Pollution Prevention – A Federal Strategy for Action is the Government of Canada’s policy framework for advancing pollution prevention as the priority approach to environmental protection. Approved by Cabinet in June 1995, the strategy elaborates on government policy, and sets priorities for action based on five goals involving partnerships with federal departments and agencies, other orders of government, the private sector, individual Canadians and the international community.

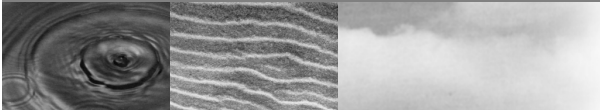
So far, twenty-five federal government departments have demonstrated leadership in developing and setting best practices as well as specific performance measures through policies, programs and internal environmental management systems.¹⁷ Below are some examples of what federal departments and facilities are doing:

Enviroclub™ for federal facilities is a pilot project coordinated and delivered by Environment Canada – Quebec Region. Its main objective is to help federal facilities involved in environmental or operations management carry out pollution prevention (P2) projects within their organization. In total, the 11 federal partners achieved the following reductions in just two years: 20 tonnes of carbon dioxide equivalent¹⁸, 7 500 litres of gasoline, 330 litres of varsol, 3.5 kilograms of nonylphenol and its ethoxylates, 435 litres of hazardous waste, 205 litres of sulfuric acid and 42 kilograms of 2-butoxyethanol.¹⁹

PRODUCT	AMOUNT REDUCED	EQUIVALENT
carbon dioxide	20 tonnes	5 cars driving one year
gasoline	7 500 litres	Fill up an average car 100 times
varsol	330 litres	1.6 drums
nonylphenol and its ethoxylates	3.5 kilograms	Weight of a small cat
hazardous waste	435 litres	2.1 drums
sulfuric acid	205 litres	1 drum
2-butoxyethanol	42 kilograms	Weight of a young teenager

The Federal Vehicles Initiative helps federal departments improve the operational efficiency of their vehicle fleets, reduce emissions from federal operations and promote the *Alternative Fuels Act, 1995* within the federal fleet. In the federal fleet there are now battery electric vehicles, propane vehicles, natural gas vehicles, and hybrid vehicles.²⁰ The initiative now has vehicles in the Ottawa area operating on E-85 fuel, (85% ethanol) and five E-85 fueling sites.²¹ On average, E-85 reduces greenhouse gas emissions by 75% compared to regular gasoline.

The federal government annually purchases several billion dollars worth of consumer, commercial and industrial goods. The purchase of environmentally responsible goods and services (e.g. less toxic, energy conserving and waste reducing) presents a significant opportunity to have a positive effect on Canada’s domestic market for environmental goods and services. Canadian taxpayers will also benefit from the savings that more energy-efficient buildings and vehicles generate.



INDUSTRY — Alcoa Aluminerie de Deschambault, Deschambault-Grondines, Québec

Alcoa is the world's leading producer of primary aluminium, fabricated aluminium and alumina. With operations in 41 different countries, Alcoa has facilities in 14 Canadian cities. The Alcoa Deschambault smelter located between Quebec City and Trois-Rivières started aluminium production in 1992 and produces 250 000 metric tonnes per year. Alcoa has always had a management philosophy based on workforce participation. Alcoa has always had a strong commitment to deploying state of the art, environmental technology. This plant was registered to ISO 14001 in 1997.

To minimize their impact on the environment even farther the plant implemented technological upgrades and improved on site work practices. New bath bin lids and anode tray covers, both used in the smelting process, help Alcoa achieve their goals of increased aluminium production and decreased fluoride emissions.

With consideration and investment in the environment, Alcoa Aluminerie de Deschambault is now experiencing its best performance since the beginning of operation.

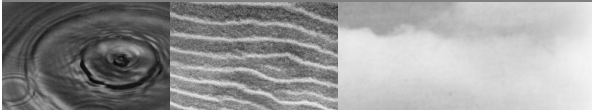
INDUSTRY — Zep Manufacturing Company Canada – Edmonton, Alberta and Montreal, Quebec

Zep Manufacturing Company of Canada (Zep Canada) is a leader in the supply of industrial and institutional maintenance and sanitation products. Zep Canada manufactures and imports products for a wide range of industries which include: Janitorial, Automotive, Hospitality, Housekeeping, Food Service, and Aviation.

In November 2004 Environment Canada published a Canada Gazette Notice requiring companies in Canada who manufacture and/or import soap and cleaning products which contain Nonylphenol (NP) and its Ethoxylates (NPEs) to prepare and implement a pollution prevention (P2) plan. The objective of the P2 Planning Notice is to significantly reduce or eliminate the quantity of NP and NPEs contained in products used in Canada. The P2 Planning Notice requirements are to reduce NP and NPEs by 95% by 2010 compared to base year values. In accordance with the notice Zep Canada has developed an 80 page P2 plan.

Prior to the Canada Gazette Notice, Zep Canada had implemented strategies to reduce or eliminate NP and NPEs in their products. In 2003 Zep Canada exceeded the requirements of the P2 Planning Notice for their facility in Edmonton by reducing NP and NPEs from soap and cleaning products manufactured and imported on-site by 98.9%. In the same year the Montreal facility had reduced the total NP and NPEs use on-site by 91% of their base year (2000) levels.

Zep Canada will meet the national objective to reduce or eliminate NP and NPEs through several pollution prevention activities including; product redesign or reformulation, spill and leak prevention, on-site reuse, recycling or recovery, good operating practices or training and formalizing its Environmental Management System (EMS) to ISO 14001 standards.



INDUSTRY — Farnell Packaging Ltd. - Dartmouth, Nova Scotia

Farnell Packaging located within the Burnside Industrial Park in Dartmouth, Nova Scotia, has been manufacturing a variety of thin and flexible plastic packaging, bags, and films in a range of sizes for over 40 years. Farnell's quality systems are ISO 9002 registered and their products are sold across North America.

In 2003 Farnell Packaging was the first Canadian company to be granted the "Compostable" logo from the Biodegradable Products Institute. Farnell's 5 mm thick bags have been designed to fully biodegrade to biomass, water and carbon dioxide in a commercial composting environment in 180 days.

Farnell's commitment to environmental sustainability includes in-house reuse and recycling programs, which have reduced waste sent to landfill by more than 20%. They sell a portion of their waste plastic to a local company that turns it into chips for lumber or filler. In 2000 this resulted in nearly 5000 kg of material being diverted from landfill. In 1999 Farnell replaced an inefficient system that used cold municipal water only once to cool machinery with a re-circulating glycol-based cooling system. This new process has reduced municipal water consumption by 85%.

Farnell remains a leader in Nova Scotia industry for implementing sound environmental practices and seeking cutting-edge, eco-efficient solutions for their business.

INSTITUTION — Canadian Coalition for Green Health Care

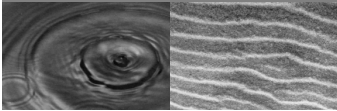
The Canadian Coalition for Green Health Care is a coalition of member groups concerned with, and dedicated to, minimizing the adverse environmental and human health impacts of Canada's health care system. To achieve its mission, the Coalition works with health care facilities, health care professionals, governments, non-governmental organizations, and the private sector.

