

Beyond the Horizon

A Strategy for Atlantic Canada's Environment Industries

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This report reflects the impressions, interpretations and conclusions of the Study Team.

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Acronyms and Abbreviations

APC	Air Pollution Control
BACT	Best Available Control Technology
BADT	Best Available Demonstrated Technology
BOD	Biochemical Oxygen Demand
CCHREI	Canadian Council for Human Resources in the Environment Industry
CCME	Canadian Council of Minister's of the Environment
CEPA	Canadian Environmental Protection Act
CIDA	Canadian International Development Agency
EBC	Environmental Business Canada
EBJ	Environmental Business Journal
EC	Environment Canada
EDC	Export Development Corporation
EMSs	Environmental Management System
GHG	Greenhouse Gases
IC	Industry Canada
IFIs	International Financial Institutions
MOU	Memorandum of Understanding
NAFTA	North American Free Trade Act
NPRI	National Pollutants Release Inventory
NRTEE	National Roundtable on the Environment and the Economy
OCETA	Ontario Centre for Environmental Technology Advancement
PM	Particulate Matter
SAGIT	Sectorial Advisory Group on International Trade
SME	Small-Medium Sized Enterprises
TPC	Technology Partnerships Canada
VOC	Volatile Organic Compounds

1.0 Executive Summary



The Organization for Economic Cooperation and Development (OECD) forecasts that the global market for environmental products and services will reach US\$600 billion in 2010. Other forecasts have placed this figure closer to \$1 trillion (Delphi). The regions expected to experience the greatest demand/growth are South America, Eastern Europe and Southeast Asia. OECD estimates that three sectors will dominate the environmental market in 2000: water and wastewater treatment (\$233 billion), solid waste handling (\$213 billion) and air pollution control (\$134 billion).

The sector is undergoing major restructuring in response to changing market demand trends and pressures. The traditional “end-of-the-pipe” market for environmental products and services is declining as regulatory drivers of market demand orient towards clean production/process technologies and approaches. Other market characteristics of this industry include heightened competition, growing client sophistication, greater emphasis on marketing, consolidation of market share in larger companies, reduced profitability and heightened merger and acquisition activity.

“Beyond the Horizon” A Strategy for Atlantic Canada's Environment Industries identifies those market forces driving environment industry evolution, forces which generate potential opportunities for Atlantic Canada's environment industries. These market drivers include:

- Minimizing corporate risk;
- Attaining and surpassing compliance;
- Changing client needs;
- Health and the environment;
- Pollution prevention and eco-efficiency;
- Climate change;
- Deterioration of physical infrastructure;
- International expansion of resource industry companies;
- Urban environmental markets; and
- Projects funded by international financial institutions (in health, infrastructure, etc.).

The report presents a strategy to assist Atlantic Canada's environment industries address the demand forces creating rapid changes in the nature of environment markets both domestically and globally. The strategy identifies the strengths and competitive advantages of Atlantic Canada's environment industries, drawing from examples of niche technologies as well as specialized expertise currently available in Atlantic Canada. It also

identifies those weaknesses and threats that must be acknowledged and acted upon to move the environment industries of Atlantic Canada forward towards continued growth and future prosperity. As a strategy for future action, the report offers perspectives on potential clients/customers and suggested geographic regions for specialized Atlantic Canadian niche market firms.

The Environment Industry

The boundaries of the environment industry are expanding as the sector moves from specific mitigation and prevention measures in response to regulation, to providing solutions that also decrease material inputs, reduce energy consumption, recover valuable by-products, reduce emissions or minimize waste disposal problems.

Innovative environment technologies and services are now providing both private and public clients numerous value-added benefits including:

- Enhanced productivity and efficiency;
- Reduced corporate risks and potential liabilities;
- Increased or maintained market share through improved corporate image; and
- Increased profits and shareholder value.

The Environment industry in Atlantic Canada

Atlantic Canada's environment industry is continuing to grow in size and scope. It is estimated at the current time that there are more than 700 companies in the region conducting business in the environment sector. Employment in the sector increased by 14.5% from 1996 to 1997, with over 10,000 individuals in Atlantic Canada working in the environment industry (Statistics Canada).

The environment industry profile in Atlantic Canada and each of the Atlantic Canadian provinces is similar in some ways to the Canadian profile. The environment industry in the region is characterized by very small companies, with 68% of those making up the sector employing less than 10 individuals and 37% of these employing fewer than 5. Firms in the region offer a wide range of products and services. Products include:

- Solid waste processing products;
- Environmental monitoring equipment;

- Waste water technology;
- Air pollution devices;
- Water supply products;
- Soil and groundwater measurement devices;
- Energy efficiency units;
- Industrial eco-efficiency products;
- Renewable energy devices; and
- Noise and vibration equipment.

Services offered include:

- Environmental contracting and engineering;
- Research and development of environmental products;
- Water supply and conservation;
- Laboratory analytical services;
- Waste water management;
- Energy efficiency;
- Air pollution;
- Noise abatement; and
- Environmental education, law and public relations.

As reported from Statistics Canada surveys, in 1997 the total market for environmental products and services in Atlantic Canada was \$962 million, and Atlantic Canada firms had revenues of over \$600 million derived from the sale of environmental products and services in both the region and outside. 96% of Atlantic Canada environment industry revenues were earned from activity in the Canadian market. In comparison to the industry in Canada as a whole (Atlantic Canada accounts for 5.3% of the national output), exports account for a smaller proportion of sales than in the rest of Canada (4% vs. 7.8%).

