

Moving Forward

with Pollution Prevention in North America: A Progress Update

Prepared by the North American Pollution Prevention Partnership

Commission for Environmental Cooperation
of North America

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Introduction

In 2002, the three North American pollution prevention round tables formed the North American Pollution Prevention Partnership (NAP³), in association with the Commission on Environmental Cooperation (CEC). The mission of the NAP³ is to collaborate on pollution prevention policy development, capacity building, stakeholder involvement and environmental leadership, through a unified and coordinated effort.

As a first step, the NAP³ partners committed to a paper highlighting pollution prevention policies, mandates and progress in their respective countries. This paper provides an update on the report, *Status of Pollution Prevention in North America, 1996*, prepared for the CEC, and a point of referral for further activities in pollution prevention.

1 Canada

1.1 Starting Points

The shift to pollution prevention policy began in Canada in the late 1980s with the introduction of the *Canadian Environmental Protection Act* (CEPA), the first piece of Canadian legislation to recognize the importance of moving to preventive environmental protection. The public debate leading up to and since the promulgation of CEPA in 1988 has been equally important and necessary to move Canadians from control of pollution to avoiding the creation of pollution in the first place.

Within Canada, municipalities, provinces, territories and the federal government share jurisdiction of the environment. These levels of government along with interested stakeholders in the private sector, environmental nongovernmental organizations, communities, labor and academia are promoting pollution prevention and cleaner production through a mix of regulatory and non-regulatory means. These means include modernizing legislation and regulations, managing national programs, developing guidelines and codes of practice for industrial operations, supporting voluntary initiatives and implementing international agreements. The following section will focus on pollution prevention policy across Canada.

In 1990, Canada launched its Green Plan for a Healthy Environment. Among the 50 programs contained in the plan were provisions for the foundation of: the Great Lakes Pollution Prevention Centre, the National Pollutant Release Inventory, and the Environmental Industries Initiative. These initiatives played a role in advancing domestic pollution prevention efforts by requiring public reporting of toxic releases, establishing the link between environmental and economic performance, and recognizing the need to effect change in the behavior of all Canadians.

The first major public policy statement promoting pollution prevention in Canada came from the Canadian Council of Ministers of the Environment (CCME). The CCME is comprised of environmental 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 released *A National Commitment to Pollution Prevention*, laying out a series of principles to guide pollution prevention in Canada.

1.2 Federal Initiatives

The pollution prevention policy framework was further defined when the Government of Canada released *Pollution Prevention—A Federal Strategy for Action* in June 1995. It included a comprehensive action plan to:

- institutionalize pollution prevention across all federal government activities;
- foster a national pollution prevention effort;
- achieve a climate in which pollution prevention becomes a major consideration in industrial activities;
- provide access to the information and tools necessary to implement pollution prevention practices; and,
- participate in international pollution prevention initiatives.

Federal government initiatives such as the Toxic Substances Management Policy, the Greening of Government Operations and the departmental Sustainable Development Strategies remain the foundation for the more detailed policy, operational and measurement frameworks needed for the successful delivery of preventive environmental care.

The Toxic Substances Management Policy was announced in 1995 and outlines a risk management process based on two key objectives: virtual elimination from the environment of toxic substances that are persistent, bioaccumulative, and primarily the result of human activity (Track 1); and life-cycle management of other toxic substances and substances of concern to prevent or minimize their release into the environment (Track 2). Environment Canada applies a pollution prevention approach and the precautionary principle to the management of both Track 1 and Track 2 substances. Environment Canada is implementing action plans to virtually eliminate the most dangerous toxic substances. Domestic action has been taken to limit or ban the production, use, importation or release of these substances.

The 1995 amendments to the *Auditor General Act* require federal departments to table a Sustainable Development Strategy in Parliament outlining departmental goals for integrating sustainable development into their policies, programs and operations. Departments are required to update their strategies every three years. Environment Canada has led federal efforts through the Interdepartmental Network on Sustainable Development Strategies and coordinated the tabling of updated Sustainable Development Strategies for all federal departments and agencies in February 2001.

Released in 2000, the document *Sustainable Development in Government Operations: A Coordinated Approach* builds on the 1995 *A Guide to Green Government*, which offers a framework for federal departments preparing sustainable development strategies. The new document builds on best practices as well as specific performance measures. The interdepartmental Committee on Performance Measurement for Greening Government Operations coordinates the development of common reporting indicators that provide an overview of how well the federal government is progressing towards bringing sustainable development considerations into its operations. In the future, a recommended reporting framework is expected.

1.2.1 Federal Legislation, Regulations, Guidelines and Codes of Practice

The *Canadian Environmental Protection Act* (CEPA) 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. Promulgated in 1988, the Canadian Environmental Protection Act was a result of the public debate moving from control and management of pollution to the prevention of the creation of pollution.

In the years that followed, environmental challenges, expectations, and legal and scientific knowledge evolved, thus triggering a process to renew the 1988 Canadian Environmental Protection Act. The 1995 report of the Canadian House of Commons Standing Committee on Environment and Sustainable Development, entitled *Its Our Health! Towards Pollution Prevention*, set the foundation for a new act centered directly on pollution prevention. The report contained 140 recommendations for the renewal of the Act.

In March 2000, the Government enacted a renewed and stronger *Canadian Environmental Protection Act* (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 CEPA. Other provisions include:

- implementing a “fast track” approach to evaluating and controlling toxic substances;
- ensuring the most harmful substances are phased out, or not released into the environment in any measurable quantity;
- improving enforcement of regulations;
- improving whistle-blower protection to encourage more Canadians to report CEPA violations; and,
- allowing for more effective cooperation and partnership with other governments and aboriginal peoples.

Under CEPA 1999, the Minister of the Environment has been given authority to require anyone who conducts an activity related to a toxic substance to prepare and implement a pollution prevention plan. The Minister sets the overall timelines for preparation and implementation, specifies what factors are to be considered in preparing the plans and sets the form, manner and content of the declaration that must be filed.

Where pollution prevention planning deals with expected operational releases, the Act also provides the Minister with the authority to require the

preparation of environmental emergency plans. The provisions are similar to those related to pollution prevention plans and will ensure that facilities are ready to deal with spills and other types of emergency situations.

Relating to the export of hazardous and non-hazardous waste, the Minister can require exporters to prepare and implement plans to reduce or phase out the export of specified waste. The Minister can refuse to issue a permit to an exporter who does not comply.

Beyond pollution prevention planning, the Act provides for the assessment of any substance new to Canada before commercialization is permitted. Through this assessment, conditions can be imposed to ensure that risk to human health and the environment is minimized. The Minister can also refuse commercial use of specific substances where warranted.

The Act also requires the Ministers of Environment and Health to identify all inherently toxic substances from among the substances on the Domestic Substances List. Those that are identified as either persistent or bioaccumulative will be further assessed to determine inherent toxicity, persistence and bioaccumulation. This work is scheduled for completion by 2006. The expectation is that from the substances that are assessed for risk, substances will be found to be entering the Canadian environment in quantities or concentrations that are a danger to human health or to the environment. In such instances, the Ministers would consider adding substances to the List of Toxic Substances. Adding a substance to the list would trigger a requirement for proposing preventive or control actions within two years and for initiating action within 18 months of actions being proposed.

Strengthened under the new CEPA, the National Pollutant Release Inventory (NPRI) provides Canadians with access to pollutant release information for facilities located in their communities. Beginning with the 1997 reporting year, the federal government requires pollution prevention tracking of qualitative progress under the NPRI. Starting in 1999, companies are required to report to the NPRI on an additional 73 pollutants, including 20 toxic substances.

1.3 Provincial Programs

The CCME's *National Commitment to Pollution Prevention* (see Section 1.1) was followed in May 1996 with *A Strategy to Fulfill the CCME Commitment to Pollution Prevention*. In the strategy, the Council of Ministers outlines its vision for pollution prevention in Canada and establishes the goal "to make pollution prevention the strategy of choice for protecting the environment and improving economic competitiveness." The strategy also sets out guiding principles for the implementation of pollution prevention by all provinces, territories and the federal government.

In January 1998, the Council of Ministers endorsed the CCME *Policy for the Management of Toxic Substances*, which was developed by the ad hoc toxics group and sets out a comprehensive, integrated, cooperative and concerted approach for the management of toxic substances. This group is now working towards results-based, accelerated action plans that will prioritize, evaluate and categorize toxic substances. In addition, the development of Canada-wide control strategies will lead to implementation plans, with defined pollution prevention and reduction targets, and time frames for selected toxic substances.

Within Canada, environmental management is an area of shared constitutional authority. The Canada-wide Accord on Environmental Harmonization is the framework agreement that establishes the common vision, objectives and principles that will govern the partnership between jurisdictions, and the development and implementation of sub-agreements. In 1998, the Government of Canada and all the provincial and territorial ministers on CCME, with the exception of Quebec, signed the Canada-wide Accord on Environmental Harmonization.

The intent of the Accord is to achieve concrete environmental results through effective co-operation and collaboration. In particular:

- all governments agree to a number of fundamental principles, including the polluter-pays principle, the precautionary principle and a recognition that pollution prevention is the preferred approach to environmental protection;
- all governments retain their legislative authorities; and
- the features of sub-agreements to be

developed under the Accord are defined, including: a one-window approach, the notion of roles being assumed by the government best situated to take them on, accountability through regular public reporting of measurable obligations and results, and a commitment to develop alternative plans if obligations are not met.

In June 2000, the Government of Canada, and provincial and territorial ministers on CCME (except Quebec) adopted new Canada-wide Standards for Particulate Matter and Ozone. These Standards set ambient air quality concentration targets for ground-level ozone and fine particulate matter for the year 2010. Environment Canada is working with provinces and territories to develop comprehensive emission reduction strategies for a number of major industrial sectors in Canada. The provinces and territories are undertaking other measures focusing largely on existing commercial and industrial sources to ensure that the new standards will be met by 2010. Other important air quality-related Canada-wide Standards either adopted or accepted in principle by federal, provincial and territorial Ministers in June 2000 address mercury, benzene, dioxins and furans.

As members of the Canadian Council of Ministers for the Environment, the provinces are committed to the CCME Pollution Prevention Strategy and are responsible to implement initiatives in keeping with this strategy. Three provinces to date have developed a formalized pollution prevention program. Other provinces are in the process of formalizing their programs and presently have elements of pollution prevention in their existing environmental protection programs.

British Columbia

There is no specific legislation in British Columbia (BC) addressing pollution prevention. Pollution prevention is seen as an overall philosophy within the Pollution Prevention and Remediation Branch of the BC Ministry of Water, Land and Air Protection. The branch's scope includes contaminated sites, stewardship programs, and the integrated pest management program, in addition to the pollution prevention program.

Pollution prevention initiatives have focused on large industrial sites, small and medium-size en-

terprises (SMEs), and municipal solid waste. In 1995, BC signed a memorandum of understanding (MOU) with six companies and the Canadian Chemical Producers Association to participate in a voluntary pilot project to demonstrate the feasibility of exploring pollution prevention planning as an alternative to, or adjunct to, the existing waste management permit system. These companies initiated pilot projects at their facilities to help test pollution prevention models and to gain the benefits of the process. Key concepts are pollution prevention, the use of public advisory committees and the commitment to continual improvement. The pilot program resulted in improved working relationships between facilities and the regulators.

Nova Scotia

In 1997, the Province of Nova Scotia released a discussion paper introducing the concept of pollution prevention and seeking suggestions for the development of a pollution prevention program and its delivery. With feedback received from various stakeholders in businesses, community and environmental groups, and all three levels of government, the Nova Scotia Department of the Environment developed its Pollution Prevention Implementation Plan. The formalized pollution prevention program has been implemented since 1998.