The Coalition for Green Health Care communicates with and educates health care decision-makers and staff about the environmental impacts of health care and how to operate in an environmentally responsible manner. They identify products and services that are environmentally preferable and advocate for the development of policies and practices that will reduce the environmental and human health impacts of the health care system.

The coalition is a catalyst for success in the Canadian health care system. All health care institutions, facilities, organizations, associations and professionals benefit from the current environmental information and resources the coalition provides.

Many partner institutions have been nationally and internationally recognized for their pollution prevention successes.

Cambridge Memorial Hospital (2001), St. Mary's General Hospital, Kitchener (2002) and Trillium Health Centre, Mississauga (2004) have achieved registration to International Organization for Standardization (ISO) environmental management system standard, ISO14001. They are among the few hospitals worldwide to achieve this accomplishment.



The Hospital for Sick Children in Toronto is a recognized leader in green healthcare. The implementation of a multimedia pollution prevention plan has helped the hospital achieve reductions in volatile organic compounds and carbon dioxide emissions, remove 2.5 kg of mercury from the hospital and realize significant energy and water savings.

Winnipeg Health Sciences Centre has committed to continuously reduce its energy demand and greenhouse gas emissions by investing in energy reducing technology and adopting an Environmentally Responsible Procurement policy.

Summary and Conclusion

This section has described how firms in the industrial, commercial and institutional sectors, and government can organize themselves to achieve pollution prevention success. As you see from the description of tools, the means to achieve pollution prevention range from very straightforward and simple to technical and complicated. The commitment to achieve pollution prevention is essential for an organization to make progress toward sustainability. The next section of the guide will help you to organize yourself to make pollution prevention a reality in your own home and your community.

¹ Ecology Centre – Great Lakes United. *Toxics in Vehicles: Mercury*. University of Tennessee Center for Clean Products and Clean Technologies. January 2001.

² *Pollution Prevention Planning Handbook*

³ Environment Canada - *Pollution Prevention Success Stories*. From: <http://www.ec.gc.ca/pp/en/storyoutput.cfm?storyID=42>

⁴ École Polytechnique de Montréal. From: http://www.polymtl.ca/ciraig/ciraig_eng_content_01.html

⁵ *Pollution Prevention Planning Handbook*

⁶ Great Lakes Binational Toxics Strategy – Mercury. From: http://www.epa.gov/glnpo/bns/reports/stakejun2004/jun17_merc.pdf

⁷ *A guide to green products and services*. From: www.buygreen.com

⁸ *Pollution Prevention Planning Handbook*

⁹ *Pollution Probe Policy Considerations (2004)*

¹⁰ Environmental Choice Website www.environmentalchoice.ca

¹¹ ISO World. Retrieved Oct 22, 2004 from <http://www.ecology.or.jp/isoworld/english/analy14k.htm>

¹² *Pollution Prevention Planning Handbook*

¹³ World Business Council for Sustainable Development

¹⁴ Indigo Development. *The Industrial Symbiosis at Kalundborg, Denmark*. Retrieved Oct. 29, 2004 from <http://www.indigodev.com/Kal.html>

¹⁵ *Pollution Probe policy consideration*

¹⁶ *Responsible Pest Management* from: www.pestinfo.ca

¹⁷ *Progress in Pollution Prevention 2002-2003*

¹⁸ Carbon dioxide equivalent (CO₂e) is a standard measure for greenhouse gas emissions, which include carbon dioxide, methane, nitrous oxide, and sulphur hexafluoride.

¹⁹ *Progress in Pollution Prevention 2002-2003*

²⁰ *Progress in Pollution Prevention 2002-2003*

²¹ *Progress in Pollution Prevention 2002-2003*



Part IV: Pollution and You

So far, this Guide has discussed the concept of pollution prevention and what governments and industry have been doing to shift their emphasis from controlling pollution to preventing it. Now we are going to talk about how individuals and families can work to achieve pollution prevention in their homes and in their communities.

Citizen Chain of Change

Every citizen has a part to play in preventing pollution. Each of us has an effect on the environment every day. The key is to make this impact a positive one as it is of great importance to protect our environment for the well being of future generations. One way of doing that is changing our approach to decision making. The concept of ‘Seven Generations’ originates from the culture of Aboriginal Canadians and calls for making decisions that consider the needs of seven generations into the future. That is equivalent to about 200 years. Seven generations can be seen as those individuals who had great grandparents when they were born and knew their grandparents, parents, themselves, their children, their grandchildren and their great grandchildren.

Looking so far ahead into the future removes individual self-interests from public decision-making and expands our capacity to think about, empathize with, and take active consideration towards future generations.

We must take responsibility for our actions, whether as individuals, or as members of a community or an organization. As citizens we need to protect nature, not just buy, sell and consume it. As you will read in this section, many Canadians have already put their concern about the environment into action, but we need to do much more, and get everyone involved.

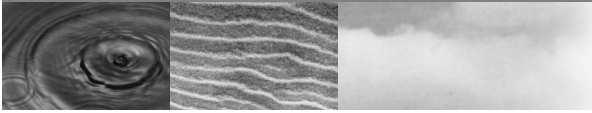
Environmental citizenship is a personal commitment to learning more about the environment and to taking responsible action such as practicing pollution prevention. The challenge of learning about and protecting the environment may at first seem overwhelming. You may find yourself saying, “but I’m just one person out of many ...what difference can I make?” This guide will show you that the effort of each individual can help achieve change.

Environmental citizenship is an idea that can rally and mobilize the support of many people and governments. Leaders within the community are needed in order to enlist the broader support of the community and to have the community take ownership of the process. When citizens, governments and industry come together to build a partnership for the environment, they are taking a big step toward ensuring sustainability.

Community-Based Social Marketing – A Toolbox for Changing Behavior

A central aspect of sustainability is widespread behaviour change, and psychology has a central role to play in fostering more sustainable behaviour. Citizens who directly catalyze behaviour change through their community work are often using community-based social marketing (CBSM). CBSM is an initiative to foster healthy sustainable communities through behaviour change in community members.

CBSM is a promising new way of promoting environmental citizenship and pollution prevention activities using psychological knowledge regarding behaviour change. Identifying the environmental activities to be promoted and the barriers that impede individuals from taking action are the essential initial steps to CBSM. A strategy is



then designed consisting of one or more behaviour change tools used to overcome these barriers. The behaviour change tools consist of commitment, prompts, norms, communication, incentives and convenience.

Unlike many information-intensive campaigns, community-based social marketing has been shown to have a much greater probability of promoting sustainable behavior.¹ In general, CBSM will be useful to any individual or institution interested in engaging citizens, citizens groups, and communities in partnerships with governments to protect and conserve the environment.

Four Steps to P2

Individuals and families can achieve pollution prevention by following a four-step plan: taking inventory; examining options and choosing priorities; making and implementing the plan; and telling your neighbours. This plan is similar to the five-step P2 plan used by businesses described in the Part III.

Taking inventory requires you to look at the energy, materials and substances you use, and the procedures and practices you follow to do everyday things such as caring for your lawn and cleaning your home.

Examining your options and choosing your priorities requires learning about the environmental effects of the way you do things. Informing yourself about alternatives – different products and different ways of doing things – will reduce the environmental impact of your actions.

Once you have set priorities, you can **make and implement your plan**. Set out a time line for what you want to achieve, and set out how you will achieve it.