A breakdown of this revenue indicates that companies in Nova Scotia accounted for 40.5% of this revenue, those in New Brunswick 36.7%, with those in Newfoundland and Prince Edward Island accounting for 17.5% and 5.4% respectively. In the region, environmental services account for 64% of these revenues with environmental goods comprising 20% and environmental-related construction making up the remaining 16%.

Unlike the figures for Canada as a whole, the major source of demand for Atlantic Canada environmental industry products and services is industry, with 54% of goods and 51% of services sold to the private sector (the remainder are sold to governments and directly to consumers). The most important industrial sector of demand in the region is the resource sector, specifically at this time the oil and gas industry, which is a client of 70% of the service providers and 50% of the environmental products firms. In common with the

industry in Canada, many Atlantic environment industry firms work closely with companies in key resource sectors such as mining, oil and gas, and pulp and paper, developing expertise in providing solutions tailored to their needs. Environmental companies which provide competitive advantage to resource processing and manufacturing industries will play a key role in the future success of all Canadian companies in export markets

Environmental products and services worth \$23.6 million are exported from the region, contributing 2.6% of Canada's total environmental exports. 32% of the environment industry companies in the region currently sell products and services outside Canada, but 56% expect to do so in the future. The United States, Europe, Asia and Latin America are the top export destinations. Eastern Europe appears to be an area of expected opportunity with 20% of companies expressing an intention to focus aspects of their marketing efforts there.

Environment Industry Strengths and Competitive Advantages in the Atlantic Region

Nova Scotia, New Brunswick, Newfoundland and Prince Edward Island - the four provinces that comprise Atlantic Canada - share many of the regional characteristics, but also present distinct differences in environment industry strengths and competitive advantages. A composite overview of the region provides a picture of regional environment industry strengths and competitive advantages such as:

- A large proportion of Atlantic Canada environmental companies have been working in the environmental field for more than five years. Many have up to 15 years experience. This indicates that the industry has a high capacity, professional expertise, and well-developed consistent leadership. In addition, companies that are more experienced tend to have an established client base and well developed relationships with regulators and other key players.
- The large number of companies in the region is a reflection of the strong and diverse regional demand for environmental products and services. In addition, it also signals a broad range of expertise and skill sets, providing companies with opportunities to partner and compete for larger projects that demand multi-disciplinary skills—capacities that are sought increasingly by both domestic and international markets.
- The presence of larger companies predominantly in the waste management business and environmental and engineering consulting field is a strength: large companies tend to provide leadership in the development of new markets outside the region and the impetus for other companies to expand from both a marketing and a technology development standpoint.
- Throughout the region, virtually every environment industry segment has some

domestic activity and supply capacity. As a sign of sector versatility, this allows the industry to survive and adapt quickly when demand shifts or a key purchasing sector slows down.

- The industry as a whole has substantial experience in working for key industrial and resource clients including the pulp and paper sectors, oil and gas sectors, mining and mineral sectors, and infrastructure (harbours, bridges, water and wastewater) sectors.
- There is a demonstrated project execution capacity that can bring together the range of skill sets (environmental impact analysis, project development, legal/contracting, design and planning, construction, technology application, marketing and assessment) to undertake large projects, particularly on the resource and ocean-based fronts (e.g. offshore gas exploration).
- The strength of the region in ocean/marine and coastal based environmental services and technologies is world class. This includes areas such as wastewater treatment for aquaculture, environmental effects monitoring, modelling, hydrodynamics, harbour clean-up, remote sensing, GIS systems, environmental assessment, impacts mitigation, restoration and remediation. This can translate into a distinct competitive advantage when bidding on projects in similar coastal regions around the globe.
- New Brunswick, Newfoundland and Nova Scotia all have active environment industry associations. Prince Edward Island has an informal network of industry representatives and is working towards an industry association.

These strengths and competitive advantages are common throughout the region. At the same time, each province in the Atlantic Canada grouping has developed specific characteristics that make its environment industry unique.

New Brunswick

The profile of New Brunswick's environment industry is similar to that of the region, with a predominance of small enterprises employing less than 10 individuals. About two thirds of the companies providing products are resellers of products made by other manufacturers. This is significantly higher than in the other three provinces. On average, each New Brunswick services company provides services in 6 or 7 categories, almost double the level of diversification in the other Atlantic provinces.

New Brunswick's environment industry embodies a variety of strengths, starting with good positioning in niche technologies and services in:

- water and wastewater treatment;
- remediation (e.g. bioremediation) particularly for the petroleum industry;

- risk-based corrective action assessment; and
- resource based engineering and consulting.

New Brunswick firms have developed specialized expertise in the oil and gas industry (especially in soil remediation and monitoring services), a strength from which to build additional export markets, particularly in Latin America. Specialized water recovery and treatment technologies provide specific longer term opportunities. New Brunswick firms have strong resource industry based expertise in pulp and paper and food processing. The NE US, Quebec and Ontario are potential markets for this expertise.

The French language capabilities and cultural understanding of most New Brunswick firms provide a distinct competitive advantage for increasing exports to French speaking countries.

Nova Scotia

The profile of Nova Scotia's environment industry is similar to that of the region with the largest percentage of firms employing fewer than 10 employees. About one third of the companies providing products are resellers of products made by other manufacturers. Nova Scotia environmental service companies generally provide services in slightly more than 3 categories.