The legislation supporting the program is the *Activities Designation and the Environmental Assessment Regulations under the Nova Scotia Environment Act*. The program is voluntary at present. There are several memoranda of understanding (MOUs) in place, the agreements being with: the Dental Association, Nova Scotia Power, two hospitals, and two pulp and paper companies, and sectoral MOUs with printing and graphics, drycleaning, and body shop industry groups. The province also signed the United Nations Environment Programme's Declaration on Cleaner Production, thereby renewing and expanding the government's commitment to pollution prevention.

Ontario

In 1992, the Ontario Ministry of the Environment established an organizational unit (the Pollution Prevention Office) to focus its pollution prevention efforts. The current program is implemented by the

Partnerships Branch, which addresses non-regulated programs.

Ontario has encouraged the adoption of pollution prevention: by incorporating it into existing and new government programs and policies; by establishing voluntary pollution prevention partnerships; through a public recognition program which is now sunsetted (Pollution Prevention Pledge Program—"P4"); and through the creation of special training materials and the sponsorship of seminars and educational programs, including videos, guidebooks, environmental management systems, case studies and codes of management practice.

Ontario has been involved in MOUs with five industrial sectors (auto parts manufacturing, chemical producers, metal finishers, motor vehicle manufacturers, and the printing and graphics sector) and Environment Canada. Other active pollution prevention partnerships with community, commercial and institutional groups include: the Emery Creek Environmental Association, the healthcare sector, autobody refinishers, and marinas. Previous partners included the photo-processing mini-labs, industrial laundries, food processing sector, and restaurants.

The next few years of the pollution prevention program is expected to see the pollution prevention approach become incorporated in more of the Ministry's programs and become an operating principle for environmental management. The Branch is also studying how to make pollution prevention a stronger component of the Certificates of Approval.

Ontario also works in partnership with the federal government under the Canada-Ontario Agreement (COA). The purpose of COA is to renew and strengthen planning, cooperation and coordination between Canada and Ontario in implementing actions to restore and protect the ecosystem; to prevent and control pollution; and to conserve species, populations and habitats in the Great Lakes basin ecosystem. Implementation of this Canada-Ontario Agreement will contribute substantially to meeting Canada's obligations under the revised Canada-US Great Lakes Water Quality Agreement as amended by the 1987 Protocol.

To date, contributions by Canada and Ontario to the virtual elimination of priority toxic substances include bans or restrictions on the generation or use of PCBs, DDT, chlordane, mirex, dieldrin and

toxaphene. These restrictions have contributed to dramatic reductions in the levels of these substances in fish and wildlife in the Great Lakes Basin ecosystem. Through both voluntary actions and regulatory programs, significant reductions in the levels of other toxic substances have taken place.

The ultimate goal of Canada and Ontario is to achieve the virtual elimination of persistent, bioaccumulative and toxic substances from the Great Lakes basin ecosystem by encouraging and implementing strategies consistent with the philosophy of zero discharge. The application of the zero discharge philosophy requires multi-media and life-cycle pollution prevention approaches in order to reduce and eventually eliminate the formation of persistent, bioaccumulative and toxic substances. Continued application of the zero discharge philosophy, both in the Great Lakes basin and outside the basin, will be necessary to achieve the long-term goal of virtual elimination. The COA 2001 Agreement is guided by the vision of a healthy, prosperous and sustainable Great Lakes basin ecosystem for present and future generations.

Other Provincial Initiatives

Manitoba

In 1996–97, the promotion of pollution prevention as the environmental management strategy of choice was actively pursued through a partnership established between Manitoba Environment and the Alliance of Manufacturers and Exporters Canada (Manitoba Division). Through this project, draft information materials were prepared, and success stories were researched. Other activities carried out included support of pollution prevention initiatives by the Manitoba Heavy Construction Association, Winnipeg Construction Association, Winnipeg Chamber of Commerce and the Manitoba Green Procurement Network.

Alberta

Alberta Environment encourages and, where appropriate, facilitates voluntary initiatives to engage in pollution prevention. The Alberta Leaders Environmental Approval Document (LEAD) Pilot Program provides access to a voluntary, initiatives-based, option within the command and control approach. The LEAD program offers to good environmental performers the recognition and the regulatory flex-

ibility that goes with the public trust that they have earned. Facilities wishing to participate in the pilot apply to do so by preparing a draft LEAD approval and other Pilot Program documents for review by the department and by the public.

Quebec

The St. Lawrence Action Plan, launched in 1988, was designed to clean up the St. Lawrence ecosystem, improve the health of communities and increase access to the river. During the first ten years of the plan, a 96 percent reduction in toxic effluent releases from 50 industrial plants was achieved. The plan's success is due largely to the close working relationship between the federal and Quebec governments. Other partners include private companies, universities, environmental groups, research centers and local organizations. Phase III (1998–2003) of the St. Lawrence Action Plan is focusing on a prevention-based approach in the areas of biodiversity, agriculture, industry, health and navigation. Community organizations also play an increasingly active role in the clean-up of the St. Lawrence ecosystem. Environment Canada, its federal partners and the Quebec government will focus their efforts on pollution prevention in the chemicals, metallurgy and metal finishing sectors.

1.4 Municipal Efforts

Canadian municipalities, at the forefront of efforts to achieve sustainability, must show leadership with environmentally responsible operations and public education on environmental issues. 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.

Below are a few examples of Canadian municipal pollution prevention efforts.

The use of chemical pesticides on public and private lands in Canada is widespread, and many Canadians are concerned with perceived or potential health effects on their children. Several Canadian municipalities have enacted new bylaws that enforce the reduction or elimination of pesticide use. Two large pesticide application companies brought one of these municipalities to court to challenge the by-

law. They lost challenges to the bylaw in two Quebec courts before appealing to the Supreme Court. The Supreme Court of Canada, on 28 June 2001, also upheld the bylaw that banned the cosmetic use of pesticides within municipal boundaries, including private property. The decision has broad implications for the use of pesticides across Canada, and for municipalities' right to regulate themselves. The precedent-setting case in support of local pesticide reduction initiatives is consistent with the precautionary principle. Many nongovernmental organizations are involved in the communities and municipal governments in the area of responsible pest management. A national strategy was developed by the Federation of Canadian Municipalities (FCM), in the spring of 2000 to encourage the responsible use of pesticides, encourage alternative pest management practices and make people aware of the possible effects of pesticide use. The decision to create a strategy recognized growing community concerns about human and ecosystem health, pest management costs, and initiation of individual municipal government programs to reduce pesticide use. FCM will continue its work to develop strategies and tools to assist municipal governments and decision makers in establishing pest management programs that will allow reduction of pesticide use appropriate to their individual community needs and desires.

Municipalities are key partners in efforts to reduce greenhouse gas emissions and to improve air and water quality. Through two funds, the Government of Canada is providing municipalities with \$125 million toward these efforts from 1999 to 2003. The Green Municipal Enabling Fund is a five-year fund that provides grants to cost-share energy audits and feasibility studies on projects designed to reduce greenhouse gas emissions and improve air and water quality, as well as to encourage the sustainable use of renewable and non-renewable resources. The Green Municipal Investment Fund provides loans to enable recipients to carry out direct energy efficiency measures such as retrofitting buildings and public transit systems.

The City of Toronto is the first municipality in Canada to incorporate pollution prevention planning requirements into its sewer use bylaw. The bylaw was passed in July 2000 and requires industries to prepare pollution prevention plans with the goal of improving the quality of water and biosolids. The bylaw requires companies that discharge any of the "subject pollutants," as defined in its new bylaw (11

metals and 27 organic compounds), to submit a detailed pollution prevention plan every six years, as well as a summary every two years.

The Greater Vancouver Regional District's (GVRD) Demand Side Management (DSM) Division coordinates DSM policy development within the GVRD and with other partners, and develops and delivers DSM programs for the GVRD's drinking water, liquid waste and solid waste utilities, and its air quality function. Pollution prevention theory and approaches are included in the set of tools used and developed by the DSM Division to meet its objectives. DSM is moving toward integrated, multi-media approaches to the delivery of regional and corporate programs. GVRD recently underwent a consultation process with industry in the review and update of its sewer use bylaw. This bylaw provides the means to regulate the discharge of non-domestic waste into the sanitary sewer from industrial and commercial/institutional sources. The consultation process concluded that pollution prevention in the region should be initiated with a program that is based on pollution prevention information, outreach, and training support, complemented by a recognition program. The pollution prevention program should initially be voluntary, seek industry cooperation, and emphasize education. The complementary recognition program is intended to provide industry with incentive to consider and implement pollution prevention approaches to environmental management. Changes to the sewer use bylaw are not, at this stage, required to implement the voluntary pollution prevention program. Recommendations regarding the proposed voluntary pollution prevention program were supposed to be made to the GVRD Board in the spring of 2002.

The Halifax Regional Municipality implemented the first phase of its Pollution Prevention Plan with continued technical support and strategic advice on at-source control issues from Environment Canada and the Nova Scotia Department of the Environment. Regulatory initiatives involved obtaining amendments in provincial legislation to accommodate municipal bylaw changes toward pollution prevention and better enforcement. The educational aspect involved photo finishing, metal finishing and auto body repair business sectors in compliance promotion visits.

1.5 Voluntary Programs

In the 1990s, Canada gained experience with industrial participation in a number of pollution prevention initiatives. Many of these programs provided resources towards the delivery of demonstration projects, guidance materials and training programs and led to the advancement of the preventive approach in sectors such as agriculture, healthcare, mining, tourism and furniture making.

The Accelerated Reduction/Elimination of Toxics (ARET) program is a multi-stakeholder pollution prevention and abatement initiative involving industry, health and professional organizations, as well as governments across Canada. The program was established in 1994 and sunsetted in 2000. Through voluntary actions, ARET sought a reduction of 90 percent of 30 selected persistent, bioaccumulative and toxic substances as well as significant reductions in emissions of another 87 toxic substances. The report *Environmental Leaders* shows that toxic emissions from 169 companies decreased by 67 percent (26,360 tonnes) in 1998, and 43 percent of the 169 companies have achieved year 2000 targets. In 1999–2000, a renewal process for ARET was initiated and a discussion paper was released. Issues presented include increasing participation in ARET, evaluating the current ARET substances list with the objective of adding/deleting certain substances based on scientific data and verifying the data reported by ARET participants. A successor program to ARET is still in the development process.

Canada has also entered into successful pollution prevention agreements with specific industry sectors, notably Canadian vehicle manufacturers, auto parts manufacturers, chemical producers, metal finishers, dry cleaners, and the printing and graphics industry. For example, the memorandum of understanding signed with Ford, General Motors and DaimlerChrysler commits these companies to reduce and/or eliminate the use, generation and release of the agreed-upon list of 65 substances of concern.

In June 2001, after many months of discussion and consultation, the federal Minister of the Environment approved the Policy Framework for Environmental Performance Agreements. The four essential principles identified in the policy are: effectiveness, credit, transparency/accountability and efficiency.

Based on this policy framework, Canada is in the process of designing a new pollution prevention voluntary program. The proposed program will target action on toxic substances and other substances of concern. It will promote the use of pollution prevention planning and encourage the use of environmental management systems. It will recognize companies that engage in promoting pollution prevention activity in their supply chain, that undertake mentoring activities and that manage downstream activities such as through extended producer responsibility programs.