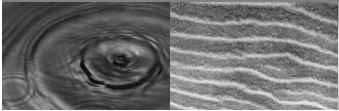
Finally, you will want to **tell your neighbours** about your pollution prevention plan because the more people who practice pollution prevention, the greater the benefits are.

Highlight – Four Steps to P2: Pharmaceutical and Personal Care Products (PPCPs)

Step #1: Take Inventory

Examine:

- *How many and what kind of over-the-counter and prescription medications are being brought into your home?*
- *What personal care products are already at home and what new products are you bringing in?*
- *Are these products getting entirely used up?*
- *How are you disposing of these products?*



Step #2: Examine your options and set your priorities

As consumers we release PPCPs into the sewers when we flush unused medication down the toilet or sink, and when we rinse soaps, shampoos and cosmetics down the drain when we bathe. Look for products without detergents, perfumes and additives. Chemicals in these products have the potential to impact entire ecosystems as well as re-enter the human body through drinking water. Increasing concern about antibiotic resistance and endocrine (hormonal) disruption in wildlife and humans has directed attention to previously unidentified or under-appreciated aspects of chemical pollution.

Step #3: Make and implement your plan

Reducing the quantity of unused drugs and disposing of excess PPCPs safely is more ecological and economical than trying to filter them from the water after the fact. Return unused pharmaceuticals or medications to your pharmacy or the Household Hazardous Waste depot. Behaviour changes geared at reducing inappropriate use, over-use and abuse of PPCPs is the best way to prevent disposal problems and risks to public health and ecosystems.

Step #4: Tell your neighbours

Share your efforts with others you know-friends, family and neighbours. Shifting thinking to new ways of doing things is difficult. However, small efforts can have a meaningful impact on the environment in the long run.

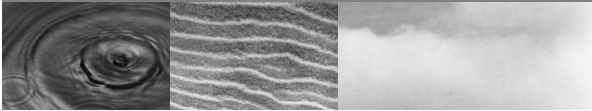
**Source: Batt, Sharon. "Full Circle: Drugs, the Environment and our Health." Women and Health Protection. 2004.
From: <http://www.whp-apsf.ca/en/documents/fullCircle.html#top>**

P2 Focus at Home: Toxic Substances and Waste

This section will outline just some of the areas where you can practice pollution prevention in your daily life. In the life cycle of a product or service, we as consumers can have a significant influence on the initial and final stages. Making smart and informed choices about the products you buy and how you use and dispose of them can have a tremendous impact on pollution prevention. In Part VI of this Guide you will find resources listed for all of the key activities discussed in this section.

Home cleaning and maintenance

Hundreds of common consumer products such as furniture polish, window cleaner, paint and some glues all have hazardous constituents. Every product is slightly different. It is important to know how to identify hazardous products and the risks associated with using them. There are many alternative household cleaning and maintenance products available on the market. When possible, the least toxic products should be considered.



ISSUES TO THINK ABOUT WHEN BUYING HOUSEHOLD PRODUCTS

Questions to ask

What are the major constituents?

Where was the product manufactured?

Is the product packaged appropriately?

Is the packaging recyclable or returnable?

Major Environmental and Health Concerns

Toxic, flammable, corrosive or explosive elements

Transportation related emissions

Waste going to landfill and natural resources to produce packaging

Waste going to landfill

The unused or unwanted portion of many home cleaning and maintenance products, when disposed or used improperly, can be a significant source of toxic pollution, harming human health and the environment. Educating yourself about proper handling, use, storage and disposal methods will prevent pollution at the source. Only buying products you absolutely need, and using up the entire quantity, is the best way to avoid disposal problems. The best way to keep toxic products out of the home is to not buy them.

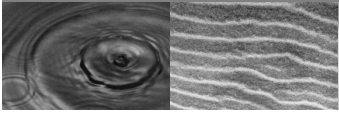
If it is impossible to avoid the use of toxic products, it is critical to be aware of the hazardous waste collection options available in your community or municipality. **The key is to keep toxic products out of the regular garbage stream, going to landfill, being incinerated or dumped down the drain.**

Personal care products

A growing concern is developing in the area of chemical pollution from the overuse and improper disposal of personal care products such as cosmetics, sunscreens, fragrances, insect repellants, medications, contraceptives and pharmaceuticals. Chemical compounds in these products are entering the environment and being detected in many water bodies throughout North America.²

Chemicals in these products have been identified as reproductive toxins and/or carcinogens, and lead to antibiotic resistance in a wide range of species including humans. In addition to physical stressors, elevated chemical concentration in soils and waterways is contributing to the alteration of natural community structure through habitat disruption and fragmentation.

Unused pharmaceuticals, medications and other personal care products should not be disposed of down your sink drains or in the toilet. Return unused pharmaceuticals or medications to your pharmacy or your municipality/township's Household Hazardous Waste program.



Sustainable Consumption

Sustainable consumption has evolved from a need to put more emphasis on the demand side of products and services since the environmental gains obtained by strategies such as clean technologies, pollution prevention and eco-efficiency have been overtaken by the exponential increase of consumption. Tools such as life-cycle thinking, including assessments, eco-design and eco-labeling are increasingly seen as one way to help tackle the problem of unsustainable consumption. Sustainable consumption encourages changing consumption habits and patterns globally to maintain natural resources, reduce stress on the environment, ensure that resources are consumed fairly and that basic human needs are met.

Successful sustainable consumption requires that all stakeholders – consumers, producers, retailers, and governments – embrace and understand the need for efficient, conscious and appropriate consumption patterns.³ Sustainable consumption should be applied to food, shelter, water, sanitation, health care, clothing, transportation and energy use, and can be achieved by improving efficiency of resource use, substituting goods, reducing consumption, shifting transport modes, reducing water and energy consumption, and reducing waste production.

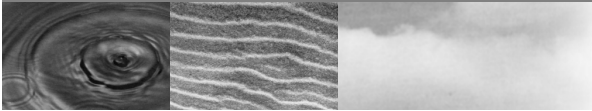
An example of a sustainable consumption activity in Canada is the Green Dry Cleaners initiative. Many dry cleaners are taking small measures such as improving operating practices, modernizing equipment, changing dry cleaning solvents or initiating recycling programs to protect the environment in their communities. Green dry cleaners offer consumers environmentally preferable cleaning processes such as cleaning clothes in water instead of solvents (wet cleaning) as well as phasing out the use of perchloroethylene, collecting and reusing hangers and recycling plastic bags.⁴

Many tools and strategies are available to help individuals change their consumption habits and participate in the global effort to improve quality of life. The North American Sustainable Consumption Alliance (NASCA) is a strategic partnership of people and organizations who are working to promote more sustainable consumption patterns in Mexico, Canada and the United States. NASCA facilitates information exchange, communication and outreach and collaborative action to achieve sustainable consumption.⁵

Pesticide-free lawn care and gardening

Maintaining a healthy and beautiful lawn or garden can be achieved without toxic pesticides and herbicides. Many municipalities have imposed by-laws banning the use of pesticides, requiring and encouraging citizens to change lawn care and gardening habits.

Learning techniques to prevent pest problems is an effective strategy to reduce the need for pesticides. Integrated Pest Management (IPM) and plant health care are two common practices used to achieve this goal.