Nova Scotia's environment industry embodies a variety of strengths, starting with good positioning in niche technologies and services in:

- water and wastewater treatment;
- water resource management;
- instrumentation;
- air monitoring services and technologies;
- solid waste management;
- geomatics; and
- engineering consulting.

Nova Scotian firms have developed water/wastewater treatment technologies for small communities or on-site treatment of sewage for rural or small residential complexes and small commercial/industrial sites. This includes instrumentation such as computer software optimization packages for water/wastewater treatment plants and power generation facilities. Water resource management expertise offers a competitive advantage for Nova Scotia firms marketing these treatment technologies to coastal areas.

In the area of risk based corrective action, Nova Scotia firms are strong in gasoline storage and contaminated site clean-up. Solid waste management, particularly with respect to

“municipal waste management systems” and the recovery, recycling (or composting) of post-consumer materials is also a strength. Potential markets exist in the Caribbean, Latin America and other developing regions.

The breadth of the industry is augmented by small niche consultants and environmental technology companies focusing on the resource sector (e.g. dissolved air flotation, packaging for hazardous waste, peat-based oil absorbent, radar sat – real-time data collection and management). With a strong expertise in the oil and gas sector (water treatment, resource management, environmental assessment) a number of Nova Scotia companies have the opportunity to successfully compete on the world market.

The close ties with the Caribbean community and several European countries, as well as the close proximity to the large NE US market are a competitive advantage for NS firms.

Newfoundland

The profile of Newfoundland's environment industry is similar to that of the region, with the largest percentage of firms employing less than 10 employees. Almost one half of the companies providing products are resellers of products made by other manufacturers. Newfoundland environmental service companies generally provide services in slightly more than 3 categories.

Newfoundland's environment industry embodies a variety of strengths, starting with good positioning in niche technologies and services in:

- water and wastewater treatment;
- small hydro;
- expertise in the resource and power generation sectors (environmental impact assessment, environmental monitoring services, waste management services and technologies);
- remediation technologies particularly for the petroleum industry; and
- engineering consulting.

Newfoundland firms have developed marine/ocean/coastal based technologies which provide sectoral niche opportunities in monitoring, protection and mitigation of the marine and coastal environment. International municipal and industrial infrastructure developments demand expertise for project execution capacity, particularly in mining, petroleum extraction and hydro generation. Prime geographic markets include the NE US, Latin America and other coastal regions. A number of Newfoundland firms are currently active in eastern and western Europe providing a “foot in the door” for other potential opportunities in this expanding marketplace.

Prince Edward Island

The PEI environment industry is the smallest within the region. The average environment industry company in PEI has been in existence for 15 years. About one third of the companies produce products only, one third supply services only and one third supply both products and services.

PEI firms have strength in niche technologies and services such as:

- water/wastewater treatment technologies for the aquaculture and agriculture sector;
- waste management processes;
- environmental monitoring for resource industries, fisheries, agriculture and large infrastructure projects;
- renewable energy particularly wind energy;
- remediation; and
- energy efficiency.

In the area of waste management technologies, PEI firms have engaged in the re-manufacture of post-consumer materials and developed specialized waste management processes such as Waste Watch. Small niche consultants provide services in energy efficiency, hazardous waste clean-up, biofiltration, groundwater monitoring and treatment.

Targeted geographic markets may include the Caribbean, Iceland, other small islands and rural communities. The NE US and opening markets in Eastern Europe for waste management and water treatment provide potential opportunities for specialized PEI firms. PEI firms have a unique opportunity because of provincial expertise in wind energy to tap into a rapidly expanding global marketplace being driven by climate change issues.

Strategy for Development

The vision of a prosperous environment industry for Atlantic Canada is based on four key elements:

- High value job creation;
- Sustained industry growth through diversification;
- Targeted export promotion; and
- Enhancement of technology development capacity.

The achievement of this vision is based on enhancing five key “pillars” of the industry:

- Human Resource Development;

- Relationships with Capital Markets;
- Export Market Development;
- Technology Innovation; and
- Environment Industry Collaboration.

The Strategy identifies two or more areas that will help the industry in Atlantic Canada work towards building each of these five pillars. Due to the different levels of development in each province, some areas may be more important focus in the short term in some provinces than in others. The Strategy lays out far more detailed information on each option that can be pursued to attain the major goals. The following are the main strategy options and a brief description of the specific actions that these imply.

For human resource development the areas involved are:

- Enhancing the skills of existing personnel (through sharing of expertise, mentorship programs and human resource planning, and the development of skills upgrading programs);
- Understanding customer needs (through increased interaction, both formal and informal, with customers including trade shows, trade missions, contract monitoring and seminars);
- Understanding potential export markets (through information sharing and country trade missions); and
- Attracting skilled personnel (through development of an attractive industry profile, continued support for post-secondary programs and facilitating entry of local graduates into the industry).

For relationships with capital markets, the options for development are:

- Enhance relations with investors (through identification of potential investors in the region, a coordinated effort to present the regional industry to brokerage houses in both Canada and the US and identification of "green" investors world-wide); and
- Tap into export financing (through familiarization with the procedures and requirements of Canadian and IFI providers).