1.6 Information, Technical Assistance and Recognition

Information

One of the commonly cited barriers to the implementation of pollution prevention is the lack of technical information. In Canada, two pollution prevention information services are coordinating efforts to support a broad range of audiences. The Canadian Pollution Prevention Information Clearinghouse (CPPIC) is an Internet-based resource linking to pollution prevention tools and information. The CPPIC offers complimentary services that include: diverse delivery mechanisms; 1–800 and e-mail enquiry service; information search and research expertise; newsletter and monthly bulletin production; e-mail list server operation; and coordination with information networks, worldwide.

Technical Assistance

Smaller companies make up a greater part of business in Canada. Many such enterprises do not have the resources readily available to invest in pollution prevention projects. Small and medium-size (SMEs) enterprises have traditionally been difficult to reach, mobilize or engage in any improvements to do with the environment. In Canada, new solutions to sustainability issues are evolving for small business. The Toronto Region Sustainability Project, Enviroclub, the Region of Waterloo's Business Water Quality Program and the Ecoefficiency Centre are some examples of the unique initiatives that deliver accessible technical assistance to SMEs.

The Toronto Region Sustainability Program aims to involve selected small and medium-size enterprises in pollution prevention planning, toxic reductions,

smog reductions and eco-efficiency. The program is an agreement between three levels of government (the Province of Ontario, the City of Toronto, and Environment Canada). OCETA (Ontario Centre for Environmental Technology Advancement) is contracted to run the project. It identifies businesses showing potential for this type of program, hires environmental consultants to conduct pollution prevention audits of participating businesses, identifies problems and potential solutions and facilitates access to financing to undertake pollution prevention projects.

EnviroClub is a similar concept that was started by Environment Canada in the Province of Quebec. The objective of an EnviroClub is to help small and medium-size enterprises improve their environmental performance, competitiveness and profitability. Because many pollution prevention projects have a “return-on-investment” that is attractive to small businesses, this has proven to be a strong marketing message. EnviroClub also shares, with participants, the costs of environmental audits at facilities. Participants have the choice of implementing identified pollution prevention projects or of developing an environmental management system for the facility. A total of 21 businesses have signed on to carry out seven projects to reduce or eliminate toxic materials, ten projects to reduce greenhouse gas emissions, and four projects to prepare and implement environmental management systems.

The Ontario Regional Municipality of Waterloo’s Water Resources Protection Strategy promotes the implementation of best management practices to minimize the impact of land uses on municipal water supplies. The Business Water Quality Program provides financial incentives for businesses to implement measures to reduce impacts on groundwater, surface water and the sanitary sewer.

Located in Burnside Industrial Park in Dartmouth, Nova Scotia, the Ecoefficiency Centre is a non-profit, arms-length educational and technology assistance center. The Centre is proving to be a practical and efficient way to engage businesses in making both environmental and economic improvements. Officially opened on 23 September 1998, the mandate of the Centre is to move the environmental agenda forward by demonstrating that the right environmental choices can help business reduce costs and/or generate new revenue. Work is being focused on the Burnside Industrial Park and the Centre provides businesses with in-

formation on waste minimization, conducts waste assessments and organizes seminars.

Recognition Programs

Some jurisdictions in Canada have developed recognition programs to reward and promote environmental initiatives undertaken by businesses. Recognition programs serve to recognize businesses that have worked diligently to excel at uniting both economic and environmental objectives successfully in their respective industries, while serving as models to their competitors.

The Canadian Council of Ministers of the Environment (CCME) presents national certificates of recognition to organizations showing leadership in pollution prevention in several award categories.

The Pollution Prevention Pledge Program (P4) of the Ontario Ministry of the Environment is an incentive and recognition program that encourages the adoption of pollution prevention and pollution prevention planning. P4 acknowledges environmental achievements including reduction or planned reduction in releases of chemicals to the environment, lowering the use of toxic chemicals, and diminishing the generation of disposal of hazardous or liquid industrial wastes.

1.7 NGOs and Citizen Efforts

Using improved information tools and resources, Canadians are increasingly taking community-based action in response to environmental challenges.

The CEPA Environmental Registry is a comprehensive source of public information relating to activities under the *Canadian Environmental Protection Act* of 1999. In addition to providing up-to-date copies of current CEPA instruments, the primary objective of the Environmental Registry is to encourage and support public participation in environmental decision-making, by facilitating access to documents arising from the administration of the Act.

Citizens also have access to a variety of Internet information tools such as Environment Canada’s Canadian Pollution Prevention Information Clearinghouse and Canadian Pollution Prevention Success

Stories. With the support of the EcoAction fund, communities across Canada were able to address issues such as pest management, oil spill prevention and wood stove purchasing.

TerraChoice Environmental Services Inc., on behalf of Environment Canada, manages and delivers the Environmental Choice Program (ECP). ECP is an eco-labeling program that helps individuals, corporations and governments make informed purchasing decisions to reduce their environmental impacts. About 3,000 brand name products in about 125 product categories now bear ECP's EcoLogo, including products such as appliances, cleaners, office equipment, electricity and paints.

Environment Canada has played a lead role in promoting and coordinating youth participation in several domestic events and two international events—United Nations Environment Programme's Sixth International High-level Seminar on Cleaner Production, and the International Pollution Prevention Summit. Along with increasing their awareness of pollution prevention issues, the youth representatives shared their dynamic and insightful views of today's environmental concerns.

1.8 International Agreements

International agreements, to which Canada is a signatory, frequently provide a basis for national and provincial legislation and other activities, which involve the application of pollution prevention principles. A few of Canada's efforts with global partners are listed here.

Asia-Pacific Economic Cooperation (APEC)

While APEC's main interest is in trade and investment, Canada looks for opportunities to advance the promotion of cleaner production and sustainable cities.

Commission for Environmental Cooperation (CEC) of North America

The CEC provides a forum for stakeholders from Canada, Mexico and the United States to build on each others' expertise and initiatives to generate synergy and advance pollution prevention. Un-

der the Capacity Building for Pollution Prevention project, a trinational partnership of North American Pollution Prevention Roundtables was struck to meet regularly and identify initiatives of common interest, to build on the capacities of the three organizations, and take collective actions for achieving sustainable development.

Organization for Economic Co-operation and Development (OECD), the Environmental Policy Committee (EPOC)

Recognizing that the success of domestic initiatives is becoming increasingly dependent on coordinated multilateral approaches, Canada is actively involved in EPOC, to support the interests of Canada and the Americas. Current initiatives include: economic and environmental policy integration looking at economic instruments and voluntary approaches; social and environmental policy integration, particularly environmental justice, the effects of environmental policy on employment, and health and environmental issues; sectoral policy integration in transport, agriculture and construction; resource-efficiency; sustainable consumption; and waste prevention and management.

Summit of the Americas

Canada supports initiatives such as the Roundtable of the Americas for Cleaner Production in furtherance of its efforts to promote partnerships among government, industry and civil society. This collaborative effort involves the advancement of the Plans of Action and the Global Pollution Prevention Information Network endorsed and the International Pollution Prevention Summit.

United Nations Environment Programme (UNEP)

Canada has strong interest in UNEP's Cleaner Production and Consumption activities. Agenda 21, adopted at the Rio Earth Summit in 1992, has provided a plan of action in support of a global partnership for sustainable development. Canada contributes by participating at various cleaner production roundtables, worldwide. Canada hosted UNEP's Sixth International High-level Seminar on Cleaner Production, in October 2000, in Montreal, in conjunction with the first International Pollution Prevention Summit.

Canada also signed UNEP's Declaration on Cleaner Production, thereby re-enforcing its commitment to pollution prevention and cleaner production, and challenged other Canadians to emulate. Canada counts 13 signatories to date: two provinces, one municipality, five companies, three associations and one university.

2

Mexico

The idea of pollution prevention was not introduced into the Mexican Law until 1971, with the enactment of the *Federal Law for Pollution Prevention and Control*. This first environmental law was mainly focused on corrective actions and health-related issues.

The *Federal Law on Environmental Protection*, issued in 1982, introduced “command and control” environmental provisions and conservation of natural areas. In 1983, the government reformed Articles 4, 25 and 27 of the Mexican constitution to deal with the overall protection of the environment. Article 27 was further modified in 1987 to recognize the duty of the State to protect the environment.

These progressive improvements in the Mexican Constitution resulted in the enactment in 1988 of the *Ley General del Equilibrio Ecológico y la Protección al Ambiente* (LGEEPA)—*General Law of Ecological Equilibrium and Environmental Protection*. This law allowed for the implementation of more effective environmental policies. A Secretary was created, a more integrated vision was incorporated and de-centralization was also included to empower states and municipalities to conduct environmental protection action. However, the environment was not yet included in the country’s overall development strategy.

In the 1990s, international factors influenced the government's environmental views, including: signing of the North American Agreement on Environmental Cooperation in 1993, which created the North American Commission for Environmental Cooperation, which has among other mandates that of promoting pollution prevention within NAFTA's partners; OECD efforts on anticipative environmental strategies; and the Earth Summit in Rio de Janeiro. These advancements resulted in further modifications to LGEEPA in 1996 and 2001 to recognize sustainable development as well as environmental compliance.

In contrast with its NAFTA partners, in Mexico the states and municipalities have not played important roles in environmental compliance. The federal government has had direct control over sectors that are important in pollution generation, such as energy generation, oil extraction, mining and, in particular, hazardous residues from all industrial sectors; besides, the 3000 or so larger industries (the main fraction of industrial GNP) are audited by the Federal Environment Attorney.

Overall it can be stated that even though good progress has been made in the last five years, the pollution prevention concept is still not yet fully comprehended by industries, industrial organizations, or the government at federal, state and municipal levels.

2.1 Environmental Regulations

The LGEEPA provides the framework for several environmentally related regulations and standards, including five specific regulations on environmental assessments, environmental impact, hazardous residues, emissions by cars and vehicles and noise, as well as 73 *Normas Oficiales Mexicanas* (NOMs).

The 1996 modifications to LGEEPA set the foundation for pollution control and prevention. Although prevention is not clearly defined as "prevention at the source of generation," it is included in the economical instruments section as well as a self-regulatory approach in the policy section, which may provide an incentive to pollution prevention, particularly in the industrial sector.

Regulations and standards still focus mainly on control of emissions and no regulation specifically includes prevention at the source so far.

The *General Law for Prevention and Integral Management of Waste*, passed by the Mexican Congress in April 2003, has included the preventive concept and philosophy in waste management. Pollution prevention has been incorporated within the Internal Rules of Semarnat.

2.2 Pollution Prevention Policy

Preventive concepts were introduced in Mexico's National Development Plan 2001–2006, as well as in the National Environmental and Natural Resources Plan 2001–2006. (The preventive concepts had been incorporated in the previous National Development Plan 1995–2000, but not as specifically). These two achievements were a result, in part, of the efforts of the P2 Policy working group, headed by the Mexican Cleaner Production Centre during 1999–2001. This would set the foundation for the incorporation of the pollution prevention concept as a state national policy.

The National Development Plan 2001–2006 establishes policies for sustainable development, with a long-term vision to increase competitiveness while respecting the environment. Objectives of these national policies are the following:

- Promote sustainable use of natural resources and efficient use of water and energy.
- Promote an integrated and decentralized environmental management.
- Strengthen scientific research and technological innovation.
- Promote the adoption of clean technologies and processes.
- Promote education and training processes.
- Improve the environmental performance of federal public administration.
- Continue the design and implementation of a national strategy of sustainable development and greenhouse gases mitigation.