The central component of IPM is planning and managing ecosystems to prevent organisms from becoming pests. Techniques include frequent lawn inspection for early detection, and correct identification of pest problems. Treatments are used that are least hazardous to human health, least toxic to non target organisms, least damaging to the environment, most likely to produce long-term results and most cost effective over time.⁶ Plant health care includes appropriate plant selection for site conditions, proper planting and optimal plant maintenance.

Keeping your lawn healthy and less susceptible to pest problems requires using good maintenance practices. Use compost for nutrient recycling, aerate compacted soil, and water deeply and infrequently to promote deep roots.⁷ Naturalizing your lawn or garden by keeping native plants reduces the need for frequent watering. There are many guides and resources available on pesticide free lawn care and gardening, some of which are listed at the back of this guide. Finding new ways to maintain your lawn or garden will improve public health and reduce environmental impacts on soil, water and air.

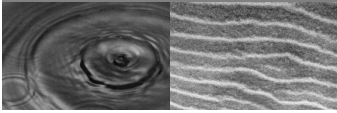
Your vehicle and boat

In 2003 there were 18.9 million vehicles on the road in Canada.⁸ The collective impact of these vehicles on resource and energy consumption during manufacture, road infrastructure and land use development, demand for fossil fuels, vehicle maintenance and end-of-life disposal is enormous. Compounds required to keep vehicles operating such as motor oil, battery acid, gasoline antifreeze, transmission and brake fluid, degreasers, rust preventatives, radiator flushers and cleaning and waxing products all contain toxic chemicals. If used carelessly and disposed of incorrectly they can create extreme stresses on the environment.

To minimize environmental impacts from motorized vehicles, owners must keep vehicles properly maintained and encourage end-of-life recycling of materials, design for the environment and product take-back by manufacturers.

Individuals engaging in sustainable commuting options such as the SMART movement program,⁹ car pooling, public transit, active transit and car sharing can avoid expensive car ownership, reduce the number of cars on the road, and minimize vehicle-related impacts on the environment. Car sharing associations that lease cars by the hour are emerging in many urban areas across Canada. This service meets the needs of individuals who only need a vehicle occasionally.

Boat users also must consider how they manage fuelling, repairs and maintenance, cleaning, painting and sewage and litter disposal. Toxic compounds present in boating products even in small quantities can accumulate in sediment and be dangerous to human health and aquatic plants and animals. Using non-toxic boat paints, eliminating in-water hull cleaning, using phosphate-free, biodegradable cleaning agents, and avoiding gasoline spills are simple and effective pollution prevention actions you can take to reduce mishandling of toxic products. Always look for marinas that are eco-certified or participating in a clean marina program.



Highlight

The Ontario Marine Operators Association (OMOA) formed the Clean Marina Program to provide an opportunity for all boaters to choose a certified, environmentally responsible homeport for their boats. In unfamiliar waters the Eco-Rating flag lets boaters choose a destination marina knowing they are doing all they can to preserve the lakes and rivers.

Eco-Ratings are determined by the results of an audit covering more than 200 environmental practices. This audit is completed by Terra Choice Environmental Services licensed by Environment Canada. Results are then converted to a rating system of green anchors, with a low of one and a high of five.

Clean Marina Information http://www.omoa.com/clean_marine_faq.asp

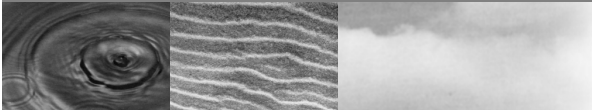
Choosing high quality sanitation devices and not pumping your sewage overboard, especially in anchorages, marinas, protected inlets, aquaculture sites or swimming areas, using rapid-dissolving marine toilet paper and using non-toxic disinfectants and going ashore whenever possible to use the washroom facilities will keep waterways healthy and marinas clean.

In your community

There are hundreds of ways to participate in pollution prevention activities in your community. Informing yourself about the tools to initiate change in your life and the lives of people around you is a vital first step. Getting involved with organizations that coordinate P2 efforts in areas such as transportation, climate change and energy and water conservation in places such as schools, neighbourhoods and municipalities is a way to impact the health of your community directly. **Volunteering, event planning, letter writing and fundraising are just some of the activities you can participate in to help improve your community.**

At the cottage

With over half a million cottages across Canada, cottagers can have an impact on the environment because cottages are usually located on or near the banks of rivers or on the shores of lakes or oceans.¹¹ Moreover, the rural location of a cottage is not supported by the same infrastructure we are accustomed to in suburban and urban environments. Taking care to dispose of garbage and waste properly, which may require taking it off site to recyclers and composting, is an effective way to bring your P2 habits to the cottage. Leaky, improperly installed and poorly maintained oil tanks can quickly contaminate soil and groundwater.¹² If you use wood heat remember to “Burn it Smart”.¹³ Use high-efficiency, low emission stoves, burn only dry seasoned wood and never burn garbage. Keep septic systems well maintained and consider purchasing a biological toilet. The Integrated Pest Management (IPM) that you practice in the city is equally important at the cottage to avoid using toxic pesticides. Using appropriate products for cleaning and maintenance is also a key factor in P2 at the cottage. **Reducing overall waste by choosing products wisely and conserving water and energy are excellent ways to practice P2 at the cottage.**



The following two examples highlight two different community initiatives that encourage citizens to gain and share pollution prevention knowledge to make their surroundings cleaner and healthier.

EcoAction Teams, an Earth Day Canada program

In 2002, twenty groups of friends and neighbours from communities across Ontario and from a variety of socio-economic levels, geographic locations and dwelling types participated in a new program. This was the beginning of the EcoAction Teams Program, a neighbourhood-based initiative developed by Earth Day Canada (EDC). Today, more than 800 hundred individuals and eighty teams are involved in the initiative. EcoAction Teams is a province-wide program that provides tools and solutions to help Canadians in both urban communities and rural areas deal with the volumes of information and incentives available to them when addressing issues of household resource efficiency. The program is designed to help people understand that making the right decisions makes good economic and environmental sense in areas such as household energy efficiency, water usage, transportation alternatives, household waste, and sustainable food and gardening habits.

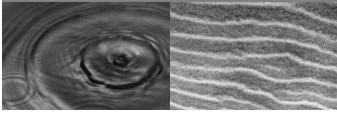
The program's Web-based tools provide immediate, online calculations of a participant's financial and environmental savings. By mid-2004, the average annual greenhouse gas savings per household was 1.2 tonnes. Average water and waste savings were 105 000 litres and 15 tonnes respectively. By 2007, the program expects to achieve annual savings of 1 350 tonnes of greenhouse gas emissions, 415 000 kg of waste from entering the solid waste stream and 37 500 000 L of water.

Other supporting elements of the program include a Web-forum, online sign-up form and a constantly updated resources and links section. EcoAction Teams staff offers support whenever needed and act as a resource for local teams. Options are available for independent, self-directed participation or as part of a team that meets four to six times a year. Please visit www.ecoactionteams.ca for information about participation.

Toronto Chinese Environmental Ambassadors (TCEA)

Toronto Chinese Environmental Ambassadors (TCEA) is a non-profit organization established and run by community volunteers. Initially trained by the Toronto Chinese Health Education Committee – Environmental Subcommittee, TCEA is dedicated to improving and protecting the environment through education in the Chinese community.