There are seven components of the *Targeting Markets for Growth* pillar. These are:

- Driving local markets (a firm and clear set of environmental regulations and priorities in the region will provide the industry with a strong basis for competition in other jurisdictions);

- Leveraging local skills through strategic alliances (cooperation between Atlantic companies with complementary skills, between government and industry and the identification of potential foreign partners will all help the Atlantic industry compete internationally);
- Exploiting opportune export markets (collecting, assessing and disseminating information on global market opportunities can be done more efficiently by organizations, such as industry associations, than by individual companies);
- Focusing efforts around sectoral strengths (three existing strengths of the industry are in carrying out infrastructure projects, providing goods and services related to the marine environment, and in providing solutions to resource industries — these are strengths that can and should translate into market opportunities in other parts of the world);
- Leveraging emerging drivers. (Three areas expected to provide significant growth to the environmental industry are Eco-Efficient Technologies, Climate Change Markets, and Health and Environment Markets. Companies currently working in those areas, or with related technologies should be identified and encouraged (through R&D incentives, for example), and supported by regional legislation and government purchases); and
- Targeting the Americas first (in particular aiming to increase sales in Central Canada, in the North-Eastern US and in the Caribbean). This would be accomplished through: sales to existing customers who also operate in these geographic regions, showcase events at large conferences, and liaison with trade officers.

The fourth pillar of the industry is continued technology innovation and development. Working towards this goal would rely on three major areas of effort:

- Enhancing product import substitution (would encourage companies to produce goods locally that are currently brought in from outside the region);
- Demonstrating and profiling local technologies (through promotion of the regional industry, through the development of research partnerships and networks and through technology demonstration programs); and
- Developing urban environmental management solutions through the development of technology and the ability to provide comprehensive solutions to multi-faceted urban environment problems.

A key ingredient of many of the strategy options is the need for increased cooperation and coordination of efforts, involving both private sector companies, industry organizations and the different levels of government. The strategy envisions, for example, industry associations playing a key role in the identification of foreign markets, government/industry collaboration in the development of technology, and the development of strategic alliances between private sector partners for both marketing and the ability to provide comprehensive solutions to complex problems.

2.0 Study Context



2.1 Background

Environmental companies across Canada represent a vital component of our country's current and future economic growth. The market opportunities for these companies are large. Industries in Canada alone spent almost \$4.5 billion through both capital and operating expenditures on environmental protection. In fact, the entire market in Canada for environmental products and services is estimated at \$21.4 billion (Source: Statistics Canada).

Today, the importance of the environment industry is even greater because it is no longer based simply on "compliance solutions" that help minimize environmental impacts. Innovative technologies and services are now providing numerous value-added benefits to both private and public clients including:

- enhanced productivity and efficiency;
- reduced corporate risks and potential liabilities;
- increased (or maintained) market share through improved corporate image; and
- increased profits and shareholder value.

The shift away from a compliance-only focus is occurring as Canadian and international firms look for solutions that are integrated with core business objectives. As this evolution unfolds and the potential marketplace continues to grow, environmental companies are also seeing increasing volatility and greater competition within the marketplace. As a result, Canadian environmental companies are having to adapt more quickly, become more creative, while at the same time broadening their reach to identify and grasp potential opportunities that may lie outside of their present market boundaries.

In addition, the environment industry continues to add value to the other key segments of our society by:

- providing jobs and economic growth for the local, provincial and regional economies;
- enhancing local ecosystems through protection and prevention; and
- improving the quality of life within local communities by reducing harmful pollutants that may have negative impacts on health and livelihoods.

2.2 Content of the Report

“Beyond the Horizon – A Strategy for Atlantic Canada's Environment Industries” is a proactive response by local industry associations and government organizations to address the challenges facing the environment industries of the region. Commissioned by the Atlantic Canada International Business Development Agreement (IBD), the study is timely and the results are critical to the growth and future competitiveness of environmental technology and service companies located in Atlantic Canada.

This document provides a strategic overview of the industry and, more importantly, presents an action plan that can be employed to effectively position the Atlantic Canada environment industry for future growth. In addition, the study:

- Assesses the market forces influencing global, Canadian and Atlantic Canada's environment industry;
- Identifies the strengths, weaknesses, opportunities and threats to environmental companies located within the four provinces of Atlantic Canada;
- Provides valuable market intelligence to help companies improve their domestic and export market strategies;
- Defines core elements - referred to as strategic pillars - which are fundamental to a successful environment industry. Addressing these strategic areas is vital to the establishment of viable environment industry enterprises and their continued growth and success; and
- Establishes business development strategies which, if implemented, will assist leading firms to penetrate new markets, support innovative technology firms to move their inventions from concept to production more easily, and attract investment to the region. This will in turn create more jobs, enhance local skills and continue to expand the local economy.

The formal study objectives and methodology is presented in Annex A. The summary of key informant interviews is presented in Annex B.

2.3 Organization of the Report

The report is organized in the following fashion:

- Section 1.0 contains the executive summary of the current study and its results, including the proposed strategies.

- Section 2.0 introduces the global environment industry and current trends. The content of the report is outlined, along with the organization of the document.
- Section 3.0 discusses the evolution of the global environment industry. The section also presents a detailed assessment of the international, domestic and regional forces that are (and will be) driving the environment industry along a new path as we head into the millennium. General characteristics of the Canadian environment industry are described.
- Section 4.0 is focused on Atlantic Canada, providing economic context and specific findings of the extensive research conducted during the study. From survey data, the regional environment industry and each provincial industry is profiled. A detailed analysis of strengths, weaknesses, opportunities and threats for the environment industry in each Atlantic province presents the rationale for the strategies developed in Section 5.0. Regional drivers unique to Atlantic Canada complete the section.
- Section 5.0 describes the critical elements or pillars upon which the business development strategies are set and which are essential for achieving the strategic goals. The strategic framework with its goals and contributing strategies is set out, along with an action plan identifying stakeholder responsibilities and potential contributors to enhance the competitiveness of Atlantic Canada environmental technology and service firms.
- Section 6.0 draws the study to a close, reviewing the findings and presenting a conclusion.