Pollution Prevention Policy Working Group

A policy working group was organized by the Mexican Cleaner Production Center that included high-level federal and state government environmental officers, congressmen, university representatives, key industrial chambers, financial organizations and NGOs. A workshop and several meetings were

held between 1999 and 2001. A white paper was produced in which barriers were outlined and a work plan for the advancement of the concept was developed. Identified among the main barriers to the adoption of pollution prevention were:

- the lack of a clear definition of the concept in the LGEEPA;
- environmental regulation focused mainly on command and control;
- resistance to change;
- lack of more integral dissemination and knowledge of concept;
- lack of economic capacity in micro- and small and medium-size enterprises;
- lack of adequate financing schemes;
- insufficient tax incentives; and
- lack of personnel trained in this new concept.

At the same time, work regulations were reviewed with the following legal, institutional and general barriers being determined:

- lack of sector studies to determine pollution prevention needs;
- not enough coordination between federal, state and municipal level authorities, together with the lack of economic and human resources and lack of interest or clashing interests between the different levels of government;
- non-existent economic resources for the promotion and execution of pollution prevention projects;
- lack of a multimedia vision as well as deficient and disperse legislation with non-effective enforcement by diverse authorities; and
- lack of agreement instruments, particularly for the smaller enterprises.

At the operating level the main barriers for further diffusion of the concept were the following:

- There is an excess in the availability of environmental consulting services.
- Executive and operating personnel in industries already face a huge workload.
- The environmental market is fully controlled by end-of-pipe technology and techniques.
- There is a lack of credibility in the pollution prevention concept and in the specific organizations that offer the services.

- Industry cannot distinguish between pollution prevention and other environmental or quality services offered.
- There is a lack of support from environmental agencies, due to lack of clarity in government's pollution prevention policy.

As a result of these discussions and findings, the Mexican Pollution Prevention Roundtable was launched, at the beginning of 2000, as a joint initiative of the Mexican Cleaner Production Center and the North American Commission for Environmental Cooperation. The objective of this collaborative effort is to give more diffusion to the concept and to coordinate the activities and resources directed towards the advancement of pollution prevention in Mexico.

2.3 National Plans, Programs and Agreements

Since 1995, the federal government has developed a range of programs, some of which have included pollution prevention concepts. Both government and industrial sectors have signed several agreements to work collaboratively. However, the implementation of the agreements has lacked resources from both government and the private sector.

At the same time, efforts have been directed towards demonstration projects to show the successful application of prevention measures in a several regions of the country (Monterrey, Guanajuato, Mexico City, Queretaro, San Luis Potosi, Villahermosa, Zacatecas, Morelia, and the US border states), as well as in some sectors (electroplating, foundry, chemical industry, hospitals, others).

It is important to highlight the fund created by the government and the private sector to encourage energy saving (FIDE), as well as the National Commission for Energy Saving (Conae). The FIDE fund has worked successfully for over 10 years, providing funding for the adoption of more energy-efficient motors, lighting and equipment.

In the past 10 years there have been over 25 actions and initiatives from the Mexican private sector directed towards improving environmental performance and competitiveness, such as GEMI, Responsible Care, and eco-efficiency. Four of these include pollution prevention and six involve envi-

ronmental management systems. However, these have been directed primarily at medium and large enterprises and have not had enough resources to expand their impact.

2.4 Internationally Supported Programs

As part of its worldwide initiative to promote cleaner production, during 1993–1994, UNIDO supported a pilot program to demonstrate cleaner production in three sugar cane mills. This gave rise at the end of 1995 to the Mexican Cleaner Production Center (MCPC), established jointly with the *Instituto Politecnico Nacional* and the National Chamber of Transformation Industry. Since then, the MCPC has worked with over 50 enterprises of different sectors and increased capacity by training more than 1000 people.

US AID supported the MCPC in 1996 as part of a global EP3 project, enabling the MCPC to work in other areas of the country, particularly with a focus on energy-saving projects. US AID has also supported policy and training work, specifically work on Environmental Management Systems in Tlalpan, a municipality of Mexico City.

Other initiatives include work performed with the support of the German Technical Cooperation Agency, GTZ, in the Mexico City area, as well as with the National Chamber of Transformation Industry and the National Institute of Ecology. Other pollution prevention work has been developed by the Global Environmental Management Initiative (GEMI), and the World Business Council for Sustainable Development. At the Mexico and United States border, pollution prevention activities have been developed by the Border Environment Cooperation Commission (BECC), working with the *maquila* sector. Other efforts have been conducted by the US-Mexico Foundation for Science in Tamaulipas and Chihuahua.

In 1995, the North American Commission for Environmental Cooperation (CEC) carried out a study to determine the status of pollution prevention activities in North America. The study resulted in a series of recommended actions for the three countries, taking into account their differing economic conditions and stages of development. The study concluded that the initiatives of the institutions promoting pollution prevention were well developed in Canada, reasonably developed in the

United States and just beginning to be developed in Mexico. Lack of information, technology and financing were among the primary reasons identified as to why these kinds of initiatives are not carried out. The study recommended the following:

- Promote information exchange to ensure that current activities in this area are not isolated from one another.
- Institute technical support for pollution prevention.
- Create projects that can demonstrate to business people the benefits of pollution prevention initiatives.
- Offer appropriate financing mechanisms for these projects.
- Implement industrial policies and practices that can stimulate companies to build relationships of productive linkages to incorporate principles of pollution prevention.

The CEC undertook ten pilot projects in 1996 through 1998 to demonstrate the economic and environmental benefits of pollution prevention techniques and technologies in different industrial sectors, including tanneries, paint production, glass production, foundries, metal finishing, and food processing.

In 1996, the CEC and the main industry association in Mexico, Concamin, created a pilot fund, Fiprev, for pollution prevention projects in small and medium-size businesses in Mexico, which started to grant loans at the end of 1998. The CEC provided technical support to the fund, which is administered by Funtec. The fund comprises around US\$3 million.

As of September 2003, Fiprev has granted 61 loans, totaling approximately US\$1,450,000. It is estimated that the environmental benefits generated by these projects to date have included a saving of nearly 2,800 tons of chemicals per year—and 5,800 since the first project was implemented—not dumped into runoff waters, and around 150,000 cubic meters of water annually (310,000 cubic meters since the first project was implemented). This has generated a collective economic savings for the companies of around US\$1,300,000 each year—more than 2.2 million since the beginning of the initiative.

The North American Development Bank (NaD-Bank) mandate includes the promotion of clean

energy, energy efficiency, transportation, water conservation, industrial/hazardous waste, and waste reduction/recycling, among other objectives. Pollution prevention is being promoted and the area of influence will be expanded to 300 km within Mexico from the border, by 2003. This is opening a window of opportunities to promote pollution prevention in the northern border states of Mexico. A project on energy efficiency was recently approved in Mexicali for about US\$3 million.

2.5 Mexican Pollution Prevention Roundtable

The Mexican Pollution Prevention Roundtable (MRPCM) started its activities in January 2000. Its objective is to serve as a space of communication and knowledge and experience interchange, to show existing necessities to successfully implement pollution prevention, and to promote joint programs to improve the Mexican environment according to anticipative approaches.

The Directive Board is formed by a group of 13 organizations belonging to the private sector, governments, research and education institutions, NGOs, and financial institutions in Mexico.

The roundtable has five working groups, focusing on the following topics:

- 1 P2 implementation in industry and services
- 2 Policies that promote P2
- 3 Education and training for P2
- 4 Tools supporting P2 initiatives
- 5 P2 funding mechanisms

The main results of the roundtable so far have been: raised awareness in different sectors and geographical areas of the country; signature of some agreements of cooperation between different contributors in the roundtable; recognition by the Ministry of Environment and Natural Resources; a catalog of pollution prevention success stories in the country; and the formation of the five working groups.

The roundtable is now working with representatives of Colombia in order to promote the Americas P2 roundtable. A document has been prepared with a specific proposal that builds over previous efforts under the Summit of the Americas project.

The roundtable's positions are the following:

- 1 There is a growing interest among Mexican P2 stakeholders to attend this kind of event and to institutionalize its organization.
- 2 Funding in order to finance P2 projects seems to be one of the main concerns in the private sector.
- 3 Understanding of the P2 concept among SMEs is an important issue that has to be addressed in the near future to assure success in the introduction of P2 practices among them.
- 4 In practice there is no pollution prevention policy in Mexico. This is an important aspect that has to be addressed, now that the environmental policy in Mexico will be presumably modified by the new administration.
- 5 There is a growing demand in the private sector for specialists in environmental compliance. P2 contents are not well represented in academic curricula of Mexican universities and there is a need to shift from the traditional end-of-pipe approaches in environmental education, to those anticipative and preventive, particularly related to process design and control.
- 6 Even though there exist many tools that support P2 projects, they are not well known in Mexico and need to be promoted a lot more vigorously.
- 7 P2 efforts and results should be measured in terms of the costs and benefits that society has incurred and accrued in promoting the P2 philosophy around the country.

2.6 Regional efforts

2.6.1 Pollution Prevention Roundtables

Interest has grown in creating P2 roundtables to respond to local problems from a local perspective, as well as to foster a more efficient use of regionally available capacities.

Two regional roundtables exist in Mexico: one in the North East and another in the North West: the first grouping the States of Tamaulipas, Nuevo León, Coahuila and Texas, and the second having the participation of both Californias. Another roundtable for the region of Bajío is in process of being created.

2.6.2 Pollution Prevention Centers

Three regional P2 centers are being created in Mexico, with support of the InterAmerican Development Bank, in Chihuahua, Villahermosa and Guanajuato. It is expected that more P2 centers will be opened in the near future, to strengthen capacities for pollution prevention in the main industrial areas of the country.

2.7 Voluntary Programs

Auditoria Limpia was created in 1992 as a voluntary program geared towards improving industry environmental performance in Mexico. Even though the program is not exclusively oriented toward the P2 philosophy, it includes P2 measures in many cases. Profepa and INE are now developing a series of performance indicators that include some related to pollution prevention measures such as savings in raw materials and energy, as well as reductions in emissions related to these kind of measures.

Two other voluntary programs set up by industry are *Responsabilidad Integral* and GEMI.

3

United States

Since the Industrial Revolution, the United States' environmental policy has focused on end-of-pipe environmental remediation, control and disposal. The end-of-pipe approach involves combating pollution, regardless of what form (solid or hazardous waste, air emissions or water discharge), only after it has been created.

Another outdated aspect of the nation's environmental policy framework is the single-medium approach to environmental problems. Single-medium approaches focus on one specific environmental medium (i.e., land, water or air) at a time, generally to the exclusion of other media.

The US takes the single-medium approach because the major environmental statutes are single-medium in scope. The *Clean Air Act*, the *Clean Water Act* and the *Resource Conservation and Recovery Act* (RCRA), each focuses on an individual medium. They contain strong measures that focus on end-of-pipe approaches to meet requirements. These statutes are at the core of the nation's environmental protection strategy. They have produced admirable results over the years, but are now facing the law of diminishing returns in the face of new, complex environmental challenges such as global climate change, energy and water shortages and persistent, bioaccumulative toxics that pass easily from one medium to the next. Today's challenges demand a more innovative and vigorous approach.

3.1 Pollution Prevention

The key to achieving a sustainable society and tackling the complex environmental challenges of the 21st century is pollution prevention. The idea has been discussed since 1976, but has only lately gained widespread support from both the private and public sectors. It is an environmentally sound and cost-effective practice that prevents pollution before it is created.

The basis of US policy is the federal statute the *Pollution Prevention Act of 1990*. Under Section 6602(b) of the Act, (Source: Habicht II, Henry F. Memorandum: EPA Definition of Pollution Prevention. US Environmental Protection Agency, 28 May 1992.) Congress established a national policy that:

- pollution should be prevented or reduced at the source whenever feasible;
- pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible;
- pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and
- disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

This national policy created a hierarchy of preferred options for dealing with environmental pollution that officially places prevention at the top of the list.