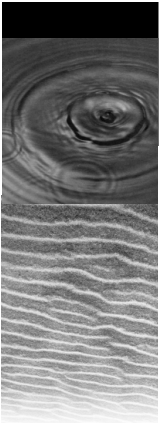
TCEA is the only Chinese green group in the Greater Toronto Area. They work with other Chinese community groups to provide environmental education programmes such as workshops, seminars, exhibits and public radio talk shows. Five to eight community events per year attract anywhere from 30 to 500 participants. Over 20 000 people tuned into the eight radio talk shows that were hosted in 2003. A wide range of environmental topics such as air quality, climate change, nature conservation, water pollution, energy saving, pesticides, waste reduction and health are covered.



Engaging the Chinese community in a culturally sensitive manner with language specific education raises environmental awareness for individuals who may not be reached by other means. TCEA has partnered with many local environmental groups for tree planting events, promoting free energy-efficiency home visits and advocating the Aluminium Recovery Project. TCEA has worked extensively on the Green Restaurant Project. This initiative is designed to help Chinese restaurants in Toronto identify ways to improve waste management practices and reduce energy consumption.

TCEA has produced a number of Chinese language educational materials including pamphlets called: *Air Pollution and You: Outdoor Air*, *Air Pollution and You: Indoor Air*, *Solar Radiation and Health*, *Energy-Saving*, *What is Climate Change*, and a booklet called the *Green Book*. They have also translated numerous brochures and posters on many topics to share the environmental awareness and protection message across the Chinese community.

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- ¹ McKenzie-Mohr, D. and W. Smith, *Fostering Sustainable Behaviour: An Introduction to Community-based Social Marketing*. (1999) Gabriola Island, BC: New Society Publishers.
- ² EPA. *Pharmaceuticals and Personal Care Products (PPCPs) as Environmental Pollutants*
<http://www.epa.gov/herlesd1/chemistry/pharma/index.htm>
- ³ UNEP. "Sustainable Consumption: a Global Status Report. September 2002. From: http://www.uneptie.org/pc/pc/pdfs/Sus_Cons.pdf
- ⁴ Canadian Centre for Pollution Prevention. "Green Dry Cleaners"
From: http://www.c2p2online.com/main.php3?section=139&doc_id=295&session=
- ⁵ NASCA. Retrieved from: <http://hasca.icspac.net/about/whatis.aspx> November 10, 2004
- ⁶ Government of British Columbia. "Integrated Pest Management".
From: <http://wlapwww.gov.bc.ca/epd/epdpa/eripm/landshtm/Chap1.htm#treatments>
- ⁷ Health Canada. "Healthy Lawn Tips". From: www.healthylawns.net
- ⁸ Statistics Canada, CANSIM, table 405-0004.
- ⁹ SMART (Save Money and the Air by Reducing Trips) Movement is Pollution Probe's workplace trip reduction program.
<http://www.pollutionprobe.org/whatwedo/Smart.htm>
- ¹⁰ Nova Scotia Environment and Labour. "Pollution Prevention Program – Past Projects".
From: http://www.gov.ns.ca/enla/envin/p2/g_craft.asp
- ¹¹ Environment Canada-National Office of Pollution Prevention. *P2 Fact Sheet; P2 & You at the Cottage*.
<http://www.ec.gc.ca/nopp/docs/fact/en/p2cottage.cfm>
- ¹² Nova Scotia Environment and Labour. "Pollution Prevention Program – Oil Tank Safety".
From: <http://www.gov.ns.ca/enla/envin/p2/oiltank.asp#prob>
- ¹³ www.burnitsmart.org



Part V: Conclusions and Recommendations

Summary of Main Points

Part II

- Pollution prevention involves continual improvement through design, technical, operational and behavioural changes. These changes help move toward sustainability.
- Pollution prevention is one of the key components of environmental, economic and social sustainable development. Sustainable consumption not only prevents pollution, but also combats climate change.
- All types of stakeholders – governments, industry, institutions or citizens – contribute to pollution and have to take leadership to prevent pollution.
- Pollution prevention implementation can meet with impediments in the short-term, but leads to long-term benefits.

Part III

- Different types of industry should implement pollution prevention through gaining commitment, information gathering and taking action. The commitment to achieve pollution prevention is essential for an organization to make progress toward sustainability.
- The means to achieve pollution prevention range from very straightforward and simple to technical and complicated.
- Increasingly both businesses and regulators are realizing that pollution prevention is a powerful and economical strategy. Business managers are finding that they can save money by preventing pollution in the first place, while increasing efficiency.

Part IV

- Environmental citizenship should be a personal commitment of each citizen to take responsible actions and practice pollution prevention.
- Community-based social marketing could help individuals and organisations to change their behaviour.

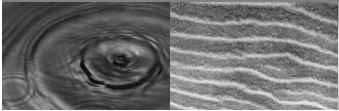
Recommendations for Next Steps

GOVERNMENT

Improving the development and implementation of policies and regulations could advance pollution prevention.

Pollution prevention should continue to be a national priority based on CEPA, 1999. The review of this Act in 2005 should evaluate the progress in the field of pollution prevention, identify where modifications are warranted and map the road for improvement.

Governments should take responsibility for maintaining and improving opportunities for exchanging ideas and facilitating the coordination of efforts to enhance pollution prevention between different stakeholders.



INDUSTRY

Every organization or facility should be committed to pollution prevention. Subsequent steps, such as information gathering and action, should be incorporated into a business management plan to help practice pollution prevention.

Information sharing among industry representatives is one of the most important elements in developing innovative methods to enhance pollution prevention.

Pollution prevention planning should be an on-going process within every business.

INSTITUTIONS

Institutions are highly visible members of the community and should practice pollution prevention to set an example for the community.

CITIZENS

Every citizen should be responsible for making smart and informed choices about the purchase and disposal of products.

Informing yourself and others about environmentally friendly products and ways of doing things would help reduce our impact on the environment.



Part VI: Resources

The references that follow will provide you with a lot of information about hazardous substances, alternatives to hazardous substances and other information to help you with your pollution prevention projects. These references are not an exhaustive listing. These will give you a head start. You may expect to find many more sources as you go.

For a more comprehensive list of pollution prevention resources, please visit CIELAP's web site: www.cielap.org.

General Information

Environment Canada Inquiry Centre

Environment Canada
Inquiry Centre
70 Crémazie Street
Gatineau, QC K1A 0H3
Telephone: 819-997-2800 or 1-800-668-6767
Fax: 819-994-1412
E-mail: enviroinfo@ec.gc.ca

Environment Canada's National Office of Pollution Prevention Web Site

<http://www.ec.gc.ca/nopp/docs/fact/en/>
<http://www.ec.gc.ca/nopp/docs/fact/fr/index.cfm> (French)

This web site is an excellent source of information on Pollution Prevention (P2). The National Office of Pollution Prevention has developed several P2 fact sheets, which cover topics including: pollution prevention activities; best practices; and activities that individual Canadians, companies, and government departments can incorporate into everyday life. For individual Canadians, the fact sheets have pollution prevention tips for: home, work, school, driving, shopping, the yard, the cottage, and energy efficiency.

Health Canada – Safe Environments

<http://www.hc-sc.gc.ca/hecs-sesc/hecs/sep/index.htm>
Health Canada's Safe Environments site provides a wealth of information on Radiation Protection, Environmental Contaminants, Water Quality and Health and Health Impacts.