3.0 The Environment Sector – An Industry in Transition



3.1 Defining the Environment Industry

The Organization for Economic Co-operation and Development (OECD) Working Group on the Environment Industry has developed the following definition of the environment industry:

"The environment industry consists of activities which produce goods and services to measure, prevent, limit or correct environment damage to water, air and soil, as well as problems related to waste, noise and eco-systems. Clean technologies, processes, products and services which reduce environmental risk and minimize pollution and material use are also considered part of the environmental industry..."

This definition is considered an international standard and has been used by Statistics Canada to begin its data collection process in 1995 from which to create a picture of this industry as it presents itself in Canada. However, the definition of "environment industry" varies significantly, and is currently under review by a number of institutions including Statistics Canada. The reason for this stems from the complex nature of the industry and its current evolution.

A newer and much broader definition, such as the one posed by Environmental Business Canada (The Delphi Group), addresses the changes that are occurring in this dynamic and high-tech industry:

"Environmental companies are industrial and infrastructure goods and services which are wholly or partially in demand as a consequence of regulatory and/or market forces which enhance environmental protection. At the same time, these technologies and services may provide various other benefits of an economic or social nature."

Using this definition a truer, and yet much broader, picture of today's environment industry emerges. The range of companies that fall under the more current environment industry definition than in past include those that provide services or technologies geared towards:

- compliance with environmental regulations;
- environmental assessment, analysis, and protection;
- pollution prevention or control, waste management, and remediation of contaminated property;

- provision and delivery of (or the design, construction of infrastructure that provides) potable water, cleaner wastewater effluents or indoor/outdoor air;
- processing of waste by-products/recovered materials or the manufacturing of products generated with recovered waste by-products;
- manufacture of technologies that provide cleaner, more sustainable energy sources, transportation methods, products, etc.;
- technologies and activities that contribute to increased energy and resource efficiency, higher productivity, and sustainable economic growth;
- professional services (lawyers, engineers, educators, etc.) that provide advice on how to enhance environmental awareness, reduce environmental risk or minimize ecosystem degradation;
- research and development institutes that conduct activities to advance specific aspects of the environment industry as defined above; and
- technologies and services that measure, collect, consolidate and analyze data regarding pollutants of any nature (water, air, soil).

3.2 The Evolution of the Global Environment Industry

The environment industry has followed the path to market maturity faster than any other sector before it. Its initial rise took place between the mid-1970s and the late-1980s when G7 governments, spurred on by public pressure, began to pass stringent regulations addressing numerous concerns about environmental degradation. Response to these demands created an industry made up of private and public organizations that provided two distinct types of products and services. These are:

22. Products and services utilized in public infrastructure delivery of potable water, wastewater treatment, and waste management.
23. Products and services needed for compliance with pollution control measures, remediation, and other environmental requirements.

This rapid demand for end-of-the-pipe solutions, environmental technologies and services occurred across all sectors, although waste and water certainly progressed more quickly than the rest. By 1996 the industry market in Canada was estimated at between \$17 and \$27 billion.

The vast majority (80%+) of the market was (and still is) found in North America, Japan and Europe. When economic recessions hit most of these regions in the early 1990s, demand for environmental products and services decreased. The downturn was initially offset by booming markets in countries with emerging economies such as Brazil, Korea, and Malaysia, but this trend was short-lived. By 1996, environmental markets, particularly in developed countries, were showing signs of increasing maturity:

- overall growth rates in environment sectors now hover between 1% and 2%,

although traditional sectors such as wastewater pollution control and municipal/industrial waste management are actually showing negative growth rates;

- mergers and acquisitions continue to consolidate sectors as key players look for ways to enhance their technology and service base in order to meet new buyer demands; and
- many markets are over saturated, and competition remains high. This is reducing profit margins, causing less flexible companies to go out of business.

Table 1
Global Demand for Environmental Technologies and Services

Environment Sector	Estimated 1996 Revenues (\$millions)	
	<i>Canadian</i>	<i>Global</i>
Municipal and Industrial Waste Markets	\$7 405	\$175 750
Infrastructure and Industrial Water and Wastewater Markets	\$6 630	\$380 960
Industrial Eco-Efficiency Markets	\$4 900	\$113 000
Construction and Facilities Markets	\$2 530	\$53 130
Non-Specific Engineering and General Services	\$2 521	\$60 504
Transportation and Industrial Air Pollution Markets	\$1 739	\$37 178
Energy Efficiency, Alternative Energy and Fuel Markets	\$423	\$7 255
R&D Environmental Technologies	\$355	\$13 490
Measurement, Instrumentation and Informatics Markets	\$329	\$6 074
Remediation Markets	\$215	\$7 095
Total:	\$27 047	\$854 436

Source: The Delphi Group, 1997

Historically, public expenditures accounted for a major portion of revenues for environmental product and service companies. In the recent past the private sector has been increasing its environmental expenditures, not only to respect regulations but to gain economic benefits from process modifications which shrink consumption of raw materials and energy and reduce waste and pollution (OECD, 1996). The adoption of worldwide environmental standards, privatization and de-regulation of utilities, in combination with corporate consolidation and increasing firm size contribute to the increasing growth of international trade in this sector. Currently, the U.S., German and Japanese industries have the largest share of most international markets, although Canadian companies are particularly strong in a number of specialized technology/niche markets and engineering consulting fields.