The *Pollution Prevention Act of 1990* also charged EPA with defining "pollution prevention." According to the EPA's official definition, pollution prevention means "source reduction," as defined in the *Pollution Prevention Act*, but also includes "other practices that reduce or eliminate the creation of pollutants through (1) increased efficiency in the use of raw materials, energy, water, or other resources, or (2) protection of natural resources by conservation." Source reduction is defined under the Act as any practice which:

- reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and
- reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. Source reduction includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

Note that the *Pollution Prevention Act of 1990* also promotes toxics use reduction, by requiring owners and operators of businesses that must file a toxic chemical release form (under the 1986 *Emergency Planning and Community Right-to-know Act*, or EPCRA) also to include a toxics reduction and recycling report. Thus, in the US, source reduction and toxic chemical use substitution together make up industrial pollution prevention.

An important feature of the *Pollution Prevention Act of 1990* is that, except for the EPCRA toxics reduction reporting requirement, the Act does not require the private sector to implement any pollution prevention activities "inside the fence," nor "outside the fence," beyond existing laws' end-of-pipe requirements for safe treatment and disposal of pollutants. In the US, pollution prevention is almost entirely voluntary. The Act itself is directed almost entirely at EPA, which is charged to:

- develop and implement a strategy to promote source reduction;
- provide grants to the States to promote source reduction by businesses; and
- establish a database about source reduction.

These charges pose major challenges, which have yet to be fully surmounted.

One challenge is for EPA to motivate companies to do P2, given the limited regulatory clout in the *Pollution Prevention Act*.

In 1996, *Economic Analysis of Federal Regulations*, the report of a Federal Interagency group, was published. It recommended guidelines for performing economic analysis of proposed Federal regulations. The report recommended that the regulators consider using new regulatory alternatives:

- Performance-based standards
- Alternative monitoring and reporting methods to ensure compliance
- Informational measures
- Economic (market) incentives

In the US, P2 is largely driven by economic incentives, through setting performance-based standards for controlling emissions, and by public access to information about industrial facilities' chemical releases as well as information about pollution prevention. Voluntary P2 programs supplement regulation and enforcement "outside the fence," and US policy views them as more cost-effective than regulation for several reasons:

- P2 occurs "inside the fence," and often requires changes to production processes, which are usually unique and proprietary.
- Writing and enforcing regulations for each production stream, even if possible, would be very costly to EPA and to the regulated community.
- Firms' desire to increase profits through cost savings from P2 can make economic incentives very effective.

A second challenge is to provide technical assistance to industries, and to make technical information widely available. Under the *Pollution Prevention Act* the provision of technical assistance to companies takes place at the state level, through EPA grants to the states. The role of the states is discussed further below.

A third challenge is to establish a database about source reduction that is accessible, especially to small and medium enterprises that frequently lack human and capital resources to find and use it. While a large body of P2 information is avail-

able directly on EPA's web site or through links, it is often fragmented among different program offices' web pages, and it can be difficult to find specific documents.

3.2 Regulatory Pollution Prevention Tools

Beyond the requirements of Section 13106 of the *Pollution Prevention Act*, several regulatory programs require or encourage companies to develop P2 programs. These statutes and regulations, in and of themselves, also provide incentives for companies to minimize pollution to avoid being subject to the regulatory requirements in the first place.

- Under the *Clean Air Act*, Section 7412, companies that reduce their toxic air emissions by 90–95 percent may qualify for permit waivers.
- Under the *Clean Water Act*, Section 1252, EPA is mandated, in cooperation with federal state, and local agencies and industries, to develop programs for preventing, reducing, or eliminating the pollution of the navigable waters and ground waters and improving the sanitary condition of surface and underground waters.
- Under the *Clean Water Act*, Section 1342, EPA can put additional restrictions on permits (not included in the act). These frequently take the form of requirements for a pollution prevention plan and/or audit.
- Under the *Resource Conservation and Recovery Act*, Section 6922, hazardous waste generators must certify in their shipping manifests that they have a plan to reduce wastes, and report biennially on their efforts to reduce their volume and toxicity.
- Under the *Resource Conservation and Recovery Act*, Section 6927, EPA can make facilities describe their waste reduction program and inspect them to determine whether a program is actually in place.

An example of an effective federal regulatory tool to promote "beyond compliance" is the use of a Supplemental Environmental Project (SEP). A SEP, which is a voluntary agreement between a company facing a civil penalty (fine) and EPA, allows the company to partially fund an environmental project with a portion of the fine, add supplemental funding above and beyond the total amount of the fine, do an environmental project related to

the violation (*Clean Water Act, Clean Air Act, etc.*) with the monies, and pay the balance of the fine to the US Treasury. The most frequent type of SEP is a P2 project, which cannot be used to bring the company into compliance; it must reduce pollution below the permitted level.

A state agency can also stipulate that a P2 or EMS program be part of an operating permit. A number of states are conducting this green permit type program.

3.3 Public Information and Right-to-know Programs

TRI and other types of right-to-know programs publicly highlight environmental releases of about 650 chemicals used by industry. The reporting requirements of these programs help a company focus on its production process and the pollution it generates. The public component of the program helps put the spotlight on these firms, making it more likely that they will try to reduce their releases in the future.

Some have advocated reforming environmental reporting and permit programs so that reporting facilities essentially perform a pollution prevention audit—identifying the waste streams and exploring opportunities to reduce them—in the process of complying with regulatory requirements.

3.4 Federal Pollution Prevention Initiatives with Industry

- Design for Environment
- PBT Profiler
- Electronics Take-back Program
- Energy Star

3.5 Pollution Prevention Partners

Public and private sectors play different but equally important roles in the effort to promote pollution prevention.

Government regulatory drivers (statutes and regulations) provide incentives for companies to try to minimize pollution to avoid requirements in the first place. An example of an excellent regulatory measure is the use of pollution prevention and a

Supplemental Environmental Project (SEP). A SEP essentially means that an agency can require a company to implement a pollution prevention program as part of their settlement. A state agency can also stipulate that a pollution prevention program be part of an operating permit. There are a number of states conducting this green permit type program.

State and local governments, also offer very critical technical assistance to companies and communities to help them identify pollution prevention options tailored to their needs. There are numerous tools that are available, including public information clearinghouses, on-site assessments, and a score of publications featuring case studies and guidebooks. Government can also offer market-based incentives that include low-interest loans for pollution prevention equipment, reduction in reporting requirements, and recognition programs that promote a company's environmental performance.

The private sector plays the unique role of being the laboratory. They are able to experiment with different pollution prevention practices and techniques within their facility. Given the proper flexibility and support, they can provide some of the major technical and cost data crucial for pollution prevention to expand.

Nongovernmental organizations such as community councils and environmental groups play a huge role in the world of prevention. These groups play a huge advocacy role. They have in the past provided some of the visionary leadership that helped to shepherd the *Pollution Prevention Act* into reality in 1990.

Unfortunately, current environmental organizations have lost sight of that initial vision. They are entrenched in the old ways of doing things, fighting any inroads into the existing regulatory framework. In order for pollution prevention, the linchpin of sustainable development, to move forward the environmental community must again assume a visionary leadership role.

3.6 State Government

States have the opportunity to promote and encourage pollution prevention through regulatory programs (permitting, compliance inspections, and enforcement actions) as well as by acting as information clearinghouses—disseminating information about pollution prevention—and estab-

lishing and supporting state pollution prevention programs. In most states, pollution prevention remains a voluntary activity. **Table 1** presents some examples of state pollution prevention legislation.

3.7 Local Government

Local governments are also a key element in pollution prevention and control as their scope is narrower than that of the states' governments. Local government may provide resources for pollution prevention to both industry and the community. Some examples:

- King County, Washington, established the EnviroStars program. The goal of the EnviroStars program is to give business incentive and recognition for reducing hazardous waste, while giving consumers an objective way to identify environmentally sound businesses. EnviroStars uses a two-to-five star rating system. This program has received national recognition and has been adopted and modified by local governments in Washington and other states.

- In Allegheny County, Pennsylvania, the local government has adopted and modified the EnviroStars program. The program recognizes industries that implement pollution prevention practices and strategies. The program acknowledges three levels of excellence in pollution prevention. To meet any of the three recognition levels, an industry must go beyond the minimum regulatory requirements.
- The Florida Hazardous Waste Management Program provides pollution prevention training for local governmental agencies. The training assists in the development of a local pollution prevention program and provides necessary training for local industries.¹
- California's Consortium of Pollution Prevention Committees has joined in on the pollution prevention effort. This organization is comprised of chairpersons of local voluntary pollution prevention groups. The committees organized the first National Pollution Prevention Week. During this week, local government, environment, economic development programs, industry trade associations and environmental groups spon-

1. Florida Department of Environmental Protection. *Pollution Prevention*. 19 July 2002. <<http://www.dep.state.fl.us/waste/categories/p2/pages/services.htm>>.

Table 1: State Pollution Prevention Legislation

State	Pollution Prevention Legislation	Goal	Operation
California	<i>Hazardous Waste Source Reduction and Management Review Act of 1989</i>	<ul style="list-style-type: none"> • Source reduction by large quantity generators • Reduction of hazardous wastes by 5% from 1993 to 2000 	<ul style="list-style-type: none"> • Source reduction evaluation and plan • State provides technical assistance
Massachusetts	<i>Toxics Use Reduction Act of 1989</i>	<ul style="list-style-type: none"> • Waste reduction by regulation of toxic waste generation • 1/2 reduction of toxic waste generation by 1997 	<ul style="list-style-type: none"> • Establishment of Toxic Use Reduction Institute for technical assistance to industries • Toxic substances report and toxics use reduction plan
New Jersey	<i>Pollution Prevention Act (1991)</i>	<ul style="list-style-type: none"> • To shift from industry pollution control to pollution prevention • Reduction of hazardous waste and discharge by 1/2 over five years. 	<ul style="list-style-type: none"> • Requires reporting • State offers technical assistance • Funding provided by the Pollution Prevention Fund
Virginia	<i>Pollution Prevention Act (1994)</i>	<ul style="list-style-type: none"> • Voluntary pollution prevention through incentives and technical assistance for industry generators 	<ul style="list-style-type: none"> • Information and technical assistance provided by the state • Incentive: waste generator reduction planners more easily comply with environmental laws.

Source: Yurcich, Stefanie. *National Pollution Prevention Roundtable*. 1997. <<http://www.p2.org/>>.

2. California Department of Toxic Substance Control. *National P2 Week*. 19 July 2002. <<http://www.dtscc.ca.gov/PollutionPrevention/p2-background.html>>.

sor numerous events. The events focus on highlighting pollution prevention as a “way of doing business.” Local government agencies “implement the activities such as pollution prevention workshops, ‘model’ facilities tours, storm drain stenciling, awards programs, special training sessions, and resolutions and proclamations.”³

3.8 National Pollution Prevention Roundtable

The National Pollution Prevention Roundtable (NPPR) is the largest membership organization in the United States devoted solely to pollution prevention (P2). The Roundtable provides a national forum for promoting the development, implementation, and evaluation of efforts to avoid, eliminate, or reduce pollution at the source.

The Roundtable’s voting membership includes state, local, and tribal pollution prevention programs. Affiliate members include representatives from federal agencies, non-profit organizations, trade associations, academic institutions, private industry, Small Business Development Centers, state energy offices, and manufacturing extension programs. Public sector members, located in every state and internationally, operate programs that provide pollution prevention information and technical assistance to thousands of industrial, commercial and agricultural facilities each year. This information helps many of these facilities reduce the cost of both production and environmental compliance. The result is improved efficiency, reduced costs, increased competitiveness, and a better environment.