Green Lane

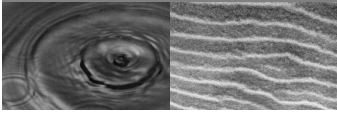
<http://www.ec.gc.ca/> (English and French)
For information about Canadian programs, pollution prevention success stories, and other initiatives and tips, a good place to start is on Environment Canada's Green Lane.

Canadian Pollution Prevention Information Clearinghouse (CPPIC)

<http://www.ec.gc.ca/cppic> (English and French)
Environment Canada's CPPIC is an online database and comprehensive resource that provides Canadians with the information they need to put pollution prevention (P2) into practice. Search over 1,200 P2 references ranging from fact sheets to case studies with the quick text search, Advanced Search or more specific Industrial Sector Search.

Pollution Prevention World Information Network (P2WIN)

<http://www.p2win.org/main/ns/55/doc/60/lang/EN>
<http://www.p2win.org/main/ns/55/doc/60/session//lang/FR> (French)
The Pollution Prevention World Information Network (P2WIN), is an Internet-based network which connects and serves as a virtual meeting place for pollution prevention roundtables, cleaner production networks and other organizations committed to promoting and advancing pollution prevention and sustainability issues.



At Home – General Tips

P2 & You @ HOME

www.ec.gc.ca/nopp/docs/fact/en/p2home.cfm

This is one of Environment Canada's National Office of Pollution Prevention P2 fact sheets. This gives you tips on what you can do in your home to save energy and water and reduce the amount of waste created, while at the same time saving your family money.

P2 & You – Energy Efficiency

www.ec.gc.ca/nopp/docs/fact/en/p2Energy.cfm

This is one of Environment Canada's National Office of Pollution Prevention P2 fact sheets. This gives you tips on how to save energy.

Home & Family Guide: Practical Action for the Environment

<http://perc.ca/waste-line/rrr/home/>

This US-based guide provides eighty pages of practical, positive advice and action tips. It takes a room-by-room approach to help you save energy and water, reduce waste and find alternatives to hazardous products.

Hazardous Substances

Safer Alternatives for Toxic Products

http://www.rco.on.ca/factsheet/fs_b10.html

This site lists safer substitutes for some household toxics. Generally, the products can be bought in grocery stores.

Toxic Toolkit

<http://www.rcbc.bc.ca/resource/toxictools.htm>

This is a reference guide to household hazardous waste.

Household Hazardous Waste (HHW) Fact Sheet

<http://www.rco.on.ca/factsheet/hazardous.htm>

This site lists household hazardous wastes (HHW), provides statistics, outlines health and environmental concerns associated with HHW, and provides information on how to identify HHW.

Health and Safety Information on Household Products

<http://householdproducts.nlm.nih.gov>

What's under your kitchen sink, in your garage, in your bathroom, and on the shelves in your laundry room? This website provides information about what's in these products, the potential health effects, and safety and handling instructions.

Hazardous Products in the Home

<http://www.epa.gov/grtlakes/seahome/housewaste/house/mainmenu.htm>

This US-based resource helps you identify potentially hazardous products in a home on a room-by-room basis and provides a comprehensive listing of household products and their constituents with actual or potential hazards, as identified.

Yard

P2 & You in the YARD

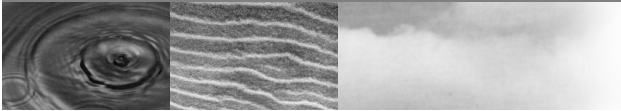
www.ec.gc.ca/nopp/docs/fact/en/p2Yard.cfm

This is one of Environment Canada's National Office of Pollution Prevention P2 fact sheets. It provides a few tips on how you can make your yard "greener" by saving water and preventing pollution from ending up in our air, water, and soil.

Healthy Lawns

<http://healthylawns.net> (English and French)

This website is where gardeners, lawn care service providers and green space professionals will find information on reduced risk pest management and pest prevention strategies for lawn and turf grass.



Personal Care Products

Proper Use and Disposal of Medication

http://www.hc-sc.gc.ca/english/iyh/medical/med_disposal.html

http://www.hc-sc.gc.ca/francais/vsv/aspect_medical/medicaments_defaire.html (French)

This Health Canada web site outlines the risks associated with the improper disposal of medication and provides information on how to properly dispose of medication.

Campaign for Safe Cosmetics

<http://www.newdream.org/consumer/safecosmetics.html>

This US-based site is run by the Campaign for Safe Cosmetics, a coalition of public health, educational, religious, labor, women's, environmental and consumer groups. The coalition's goal is to protect the health of consumers and workers by requiring the health and beauty industry to phase out the use of chemicals that are known or suspected carcinogens, mutagens and reproductive toxins.

Green Shopping

Environmental Choice[®] Program

<http://www.environmentalchoice.com/>

Environmental Choice[®] is Canada's eco-labelling program. Products and services certified by the Environmental Choice[®] have been proven to have less of an impact on the environment because of how they are manufactured, consumed or disposed of. The website provides access to environmentally preferable products and services.

Be, Live, Buy Different – Make a Difference

<http://www.ibuydifferent.org/>

This campaign is to help young people learn how they can make a difference by buying differently. The US-based website, designed in a youth-oriented style, features a variety of tools and materials to help youth learn about the connections and actions that make a difference.

Good Stuff? A Behind-the-Scenes Guide to the Things We Buy

<http://www.worldwatch.org/pubs/goodstuff>

If you've had questions about the environmental and social impacts of the products you buy and use, *Good Stuff* is for you. It contains many of the tips, facts, and links you'll need to start making more informed purchases that benefit your health and the environment.

At the Cottage

P2 & You @ the Cottage

<http://www.ec.gc.ca/nopp/docs/fact/en/p2cottage.cfm>

<http://www.ec.gc.ca/nopp/docs/fact/fr/p2cottage.cfm> (French)

This is one of Environment Canada's National Office of Pollution Prevention P2 fact sheets. It provides ways in which you can practice P2 while at the cottage.

Camp Green, Canada!om

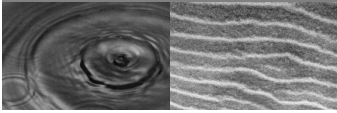
<http://www.campgreencanada.ca/>

This national campaign encourages recreational vehicle (RV) users to use non-toxic, biodegradable products for the treatment of RV effluent and odour control in on-board holding tanks. It also raises awareness among campground owners of the economic and environmental benefits of declaring their dumping facilities chemical-free.

Fish Lead Free

<http://www.cws-scf.ec.gc.ca/fishing/> (English and French)

This Environment Canada site provides facts on lead fishing sinkers and jigs, information on regulations and outreach activities, tips on where to find lead-free alternatives, and information on wildlife research. You can also order a hardcopy of the Fish Lead Free brochure.



Green Home and Cottage

<http://www.gnb.ca/0009/0013-e.pdf>

<http://www.gnb.ca/0009/0013-f.pdf> (French)

This brochure is a quick reference guide to 'green living' for shoreline property owners.

Your car, motorcycle and boat

Automotive

P2 & You and DRIVING

www.ec.gc.ca/nopp/docs/fact/en/p2Drive.cfm

This is one of Environment Canada's National Office of Pollution Prevention P2 fact sheets. It provides a few tips on how you can reduce your car's impact on the environment.