3.3 The Transition – 2000 and Beyond

Environmental regulations that created much of the market growth in the beginning are now having a lessening influence on buyer demand for environmental technologies and services. Substantial compliance with existing regulations has been reached by most major industrial sectors while the number of new regulations is diminishing. Purchasing patterns for environmental products and services are undergoing a fundamental shift from a predominant demand for end-of-the-pipe pollution control, waste management, and remediation to an evolving demand for eco-efficiency, pollution prevention and risk prevention/mitigation, all of which enhance competitiveness. As this change gathers momentum, the environmental market is beginning to evolve from one dominated by activities that address mistakes of the past to one dominated by activities that prepare for the future.

This phenomenon is not unique to Canada; in fact, this trend is being observed across all industrialized countries. For example, a study on the environment industry by the US Department of Commerce determined that the period of rapid growth, which corresponded to the initial rush of new environmental regulations, is now behind most sectors of the industry. A high degree of compliance with existing environmental regulations by its customers, fewer new regulations, and the perception of softened enforcement have reduced demand for many of the industry's products and services in US markets. In addition to decelerating growth, other market characteristics include heightened competition, growing client sophistication, greater emphasis on marketing, consolidation of market share in larger players, reduced profitability, and heightened merger and acquisition activity. This context is mirrored in Canada.

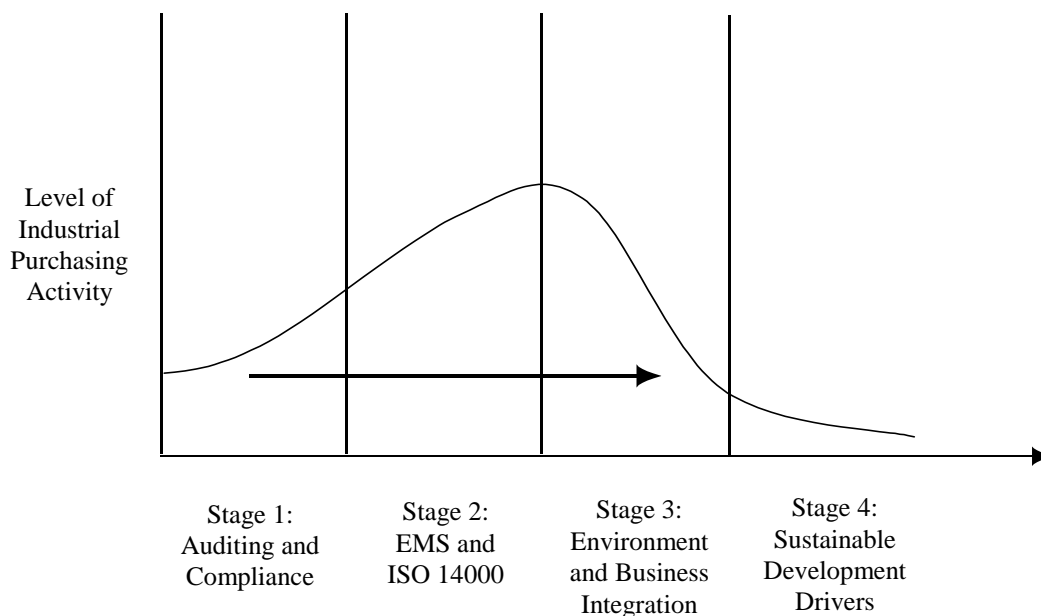
As a result of this transition, many environmental companies positioned in the more "traditional" end-of-the-pipe sectors are looking at a fairly bleak future. At the same time, innovative Canadian firms, including many located in Atlantic Canada, are adapting to the changing demands of domestic and international buyers, positioning themselves as leaders in a number of emerging areas of growth such as:

- Air pollution prevention and control including issues surrounding climate change, transportation emissions, indoor air and other pollutants associated with decreased health (e.g. PM 2.5, ground-level ozone);
- Energy efficiency, renewable energy and alternative fuels;
- High-end risk-based consulting;
- Industrial pollution prevention and eco-efficiency;
- Integrated measurement instrumentation;
- Numerous sector or geographic niche markets (e.g. reducing oil content of drilling mud and cuttings, tailings management, sludge and bark management, cost-effective remediation of specific persistent compounds, etc.).

As the environment industry adapts to strong emerging market forces, it is propelled along an evolutionary path leading to a broader and more robust sector. As shown in Figure 1, in the more mature markets of North America, Europe and Japan, industrial corporations are now integrating environmental considerations directly into their strategic planning process. As a result, demand is no longer focused solely on auditing and compliance. "Environmental decisions" along with capital and operating expenses must now be in line with the core business objectives of increased profits, reduced liability, enhanced market share and overall improvement of shareholder value.