The Roundtable hosts an annual conference, which provides members a forum for exchanging the latest in pollution prevention (P2) research, policy funding opportunities, and technical expertise. The spring conference attracts representatives from the public, private, and government sectors. An annual dues fee makes the non-profit Roundtable as inclusive as possible. In addition to the annual conference, the central office located in Washington, DC, provides members with (1) access to information on legislative and regulatory development, (2) information on technologies and technical assistance programs, and (3) access to publications of state, local, and other related programs.

National Pollution Prevention Policy Papers

The Roundtable has issued a number of position papers addressing various relevant topics. These include papers concerning the expansion of TRI, the Performance Partnership Grant System, the 1995 *Clean Water Act* amendments and the *Small Business Regulatory Relief Act*. They also include comments to the General Accounting Office (GAO) regarding its January 1994 report titled *Pollution Prevention: EPA Should Reexamine the Objectives and Sustainability of State Programs*. Several of the policy papers are stored in their entirety in the appendix on the Roundtable’s web site.

Roundtable Workgroups

Roundtable members participate in workgroups, which focus on special cutting edge issues related to pollution prevention. The following are the current Roundtable workgroups: 1) Integration & Innovations, 2) Local Government, 3) Policy & Planning, 4) Research & Technology Transfer, 5) Information, 6) Education, Training, & Learning, and 7) Small Business. The Roundtable also has several formal discussion groups, including the Energy Efficiency & Pollution Prevention Task Force, International, Healthcare P2, and Environmentally Preferable Purchasing. Small Business, and Environmental Security.

NPPR’s International Pollution Prevention Activities

NPPR is active internationally. In November 1995, with funding from the German Marshall Fund of the United States, NPPR sent a delegation of eleven members to the Netherlands to attend the European Roundtable on Cleaner Production and Cleaner Products. This meeting provided NPPR with an opportunity to discuss the status of P2 and cleaner production with its European counterparts and to explore future long-term partnerships between the National and European Roundtables. The two Roundtables also launched a joint computer list server discussion forum, P2Trainer, focusing on education and training issues. In subsequent years, NPPR has sent representatives to the European Roundtable, which facilitated increased collaboration between the two organizations. NPPR is also presently working with its counterparts in Europe on the International Declaration on Cleaner Production that will continue to commit world leaders

to an environmental policy centered on pollution prevention and cleaner production approaches. The Declaration was signed by several dignitaries from other countries and was introduced in the United States at NPPR's 1999 Spring Conference and was again highlighted at NPPR's 2000 Spring Conference, in Boston, Massachusetts, where several state leaders joined the list of distinguished signatories.

In the fall of 1996, NPPR joined the US Asia Environmental Partnership (AEP), with funding provided by the US Agency of International Development (AID), in a P2 project focused on establishing sister Roundtables in eight key Asian countries. The NPPR project focused on international development P2 activities in the countries of Singapore, Indonesia, South Korea, Malaysia, Philippines, Taiwan, India and Thailand, and Hong Kong.

In 1997, NPPR partnered with the US EPA's International Activities Office to develop and deliver two international workshops on public policy tools to promote P2. These interactive workshops explored the definitions and benefits of multi-media P2, general conditions and criteria that encourage or hamper the adoption of P2 practices, and specific public policy options to motivate adoption of P2 as a preferred approach to environmental management.

In 2002, the NPPR helped establish the North American Pollution Prevention Partnership to collaborate with the Canadian and Mexican Pollution Prevention Roundtables. This partnership is creating collaborated efforts across all three countries to help align pollution prevention policy and implementation throughout North America.

Partnership Efforts

Below are some successful projects that the Roundtable has completed, in part due to successful partnerships:

Information Network Project: The Roundtable has considerable experience working with multiple stakeholders on P2 issues. In 1994 and 1995, the Roundtable held several focus group meetings to gain input from participants on its national P2 information network study. These focus groups included big and small business representatives, state and local government regulatory and non-regulatory personnel, nongovernmental organization representatives, representatives from academia,

federal agency officials, consultants and staff from small business development centers. As a result of these multi-stakeholder meetings, the Roundtable was able to produce a report, entitled *Organizing a National Pollution Prevention Network*, that more accurately reflected the needs and concerns of P2 practitioners in both the private and public sectors.

Waste Minimization Project: Another multi-stakeholder type of approach was used during the Roundtable's Waste Minimization/P2 grant project. This EPA-funded project required putting together a diverse team of Roundtable members to review the grant proposals submitted to the Roundtable for funding. The proposed projects entailed demonstrating innovative ways P2 could be incorporated into EPA's National Waste Minimization Plan. Over 30 proposals were submitted. The Roundtable's team consisted of state and local government representatives, as well as a representative from Dow Chemical and the Environmental Defense Fund. The team was able to move forward with the selection process and narrow the field to the final two awardees within the designated time period.

Additionally, NPPR currently coordinates with EPA's Office of Solid Waste, Waste Minimization Branch in its annual awards program, the MVP2 (Most Valuable Pollution Prevention) Awards. It added a new award to this year's program—the PBT Cup. This award is presented to the applicant who has demonstrated an innovative pollution prevention approach to the reduction of one or more persistent, bioaccumulative and toxic (PBT) chemicals. EPA is finalizing its list of PBT chemicals this year and will be working regionally to develop minimization strategies in the next year. This partnership highlights and recognizes companies that are working proactively to reduce these PBT chemicals before EPA's formal plan is released.

Materials Accounting Project with the Business Roundtable Industrial Pollution Prevention Council Project: The Roundtable, in conjunction with member companies of the Business Roundtable's Industrial Pollution Prevention Council (IPPC) and with funding from Pew Charitable Trusts and The Joyce Foundation, recently completed its national Materials Accounting Project (MAP). This project examined ways materials accounting can enhance the efficiency and environmental performance of industrial facilities and whether chemical use reporting can meet the diverse needs of industry, government and public

interest stakeholders. The project involved a design phase and an implementation phase demonstrating the designed model into plant operations.

Energy Efficiency and Pollution Prevention Project: In 1997, NPPR partnered with the US EPA Atmospheric Pollution Prevention Division to integrate Energy Efficiency (E2) into NPPR pollution prevention (P2) activities. This project also established an Energy Efficiency Task Force, expanded the NPPR Conference Agenda to integrate more E2 topics, and provided for inclusion of E2 information into NPPR documents and resources.

Local Government Compliance Assistance and P2 Training: In 1998 and 1999, NPPR received funding from US EPA's Pollution Prevention Division (PPD) and Office of Enforcement and Compliance Assurance (OECA) to integrate pollution prevention techniques into OECA's Local Government Compliance Assistance Sector Notebook and complete a P2 and Compliance training for localities. The Notebook was focused on providing compliance information to localities in eight operation areas, and the NPPR's Local Government Workgroup identified pollution prevention tips and suggestions to correspond to these compliance requirements. Additionally, it partnered with PPD to develop a pollution prevention training utilizing the compliance information and tips created for the Notebook. The training was piloted in January in Cincinnati and trainings have also been held in Washington, DC, at NPPR's Spring Conference and in Chicago, IL, at the Great Lakes Regional Pollution Prevention Roundtable meeting, and pieces of the training have been used at several state and local conferences and meetings.

Region III Pollution Prevention Roundtable Partnership: The Roundtable, with funding from EPA Region III, produces Region III's Winter P2 Conference. This conference focuses on the latest P2 initiatives related to regional environmental concerns. The meeting combines formal presentations from P2 experts with valuable networking opportunities. It attracts over 130 participants from Pennsylvania, Maryland, Virginia, West Virginia, Delaware, and the District of Columbia. The next meeting will be held in January 2004.

Roundtable List Servers

The Roundtable network manages four electronic list

servers—NPPR (P2 Policy), P2 Tech, P2 Energy and P2 Trainer—that function as forums for sharing P2 information. A list server acts as a message re-director for a group of subscribers. A message posted by any member automatically transmits to every other subscriber. The service is free but you must contact the Roundtable office to subscribe. Some message texts are archived, such as the NPPR list server, which focuses on policy and legislative topics.

Resources

The Roundtable has a wealth of resources to draw upon, including extensive expertise in technology evaluation and membership network databases such as Vendinfo, Techinfo, and the Research Projects Database. The organization has also produced numerous extensive practical resource directories: The P2 Yellow Pages; a local government compendium of P2 case studies entitled *Preventing Pollution in Our Cities and Counties*; an industrial expertise directory of members catalogued by Standard Industrial Classification (SIC) Codes; and a guide to National Pollution Prevention Week that includes information on how programs can implement National P2 Week activities, as well as valuable details on successful past activities and contact information. The P2 Yellow Pages is the most comprehensive national listing of state and local government pollution prevention contacts available. Another invaluable resource, the Roundtable's *A Compendium of State P2 Legislation*, is the only comprehensive guide of state P2 legislation available. In a similar vein, the Roundtable is also working to expand this document to also include local government statutes and mandates for P2. Many of these resources are available electronically through the Roundtable's Web page in an abbreviated version.

Pollution Prevention Resource Exchange (P2Rx)

The Pollution Prevention Resource Exchange (P2Rx) is a consortium of eight regional pollution prevention information centers, funded in part through grants from EPA. These centers all provide pollution prevention information, networking opportunities and other services to states, local governments and technical assistance providers in their region. The centers represent a broad constituency, including state and local pollution prevention programs, manufacturing extension partnerships, cooperative extension and nonprofit organizations.

The diversity of audience contributes to an overall breadth of P2 information and opportunities.

P2Rx is a national network of regional centers dedicated to improving the dissemination of pollution prevention information in the service provider community. The national goals include the following:

- ❶ Serve as the first stop for pollution prevention (P2) information for environmental service providers.
- ❷ Increase the awareness, accessibility, and usability of P2 information.
- ❸ Facilitate dynamic regional P2 networks.

P2 Measurement and Results

In 2003, the National Pollution Prevention Roundtable (NPPR) released a study which evaluated and reported on the results achieved by state and local pollution prevention program achievements from 1990 to 2000. This report, *An Ounce of Pollution Prevention is Worth 167 Billion Pounds of Cure—A Decade of Pollution Prevention Results*, was the National Pollution Prevention Roundtable's first cohesive attempt to collectively document and explore the myriad of innovative pollution prevention (P2) activities and results on the state and local levels, and translate the data into aggregate nationwide results.

The three main parts of the report consist of a general overview of state and local programs, quantitative data demonstrating the effectiveness of P2, and several examples of successful case studies from across the country to help give a more detailed illustration and demonstration of P2 in practice.

The data included in the report are compiled from more than 60 programs across the United States. This study documents the progression and growth of P2 programs across the country from the passage of the *Federal Pollution Prevention Act* in 1990 to 2000.

During this period, thousands of companies and state and local governments implemented pollution prevention programs and activities. In almost every case, these efforts have not only led to environmental improvement, but have been cost-effective, saving millions of dollars per year.

Some results from this study include the following:

- For the period 1990–2000, NPPR calculated that more than 167 billion pounds of pollution were prevented, calculating air, water, waste, and energy efficiency measures as reported in the surveys.
- In addition to pounds of pollution prevented, the P2 community also reported more than 4 billion gallons of water being conserved.
- In 1998 alone, programs reported saving as much as \$256 million nationwide.
- During the period 1998 to 2000, 13 P2 programs, with a total average budget of \$1.9 million annually, reported total cost savings equal to \$404 million. This represents average savings equal to 5.4 times the budget allocated to implement the P2 programs responsible for these results.
- In response to questions about barriers hindering successful implementation, 70 percent of respondents said that they had a lack of capital and 40 percent complained of the high rate of staff changes, as well as a lack of management commitment.