Environmental Implications of the Automobile

<http://www.ec.gc.ca/soer-ree/English/products/factsheets/93-1.cfm>

<http://www.ec.gc.ca/soer-ree/Francais/products/factsheets/93-1.cfm> (French)

This fact sheet (SOE Fact Sheet No. 93-1) is part of the Environment Canada's State of the Environment Database. It discusses: the Car and the Economy; the Car and the Environment; and The Car and a Sustainable Environment.

Green Cars: A Guide to Cleaner Vehicle Production, Use and Disposal

<http://www.edf.org/article.cfm?ContentID=928>

This US-based site by Environmental Defense provides information on what happens in each stage of a vehicle's life-cycle and how you can help prevent pollution.

National Resources Canada's Office of Energy Efficiency: Personal Transportation

<http://oee.nrcan.gc.ca/transportation/personal/index.cfm?text=N&printview=N>

<http://oee.nrcan.gc.ca/transports/personnel/index.cfm?attr=8> (French)

This site provides information on how you can use less energy, save money and be kinder to the environment when running your vehicle.

RiverSafe CarWash Campaign

<http://www.riversides.org/riversafe/>

This campaign aims to educate Canadians about the environmental impacts of at-home car washing and to promote alternatives.

Boating

Protecting the Marine Environment: A Boater's Guide

<http://www.tc.gc.ca/BoatingSafety/pubs/pme/menu.htm>

<http://www.tc.gc.ca/securitenautique/pubs/pme/menu.htm> (French)

This Transport Canada site is a boater's guide to protecting the marine environment.

Eco-Friendly Boating Fact Sheet

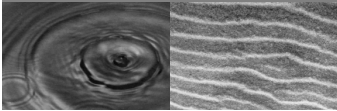
<http://www.deq.state.mi.us/documents/deq-ead-p2-marina-boating.pdf>

This is a checklist for good boating and clean water, published by the Michigan Department of Environmental Quality.

Take the Green Craft Challenge

http://www.gov.ns.ca/enla/envin/p2/g_craft.asp

This site is published by the government of Nova Scotia's Environment and Labour department. It provides information on how boaters can reduce environmental impact.



In Your Community

Community Programs: Resource Materials

<http://www.ns.ec.gc.ca/community/resources.html>

http://www.ns.ec.gc.ca/community/resources_f.html (French)

This website provides links to environmental information of interest to communities in the areas of Public Policy; Fundraising; Health and Environment; Strategic Planning; Research; and Tools for Building Sustainable Communities.

Down-to-Earth Choices: Tips for making where you live one of Canada's Healthy Neighbourhoods

http://www.ns.ec.gc.ca/community/down_to_earth_choices/index_e.html

http://www.ns.ec.gc.ca/community/down_to_earth_choices/index_f.html (French)

On this site, Environment Canada offers tips for making where you live one of Canada's Healthy Neighbourhoods. The site is simple to use and offers hundreds of tips and suggestions on environmentally sensitive habits for individual Canadians to practice every day, everywhere.

Eco-Action Community Funding Program

<http://www.ec.gc.ca/ecoaction/> (English and French)

Environment Canada's Eco-Action program has provided financial support to community groups for projects that have measurable, positive impacts on the environment. Eco-Action encourages project submissions that will protect, rehabilitate or enhance the natural environment, and build the capacity of communities to sustain these activities into the future.

Green Communities Association

<http://www.gca.ca/>

The Green Communities Association (GCA) is the national umbrella for local non-profit organizations that bring environmental solutions to Canadian households and communities. On this site, you can learn more about the GCA, its member organizations, and their menu of innovative programs.

Sustainable Communities Resource Package

<http://www.law.ntu.edu.tw/sustain/intro/ortee/>

The Ontario Roundtable on Environment and Economy's Sustainable Communities Resource Package is intended for communities and groups working on sustainability in all its forms, including environmental, social, health and economic initiatives in Ontario.

National Pollutant Release Inventory (NPRI)

<http://www.ec.gc.ca/pdb/npri/> (English and French)

The National Pollutant Release Inventory (NPRI) is the only legislated, nation-wide, publicly accessible inventory of its type in Canada. It provides Canadians with access to information on the releases and transfers of key pollutants in their communities.

Pollution Watch

<http://www.pollutionwatch.org/>

The PollutionWatch web site is based on NPRI data and provides information about the toxic pollution that facilities release in your community. On this website, you can search for polluters in your area using your postal code, obtain information about the health effects associated with specific pollutants and groups of chemicals, and more.



Glossary of Terms

Acid rain: Acid rain is a generic term used for precipitation that contains an abnormally high concentration of sulfuric and nitric acid. These acids form in the atmosphere when industrial gas emissions combine with water, and have negative impacts on the environment and human health.

Air quality: Scientists collect and analyze samples of air in different regions of Canada on a regular basis to determine pollutant levels. This information is not only used by decision-makers to pinpoint the sources of air pollution and determine strategies for reducing it, but also to produce daily air-quality forecasts that warn Canadians when smog levels are high.

CFC (chlorofluorocarbon): A greenhouse gas that causes depletion of the atmospheric ozone layer. CFCs are various halocarbon compounds consisting of carbon, hydrogen, chlorine, and fluorine, once used widely as aerosol propellants and refrigerants. (Sources: David Suzuki Foundation, The American Heritage® Dictionary of the English Language, Fourth Edition)

Climate Change (UF Global Warming): Human activities are altering the chemical composition of the atmosphere through the build-up of greenhouse gases that trap heat and reflect it back to the earth's surface. This is resulting in changes to our climate, including a rise in global temperatures and more frequent extreme weather events.

Conservation: Environmental conservation is a general term that refers to the preservation of the natural environment—including wildlife, habitat, and the ecosystems they are a part of.

Contamination (Water): Water is considered contaminated if it contains chemical or biological pollutants that are harmful to human health or the environment.

Design for the Environment (DfE): The Design for Environment approach is grounded in comparing performance, costs, and the risks associated with alternatives. It uses cleaner technologies substitutes assessments (CTSAs) and life cycle tools to evaluate the performance, costs, and environmental and human health impacts of competing technologies. A goal of DfE is to encourage pollution prevention, front-end, innovations through redesign rather than relying on end-of-pipe controls to reducing potential risks to human health and the environment.

Eco-Labeling: A communication and marketing tool for industry which uses labels to distinguish products and services meeting established environmental criteria. (Source: Citizens' Guide to Pollution Prevention, Part III – How Does P2 Work in the Industrial, Commercial and Institutional Sector in Canada?)

Ecology (Industrial): A discipline which focuses on the design, development, operation, renewal and decommissioning of industrial facilities as ecological systems, with an emphasis on the optimization of resource efficiency. (Source: Citizens' Guide to Pollution Prevention, Part III – How Does P2 Work in the Industrial, Commercial and Institutional Sector in Canada?)

Ecosystem: A biological community of interacting organisms and their physical environment.

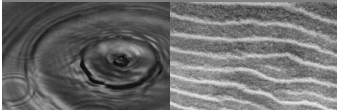
Effluent: Something that flows out or forth, such as a stream flowing out of a body of water, an outflow from a sewer or sewage system or a discharge of liquid waste, as from a factory or nuclear plant. (Source: The American Heritage® Dictionary of the English Language, Fourth Edition)

Emission: A substance discharged into the air (Source: The American Heritage® Dictionary of the English Language, Fourth Edition)

Energy (Industry): The energy industry includes businesses that produce power through such means as hydroelectricity and nuclear energy, as well as those that extract and refine energy-producing fossil fuels. Others are involved in the development of alternative energy sources, such as solar and wind power, and fuel cells.