Figure 1

**NORTH AMERICAN AND EUROPEAN INDUSTRIAL MARKETS FOR
ENVIRONMENTAL PRODUCTS AND SERVICES**

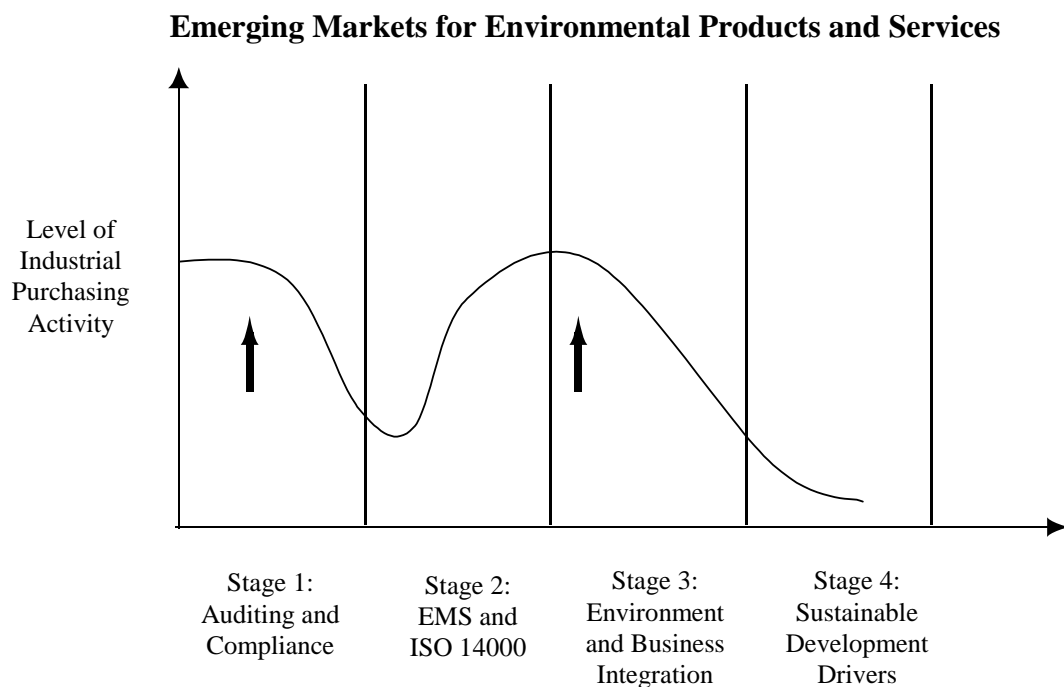


Source: The Delphi Group, 1998

As shown in Figure 2, in the emerging markets of Asia, Latin America, and Eastern Europe, demand is evolving differently. Rather than a single industry movement from compliance to environment and business integration, demand is occurring on two fronts. Firstly, a group of sophisticated corporations (e.g. multinationals) are demanding solutions similar to their western counterparts that integrate business and environmental objectives. A much larger number of companies are looking for more traditional end-of-the-pipe or compliance-based technologies and services that are oriented towards developing and maintaining environmental infrastructure (e.g. water and wastewater treatment, waste management, etc.).

Knowledge of these differing patterns of evolution has implications for marketing approaches and corporate contacts.

Figure 2



Source: *The Delphi Group*

3.4 Emerging Market Forces Driving Future Growth

In the past, regulations alone established the environment industry. Today, however, there is a broad range of emerging forces that are influencing the type of environmental technologies and services in demand. Some of these forces are a direct result of the changing characteristics of buyers and their approach to resolve specific environmental issues. Others arise as:

- public concerns shift from environmental degradation to human health;
- governments attempt to engage industry through voluntary initiatives that reduce pollution at the source or regulate them through broader legislation that integrates several related issues; and
- global economic markets expand and large institutions (e.g. World Bank) play a greater role in developing environmental infrastructure.

Understanding the major forces driving future growth is the market intelligence needed to assist companies to improve both their domestic and export market strategies. The market forces discussed in the following section are:

- Minimizing corporate risk;
- Attaining and surpassing compliance;
- The changing needs of clients;
- Health and the environment;
- Pollution prevention and eco-efficiency;
- Climate change;
- Deterioration of physical infrastructure;
- International expansion of resource industry companies;
- Urban environmental markets; and
- Projects funded by international financial institutions.

3.4.1 Minimizing Corporate Risk

Industrialized corporations have significantly modified their approach to assess and manage the pollutants they discharge to the air, water and land. Pollutants are no longer viewed as simply something to treat, manage, or dispose of in order to comply with a regulation. Decisions are now made on priorities – those issues that represent the greatest risk (or opportunity) are receiving the most attention. Risk-based decision-making techniques (e.g. RBCA, Risk Based Corrective Action) are also increasingly being adopted across North America. This trend is reflected in the Atlantic Region as well. The Atlantic Provinces have established the PIRI Committee (Partners in RBCA Implementation) comprised of representatives from government, industry and consulting companies in the four Atlantic provinces, working together to bring the risk based corrective action process to this region.

This new focus is distinguished from previous market forces because:

- Environmental decision-making is moving in non-traditional directions as people from a variety of backgrounds make decisions on corporate environmental matters.
- A financial or liability issue may take priority over an issue of compliance.
- Public perception is now recognized as a primary concern requiring ongoing attention in order to run a successful business. As such, companies are implementing measures such as regular public consultation, local environmental impacts assessment and monitoring, and corporate transparency to ensure that an environmentally responsible image is maintained.

These factors are increasing the demand for high-end specialized risk-based consulting services and technologies that can assist corporations manage their risks from the design stage all the way through to decommissioning and remediation.

3.4.2 Attaining and Surpassing Compliance

The increasing risk of prosecution or the financial/corporate image consequences of violating a regulation continues to position compliance as a high priority for buyers¹. Although compliance is no longer the major single factor driving the environment industry forward, it continues to play an important role in shaping the industry. As a result, demand for environmental services and technologies that assist companies attain (or surpass) compliance will continue to be required on both the domestic front, and more importantly in emerging economies.