It is important to note that pollution prevention, as defined in this report, is multi-media in scope, and means to reduce or eliminate pollution at the source.

End-of-pipe data is not included, such as recycling, control or treatment results. NPPR's interpretation of P2 is also broader than most state definitions, including energy efficiency. The organization also considers conservation a prevention approach. Water conservation results were not included into the overall reduction number from this study, due to the difficulty in finding a uniform unit of measurement.

Innovative sustainability measures that do not transfer pollution from one medium to another and instead reduce or eliminate waste streams are prevention. Pollution prevention encompasses any and all innovative approaches focused on reducing the environmental footprint of mankind. All types of tools and practices are part of the toolbox used to identify P2 opportunities and implement them, including environmental management systems (EMSs), industrial site visits and inspections, permitting, voluntary private-public partnerships and even software tools such as environmental management accounting software.

The appropriation and actual federal budget for state and local government pollution prevention programs nationwide amounts to less than \$6 million annually. This is less than one percent of what is allocated for state media grant programs (air, water and land). Taking into account this small allotment of resources and support over the past decade and the fact that these programs compete for support and resources against established media programs with strong regulatory requirements, the results are impressive.

The report also highlights the fact that pollution prevention efforts, due to poor funding, are still in their infancy and are just scratching the surface of the environmental landscape. Tepid political support and weak legislation such as the 1990 Federal Pollution Prevention Act, which contained a good framework but lacked real teeth and was never fully implemented, also contributed to the lack of nationwide focus on prevention.

It is reasonable to deduce from this report that if these programs, which emphasize efficiency, were funded comparatively to their sister media programs such as the air, water and hazardous and solid waste departments, the United States would reap serious environmental and financial benefits. This focus on efficiency would lead to increased global market competitiveness for the United States.

Much more is being accomplished than NPPR can capture in this report, due to time limitations and resources. The first report is just the beginning of the process to measure the effectiveness of P2 efforts nationwide, in both the private and public sectors. NPPR's study is focused on the public sector side, since this is where the organization's voting membership resides. However, in the future, with more resources, it is conceivable that we will be able to more comprehensively identify, track and quantify the impact of all types of innovative, eco-efficiency programs promoting P2, including federal agency initiatives and private sector programs.

This will in all likelihood lead to results that far surpass our current calculations. *An Ounce of Pollution Prevention* is only the beginning—it is not the ultimate dissertation on the subject regarding P2 measurement and does not pretend to be. This report is a good starting point in documenting the significant results that have been achieved nationwide, focusing on prevention rather than clean-up and control. Ideally this document will provide a

good foundation for future work on this subject. NPPR would also like to point out that there are several other publications similar to *An Ounce of Pollution Prevention*. These publications, although smaller in scope, provided much insight which helped produce the original report. The Northeast Waste Management Officials' Association (NEWMOA) project *Pollution Prevention Progress in the Northeast* and the Iowa Waste Reduction Center's report *The State of Pollution Prevention* are among the reports that were referenced while conducting the study.

3.9 Legislative Action for the Future

As stated earlier, the single-medium approach to environmental protection is an impediment to progress. There have been many attempts to change things on the federal, state and local levels to leverage more opportunities for prevention and cleaner production without dismantling the current regulatory framework. US EPA's Project XL, Performance Partnership Grants, the Common Sense Initiative and the current National Performance Track program are among the programs that have been designed to allow more flexibility within the current system, in the hope of attaining more creativity and innovation. State voluntary programs have proliferated as well and have included recognition programs and the adoption of environmental management system programs.

Without serious funding and mandate, however, many of these programs have languished on the periphery, disappearing when a new Administration arrives.

The Pollution Prevention Act of 1990 provided a good foundation for the beginning of pollution prevention in the United States. It provided much needed definitions, contained provisions to set up an information clearinghouse and awards program and most importantly provided some initial seed money for states and EPA to work on dedicated pollution prevention programs. Unfortunately many provisions of the Act were never fully implemented and the appropriations were insufficient to orchestrate a comprehensive program (less than one percent of federal grant monies to states for other media programs such as air, waste and water, goes to pollution prevention).

Real change will come only by modifying the key

statutes. One idea, long proposed, is a unified organic statute. The existing statutes would be woven into a more holistic law that is multi-media in scope, with prevention as the foundation. Others advocate the weaving together only of specific aspects of the legislation.

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Appendix I — Status of Comparability of P2 across North America

Major data element	Canadian P2 perspective	Mexican P2 perspective	American P2 perspective	Status of comparability
Legislation	Strong enabling legislation in <i>Canadian Environmental Protection Act</i> (1999) providing powers to require P2 planning for toxic substances.	Recent addition (April 2003) of the General Law for Prevention and Integral Management of Waste; has included the preventive concept and philosophy in waste management.	<i>Pollution Prevention Act</i> (1990) enabling legislation.	Legislative backdrop evident. Strength of the legislation varies.
Policy framework	Policy framework well defined through 1995 federal document <i>Pollution Prevention—A Federal Strategy for Action</i> , which includes national promotion, involvement in international P2 and inter departmental activities.	Preventive concepts were introduced in Mexico's National Development Plan 2001–2006 as well as in the National Environmental Plan 2001–2006, spearheaded by a P2 Policy working group under the Mexican Cleaner Production Centre.	Not articulated at a Federal level.	Not comparable.
Prov/State programs	Canadian Council of Ministers of the Environment P2 Strategy. Of the 13 jurisdictions, about half have developed programs, policies, and/or regulatory integration initiatives.	Little regulatory power over industrial discharges/emissions limits involvement.	Strong P2 regulatory and education programs/activities in a significant number of states.	Broader range of P2 providers as P2 programs mature.
Local government programs	Most P2 work linked with the need to show leadership on environmentally responsible operations and public education on environmental issues. Driven by early adopters.	Little regulatory power over industrial discharges/emissions limits involvement. Local governments still getting up to speed on P2.	Several outstanding examples of specific P2 programs by leading local governments in areas where they have a responsibility (i.e., wastewater treatment).	As environmental responsibilities evolve, so does the need for well defined P2 programs.
International	Numerous international agreements to which Canada is a signatory have P2 applications.	Numerous international agencies have catalyzed specific projects.	Partnerships and P2 demonstration projects in foreign countries abundant.	International partnerships point to P2 as a tool for environmental protection globally.
Voluntary programs	Various industrial initiatives, ranging from demonstration projects to environmental performance agreements.	A voluntary industrial environmental performance program (Auditoria Limpia) has been in existence for a decade. Mexican industry is also involved in other international programs, such as GEMI.	Various.	Integral to all.
Working partners—roundtables	Annual Canadian Pollution Prevention Roundtable brings is the premier forum for pollution prevention information sharing in Canada. This networking event serves as a key information link between various levels of government—federal, provincial and municipal—industry, NGOs and the international community.	The Mexican P2 Roundtable is in its infancy but has a strong backing from organizations belonging to the private sector, governments, research and education institutions, NGOs and financial institutions in Mexico.	The National Pollution Prevention Roundtable has a long history of networking those interested in P2 primarily at all levels of government. A number of NPPR working groups have been effective in advancing key issues.	Integral to all.
Information	Electronic P2 clearinghouse operated by Federal government is complimented by NGO providing phone and e-mail support.	A component of the Mexican Pollution Prevention Roundtable (MRPCM) is dedicated to information exchange.	Strong electronic information resources (i.e., P2Rx) to compliment state outreach initiatives.	Integral to all.
Technical assistance	Few regional programs have established programs targeted at predominantly small and medium-size enterprises (SMEs).	International agencies seem to have provided the most assistance.	Numerous programs at a state and federal level.	Focus tends to be on small and medium-size enterprises (SMEs).
Recognition	Nationally, a P2 awards program annually recognizes companies/organizations in a variety of categories. Some jurisdictions have programs to recognize environmental initiatives.	No formal recognition program.	MVP P2 Awards is the national benchmark P2 awards program; coordination by NPPR. Individual state and local P2 awards programs prevalent as well.	More established where P2 programs have existed longer.

Appendix II—The Evolution of Pollution Prevention in the United States

P2 has a rich history in the United States. A timeline is included to provide readers with a snapshot of the watershed events in the United States P2 movement as well as to shed some light on how pollution prevention evolved.

Only the names of authors of noteworthy publications, as well as high-level political officials, are included in this timeline. So many people have been involved with the P2 movement over the years that it is impossible to include some and not others.

1969/1970s

Enactment of major environmental statutes, including NEPA, the *Clean Water Act*, the *Clean Air Act*, and the *Resource Conservation and Recovery Act* (RCRA), that are single medium in scope and focus on end-of-pipe pollution control. (RCRA was multi-media for treatment, storage or disposal facilities [TSDFs] but not for generators.)

1970

US Environmental Protection Agency (EPA) is created under the Nixon Administration and approved through Congressional action.

1975

The company 3M establishes its Pollution Prevention Pays Program (3P). This program is novel, since the concept of applying pollution prevention company-wide and documenting results has not been tried before.

1976

EPA first mentions “source reduction” in a document discussing the hierarchy of preferred approaches for minimizing and managing solid waste.

1979

M.G. Royston publishes his landmark book *Pollution Prevention Pays*, which promotes the idea that preventing pollution, rather than controlling it, is the better course of action. This book factors heavily in 3M’s early pioneering efforts.

1980s

State efforts to site hazardous waste landfills and incinerators (as alternatives to dumpsites) met by community opposition. RCRA had set standards for landfills and CERCLA (Superfund) had established liability, but not standards. Communities demand that waste must first be reduced at the source.

With nothing occurring on the federal level, several states take charge and develop programs to promote source reduction and recycling.

In the early part of the 1980s, the Maryland Hazardous Waste Facilities Siting Board conducts a study to test the effectiveness of a pollution prevention technical assistance program. The results, presented at Massachusetts Hazardous Waste Source Reduction Conference and Exhibition in 1983, form the basic structure and function of most P2 technical assistance programs. The first state program in the country is North Carolina’s Pollution Prevention Pays Program, established in 1983.

1980

US Superfund legislation passes in December, establishing a superfund to clean up major toxic waste dumps as well as instituting private party liability for cleanup.

Industry programs, such as DOW’s WRAP (Waste Reduction Always Pays) and Chevron’s SMART (Save Money and Reduce Toxics) emerge in response to public pressure and cost-savings opportunities.

1984

Congress reauthorizes RCRA, requiring hazardous waste generators to certify that they have a waste minimization program in place. First appearance of environmental hierarchy—establishing a preferred place for source reduction and recycling appears in statute as well.

1985

The US National Pollution Prevention Roundtable (NPPR)—known then as the National Roundtable of State Pollution Prevention Programs (NRSPPP)—is started when a small group of state officials begin to meet to discuss prevention approaches within their states. Some of the earliest state programs involved in this effort include North Carolina, Minnesota, Illinois, California and Massachusetts. One of the most active states to play a leadership role in mobilizing others to form a state P2 network is North Carolina.

Woods Hole Pollution Prevention Conference, Woods Hole, Massachusetts—the first of a series of small high-level policy meetings of pollution prevention experts invited from both the private and sectors—is convened. The conference convenes annually until 1999.