Environmental Assessment: Carrying out an environmental assessment means determining or estimating the value, significance or extent of damage to a particular ecosystem or aspect of it.

Environmental Citizenship: A personal commitment to learning more about the environment and to take responsible action such as practicing pollution prevention. (Source: Citizens' Guide to Pollution Prevention, Part IV – Pollution Prevention and You)



Environmental Management System (EMS): Tool that enables facilities to systematically control the impact of their activities on the environment by identifying, prioritizing and managing the environmental aspects associated with their operations, products and services. (Source: Citizens' Guide to Pollution Prevention, Part III – How Does P2 Work in the Industrial, Commercial and Institutional Sector in Canada?)

Environmental monitoring: Monitoring, or making systematic geo-referenced observations of the environment-such as measuring water level or counting trees-is essential to detecting changes in ecosystems over time.

Greenhouse Effect: The greenhouse effect is the phenomenon whereby certain gases that absorb and trap heat in the atmosphere cause a warming effect on earth.

Greenhouse Gases: Greenhouse gases are gases that absorb and trap heat in the atmosphere and cause a warming effect on earth. Some occur naturally in the atmosphere, while others result from human activities. Greenhouse gases include carbon dioxide, water vapor, methane, nitrous oxide, ozone, chlorofluorocarbons (CFC).

Green Procurement: Green procurement is to purchase products or services that have a reduced environmental impact. (Source: Citizens' Guide to Pollution Prevention, Part III – How Does P2 Work in the Industrial, Commercial and Institutional Sector in Canada?)

Hazardous Waste: Discarded material which, because of its inherent nature and quantity, requires special disposal techniques to avoid crating health hazards, nuisances or environmental pollution. Hazardous waste can physically be solid, liquid, semi-solid or gaseous.

Life Cycle Assessment (LCA): Life cycle assessment is a specific method for systematically identifying, quantifying and assessing inputs and outputs (i.e. sources of environmental impact) throughout a product's life cycle. It is one of a range of tools that support life cycle management, but is not a prerequisite for life cycle management.

Life Cycle Management (LCM): Life cycle management is about minimizing environmental burdens throughout the life cycle of a product or service. The life cycle includes all activities that go into making, using and disposing of a product.

Ozone: Ozone is a naturally occurring gas, formed from normal oxygen, that protects the earth by filtering out ultraviolet radiation from the sun. Most of the world's ozone is concentrated in the stratosphere, 10-50 kilometers above the earth's surface.

Pollutant (Organic): Organic pollutants, by definition, contain carbon. They can be formed with natural products from plants, animals, coal and oil or synthesized artificially to produce such compounds as industrial solvents, pesticides, explosives, resins, plastics and fibers. (Source: Citizens' Guide to Pollution Prevention, Part II – What is P2)

Pollutant (Metal): Toxic metals, such as lead or mercury. (Source: Citizens' Guide to Pollution Prevention, Part II – What is P2)

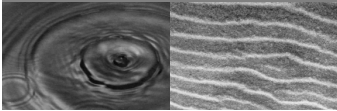
Pollutant (Radioactive): Chemicals that release radiation to the air, water or soil through improper disposal, accidents or explosions. (Source: Citizens' Guide to Pollution Prevention, Part II – What is P2)

Pollution (Industry): Any substance that is present in or has been introduced into the environment and has harmful or unpleasant effects. Pollution comes in many forms, and may be present in air, land, water, or organisms. Although some pollution is from natural sources, most is produced by human activities.

Pollution (Water): Any substance introduced into water or a body of water that has unpleasant or harmful effects. Although water pollution often comes from direct sources, such as effluent emitted into lakes and rivers by industries, it may also fall out of the atmosphere or seep in from surrounding land.

Pollution prevention: Pollution prevention refers to the use of processes, practices, materials, products or energy that avoid or minimize the creation of pollutants and waste, and reduce the overall risk to human health or the environment.

Recycle: Taking an unwanted material, processing it, then producing a useful product, again. Aluminum cans may be melted (processed), then reformed as aluminum cans or made into other aluminum products. Other examples include newspaper made into insulation, auto body steel made into bridge abutments, or milk jugs made into park benches. (Source: Idaho National Engineering and Environmental Laboratory <http://www.inel.gov/pollution-prevention/define.shtml>)



Reduce: BEFORE generating that waste stream, try minimizing the quantity or toxicity of waste by substituting non-toxic chemicals, use both sides of paper or e-mail. (Source: Idaho National Engineering and Environmental Laboratory <http://www.inel.gov/pollution-prevention/define.shtml>)

Reuse: Materials that are unwanted by one party, then used for its intended purpose by another party. Hand-me-down clothes, using unwanted paint, refilling a gas can are examples of reuse. (Source: Idaho National Engineering and Environmental Laboratory <http://www.inel.gov/pollution-prevention/define.shtml>)

Risk Assessment: A risk assessment is an estimate of the chance that environmental or health problems will result from a particular activity. Risk assessments play an important role in determining controls for the manufacture, use and transportation of toxic chemicals.

Risk Management: The process of selecting and implementing management actions on assessed risk, taking into account a wide range of legal, economic and social factors.

Smog (Ground-level ozone): Smog is formed in the Earth's lower atmosphere, near ground level, when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources react chemically in the presence of sunlight. Ninety per cent of all smog found in urban areas is made up of ground-level ozone-the same chemical found in the stratosphere. In large enough quantities, ground-level ozone can cause respiratory problems in humans and other animals, and damage to plants and building materials.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In other words, development is essential to satisfy human needs and improve the quality of human life. At the same time, development must be based on the efficient and environmentally responsible use of all of society's scarce resources – natural, human, and economic.

Toxic Substances (Water): Substances that have or may have an immediate or long-term harmful effect on the environment or human health. Toxic substances from industrial and agricultural activities often enter water and have been linked to health problems in animals and humans.

Treatment (Water): The treatment of wastewater or contaminated water using chemical, physical or biological agents to make it safe for drinking and other uses.

Waste (Water): Wastewater is water that has been used for a human activity and allowed to run away-usually into the environment or into a treatment facility.

Waste (Sanitary): Solid wastes, such as garbage, that are generated by normal housekeeping activities and are not hazardous or radioactive. (Source: Idaho National Engineering and Environmental Laboratory <http://www.inel.gov/pollution-prevention/define.shtml>)

Waste Management: Disposal, processing, controlling, recycling, and reusing the solid, liquid, and gaseous wastes of plants, animals, humans, and other organisms. It includes control within a closed ecological system to maintain a habitable environment. Some of the waste materials involved are hazardous while others are simply so voluminous that their permanent disposal becomes a problem.

Water conservation: Water conservation means reducing water usage or using water more efficiently, in order to reduce pollution and health risks, lower water costs, and extend the useful life of the existing supply and waste-treatment facilities.

Water quality: The quality of water as determined by its chemical and bacterial composition. To ensure the safety of drinking water in Canada, maximum allowable limits exist for all potentially harmful contaminants.

Sources: unless otherwise indicated, the definitions above are from Environment Canada's web site: http://www.ec.gc.ca/glossary_e.html and <http://www.ec.gc.ca/cppic/aboutp2/en/glossary.cfm>