1986

Reauthorization of Superfund (SARA) includes provisions to establish the Toxics Release Inventory (TRI), which requires companies using large amounts of toxic chemicals to publicly report the quantities of chemicals released to the environment. The first national “Right to Know” program creates an incentive to prevent pollution.

EPA releases a waste minimization report as a requirement of HSWA (amendments to RCRA of 1984). The report draws mixed reviews. Proponents of the report say EPA was following what Congress stipulated, and that it is the first effort to focus explicitly on ways to avoid treatment and remediation. Detractors of the report think EPA was weak in that it did not support (nor even mention) source reduction as a method to reduce waste.

The Congressional Office of Technology Assessment (OTA) releases a seminal report, *Serious Reduction of Hazardous Waste*, written by Joel Hirshhorn and Kirsten Oldenburg. The study advocates that US policy should focus on source reduction and not waste minimization. This report is a milestone in the effort to promote pollution prevention nationwide.

1987

Meeting in Cool Font, West Virginia convened by EPA and several representatives from outside organizations. The purpose of the meeting is to bring together interested parties from different stakeholder groups around the controversy created from the release of the 1986 EPA Waste Minimization report and the OTA report. This results in all parties present agreeing that source reduction (i.e., pollution prevention) is an important facet of environmental protection efforts. Subsequently, a meeting of Senior Executives at EPA is convened, to further the issue within the agency. At that meeting it is decided that a pollution prevention office be established in EPA’s Policy Office.

1988

The Wolpe-Schneider bill on pollution prevention, while not enacted into law, serves as the foundation for the creation of EPA’s program on P2, and for the federal *Pollution Prevention Act of 1990*.

1989

The first TRI data release serves as a major impetus for the creation of P2 programs at the Federal level, and for businesses to re-examine their emissions and waste streams to prevent pollution.

The Massachusetts Legislature unanimously enacts the *Toxics Use Reduction Act (TURA)*, under which industry discloses its use of toxic chemicals and develops plans which emphasize the reduction of toxic chemical use as a means of pollution prevention. Several other states enact pollution prevention/waste minimization planning laws.

Massachusetts also launches the Blackstone project to test different methods of coordinating inspections enforcement and technical assistance for all environmental media (air, water, waste). The state reorganizes itself to reflect the lessons learned under the project.

This same year, the Oregon State Legislature unanimously passes the *Toxics Use Reduction and Hazardous Waste Reduction Act of 1989*, which is signed by the Governor on 24 July, the same day the Massachusetts legislation is signed into law.

1989–1993

Numerous states pass pollution prevention planning laws, including California, Texas, Minnesota, Ohio, Arizona. Nationwide, during this time period 23 states pass some type of law requiring facilities to produce P2 planning reports. The laws vary state by state. Some are no longer enforced, but many are still in effect today.

1989–1998

Through support from EPA and the states, several regional P2 groups begin to form, including NEW-MOA’s Northeast P2 Roundtable (1989) and The Great Lakes Regional Pollution Prevention Roundtable (GLRPPR), in 1994. In addition, a few non-governmental organizations start up to promote the message of P2, including the American Institute of Pollution Prevention (AIPP). AIPP focuses on being a forum for representatives from Trade associations and is funded through EPA. It goes defunct in 1998.

1990s

There is also a proliferation of reinvention, sustainable development and voluntary initiatives at the state and local levels, including New Mexico’s Green Zia award program, which patterns itself after the prestigious Malcolm Baldrige awards, focusing on efficiency and quality standards resulting in environmental improvement. Several states start fee-based systems to augment the initial seed money allocated by Congress for P2 efforts. These fee-based programs have mixed results and many of the programs remain underfunded through the 1990s.

States also initiate numerous innovative non-regulatory and regulatory efforts to infuse P2 into mainstream environmental policy. Several states begin to require more pollution prevention requirements in industry permits, states enhance their inspection procedures to be multi-media in scope (mirroring Massachusetts' Blackstone project), and state enforcement programs incorporate P2 elements into supplemental environmental projects (SEPs).

1990

The *Pollution Prevention Act of 1990* (PPA), is signed in October, by President Bush. The PPA provides a basic foundation for adoption of pollution prevention (P2) as the top of the environmental management hierarchy. Authorizes \$8 million in seed money for both state and federal P2 efforts. To date, the \$8 million for states has never been fully realized, instead averaging \$5.9 million a year. Also establishes the Federal Pollution Prevention Division at US EPA and requires a quantitative measurement standard for P2 be developed as well as a overall strategy. Companies disclosing their toxic chemical releases under TRI must also report their progress in preventing pollution.

The *Clean Air Act* amendments of 1990, which include a section to establish new small business assistance programs (SBAPs or 507 centers) are passed. These programs, housed in state air offices, are charged with offering assistance to small businesses, including pollution prevention assistance. This newly formed network in some cases combines eventually with state P2 programs. However, in numerous other states the P2 programs and SBAPs remain separate, creating a complicated situation with both entities struggling for limited resources.

1990/91

EPA launches the 33/50 program, a voluntary program under which companies commit to reducing their releases of 17 top priority chemicals by 33 percent by 1992 and 50 percent by 1995, emphasizing pollution prevention. EPA also focuses on Green Lights, the prototype P2 program for energy efficiency. These programs become the prototypes for proliferation of innovative and voluntary approaches to environmental protection across EPA in the 90s. They emphasize efficiency, an attribute of P2. They serve as models and inspirations for other EPA voluntary programs, including Energy Star, Design for the Environment, Green Chemistry, Waste Wise, and Environmental Justice through Pollution Prevention.

1991

The State of New Jersey passes the *New Jersey Pollution Prevention Act* (8/91), which, like the Massachusetts law, requires disclosure of toxic chemical use and planning that emphasizes pollution prevention. The law is signed at two chemical plants to demonstrate support for it by the chemical industry.

1991/1992

Through the US Congress appropriations process, the Pollution Prevention Policy staff office is created in the EPA administrator's office to ensure that P2 is a high priority.

1992

US EPA Administrator Bill Reilly and Deputy Administrator Hank Habicht issue memorandum defining pollution prevention as distinct from, and preferred to, recycling. This memorandum becomes the definitive statement of P2.

The US National Pollution Prevention Roundtable (NPPR) is incorporated as a tax-exempt organization under section 501 (c) (3) of the IRS code. This is the first national membership organization for states and local governments devoted solely to promoting pollution prevention and cleaner production.

The state of California launches the nation's first "Pollution Prevention Week." This week is designated to showcase P2 efforts throughout the state.

1993

The Clinton EPA announces on Earth Day its support for pollution prevention as the preferred approach and the President issues the first of several executive orders promoting P2 with the federal government.

1994

The printing industry, environmentalists, the Great Lakes states and EPA complete the Great Printers Project, developing a series of recommended reforms to environmental programs and industry practices to make pollution prevention the preferred approach of the printing industry.

EPA launches the Common Sense Initiative (CSI), to apply the approach demonstrated by the Great Printers Project to six industry sectors. EPA also reorganizes its enforcement office, combining enforcement for all media and compliance assistance, in emulation of state efforts to better coordinate enforcement and assistance.

1994/1995

EPA responds to Congressional criticism by launching dozens of reform initiatives, many in emulation of their earlier 33/50, energy efficiency and CSI initiatives. The new initiatives include Project XL, as well as a host of consolidated reporting efforts, and a number of federal and state environmental awards programs are conducted. Among the federal awards programs are the Closing the Circle awards, recognizing federal facilities with exemplary environmental programs including prevention efforts, and the Green Chemistry awards.

1995

The Small Business Development Centers (SBDC) network lobbies for appropriations to develop and expand their environmental assistance services to small businesses. This environmental assistance includes pollution prevention. At the same time other assistance programs such as State P2 programs, the SBAP programs and NIST Manufacturing Extension Partnership (MEP) programs are all lobbying for funds as well to provide environmental assistance services. This fragmented situation on the technical assistance front highlights the major competition for funding. The SBDC lobbying effort for major funding continues unsuccessfully through 2002.

National Pollution Prevention Week commences, based on the California model. NPPR helps coordinate the national effort to promote P2 activities nationwide. As part of this effort, NPPR manages to secure President Clinton support letters for National Pollution Prevention Week, from 1996 to 2000. NPPR also helps facilitate the production and distribution of designer P2 posters.

Starting in the mid-1990s, states develop environmental management systems (EMSs) that feature P2 as a major component. Many states work with industry partners to get ISO certification and/or establish an EMS program. NPPR establishes an ISO workgroup and eventually produces a policy paper. Eventually the interest in ISO and EMS programs leads to additional initiatives and efforts, including the Multi-State Working Group (MSWG), focusing on environmental management systems. MSWG, along with NPPR and others, works with the ISO Technical Advisory Group (TAG) to ensure that the wording in ISO 14000 is clarified to promote P2.

1996

International roundtable efforts are launched by US NPPR in Asia and South America. Funding is

provided by US AID's Asia-Environmental Partnership program. Countries in Asia include Malaysia, Hong Kong, Indonesia, Korea, India, Philippines, Singapore and Thailand. Roundtable efforts are also underway in Europe and Canada, to which the US NPPR sends representatives.

EPA removes the Pollution Prevention Policy staff office from the office of the EPA administrator and places it with the assistant administrator office of the Office of Pollution Prevention and Toxics (OPPTS), lowering the profile given pollution prevention within the agency.

1997/98

A number of additional initiatives and projects spring up during this time period that help promote P2 awareness within the context of sustainability and product stewardship. One of these is the launching of the Pollution Prevention Resource Exchange (P2Rx), a national network of regional P2 centers, funded through EPA, to help disseminate technical information on a wide range of P2 topics. Other landmark events include the passage of Oregon's Green Permits Program legislation. This program encourages adoption of EMSs incorporating pollution prevention. Wisconsin also establishes its Environmental Cooperation Pilot Program around the same time.

1998

NPPR establishes an annual MVP2 (Most Valuable Pollution Prevention) Awards program as part of the National P2 Week celebration. The event, which recognizes exemplary P2 efforts, takes place in Washington, DC, every September.

1998/1999

NPPR helps participation in the first Roundtable of the Americas, hosted by Brazil. NPPR also lends crucial support for the International Summit of P2 Roundtables, hosted by the Canadians in the fall of '99. More than 60 countries are represented. One of the outcomes of the conference is a series of detailed action agendas on a number of P2 issues.

1998–2001

The US National Pollution Prevention Roundtable begins the process of revisiting the *Pollution Prevention Act of 1990*. The result of the effort is the release of a comprehensive proposal to strengthen the Act's provisions based on the decade of practical experience since the Act's passage. Several educational briefings to congressional members

and staff take place to promote the proposal, but the political climate is not conducive to any serious consideration. In addition, NPPR brings together a group of experts from EPA, environmental groups and industry to discuss ways to improve and strengthen the existing legislation.

2002

Pollution prevention continues to play a critical role in meeting the environmental challenges of the 21st century. Despite intensive pressures on public and private sector P2 budgets, P2 is a key element of successful programs for innovation and sustainability globally. NPPR sends an official representative to the World Summit on Sustainable Development, held in Johannesburg, South Africa, in fall of 2002. The North American Pollution Prevention Partnership (NAP³) is formed among a collaboration of the Canadian, Mexican and US pollution prevention roundtables. A MOA is signed for collaborative work in all three countries on policy issues.

2003

Most state and local programs are hit hard due to budget cuts. Several P2 programs are eliminated or significantly reduced. Natalie Roy leaves the NPPR to become deputy director at the Environmental Council of the States (ECOS).

2004

The P2 community joins forces to establish the Environmental Assistance Summit to combine the annual NPPR Spring Meeting with the EPA Compliance Assistance Forum.