Voluntary initiatives undertaken by companies - such as Irving Oil's projected \$110 million expenditures on environmental technologies and services over the next year as part of \$1 billion facility upgrade - are raising the bar above simple compliance in order to gain benefits such as increased market share, enhanced corporate image, and reduced costs. These types of voluntary initiatives not only increase demand for pollution prevention technologies, they also encourage extended producer responsibility programs (e.g. value chain management, minimal impact manufacturing) which further increase the need for environmental products and services.

Technologies that simply solve the compliance issue (e.g. end-of-pipe treatment) are no longer sufficient. Companies now look to more holistic solutions that reduce or eliminate the source of the problem (or combination of concerns), thereby reducing risk or providing benefits that are integrated with the business objectives.

3.4.3 The Changing Needs of Clients

As environmental issues become inherently linked to business objectives and risk, integrated solutions that employ technologies and services to address complex interrelated issues are sought. Although niche opportunities will always exist for the narrowly focused specialist, clients are more often looking for service and goods providers that:

- **Provide broader geographic coverage.** Larger corporations are regularly going with sole-sourced contracts for environmental services that cover all branch plants and offices across a region, country or continent. For example, roughly a third of the demand-side interviewees noted that sole source contracts are provided for specific areas of work (e.g. remediation, environmental effects monitoring, etc.)

¹ The annual *Canadian Environmental Management Survey 1996 (KPMG)*, illustrated that regulatory compliance and director/officer liability were placed first and second in terms of importance of environmental issues faced by Canadian corporations. Over half the buyers surveyed during this study also noted that compliance was still one of the major factors driving companies to purchase environmental products and services.

- **Have the interdisciplinary skills** (i.e. technical expertise in conjunction with socio-economic and financial skills), **expansive resources and the financial depth** to solve more complex problems from start to finish in a defined period of time.
- **Can provide sophisticated solutions** that will result in and illustrate value-added benefits such as increased efficiencies, reduction of pollutants at source, enhanced corporate image, improved cost-savings or decreased corporate risks.
- **Have a thorough understanding of the client** in terms of their industry, business, facilities and more importantly the domestic and international standards and objectives they are trying to achieve.

Those environmental companies that can identify and focus their technology or service on an emerging niche market or have the resources to establish the depth and range of skills required to meet the ever increasing client needs will prosper. Those that are not able to adapt to the changing market conditions are, on the other hand, unlikely to succeed.

3.4.4 Health and the Environment

As scientists, members of the public and government officials become better informed about the links between various contaminants (e.g. airborne particulates, persistent chemicals, etc.) and human health, demand for front-end solutions and healthier products/processes will continue to grow. In particular, the demand for environmental technologies that address indoor and outdoor airborne contaminants (PM 2.5, ozone precursors, VOCs), persistent toxics and endocrine modulators is expected to increase.

The health driver initially emerged with some force in the early to mid-1990s as concerns around smog and other health-related environmental issues began to reach the public domain. This trend was substantiated in 1994 when the *International Environmental Monitor* of EnviroNics International, which tracks public opinion on the environment, concluded that environmental impacts on human health was becoming one of the biggest concerns to individuals in both developing and industrialized countries. In fact, those responding to the 1994 survey, conducted in 24 developed and developing countries, ranked environmental risks to health, and to the respondents' children, as among the highest priority concerns. On average, 94% of respondents perceived that environmental degradation was already harming their health.

This public concern is already resulting in action. For example, among the clean air measures undertaken by the Government of Canada are proposed regulations to reduce the level of sulphur in gasoline by 90 per cent by 2005. Also, negotiations will be held over the next year with the United States to reduce pollutants that cause smog - it is estimated that up to 90 per cent of the ozone component of smog in New Brunswick and Nova Scotia and about 50 per cent in the Windsor-Quebec City corridor originates in the United States.

The health and environment trend can only increase as:

- The general population in the developed world continues to age and health costs continue to rise; and
- People in developing countries increase their standards of living and levels of education while at the same time the cities in which they live continue to grow rapidly. This will result in more people being exposed to higher concentrations of air pollutants and other toxic compounds emitted from transport, industrial, and commercial product sources.

3.4.5 Pollution Prevention and Eco-Efficiency

Over the past decade, corporations in Canada, the US, Europe, Japan and many developing countries have selected pollution prevention or eco-efficiency² as the primary means to address priority environmental concerns such as toxic wastes. This is particularly true in the resource extraction and processing and large manufacturing sectors.

The objective of this ongoing movement towards front-end solutions is to eliminate or reduce the quantity or toxicity of pollutants at the source, thereby minimizing risk, potential liabilities, and associated costs. The driver is not generally compliance.

Although the concept of front-end solutions is not new, the full potential has yet to be tapped because corporations generally upgrade existing stock and/or processes when they are either fully amortized or become unproductive—completing this cycle of capital stock replacement can take several decades. In addition, there are a number of pollution prevention technology gaps that need to be filled. Thus, pollution prevention will offer an excellent opportunity at home and abroad for both innovative service and technology companies well into the next decade or more.

3.4.6 Climate Change

With the signing of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) in December 1997, Canada agreed to reduce its greenhouse gas (GHG) emissions to 6% below 1990 levels by the period 2008 - 2012. By doing so, Canadian companies and most major firms located in industrialized countries will be seeking to address this potential business risk. The market forces and government regulations that may follow to attain these objectives will in turn drive the demand for solutions that reduce the emissions of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. This may include technologies and services that:

² The concept of eco-efficiency (actions that generate economic and environmental dividends) is closely associated with pollution prevention.

- Increase energy efficiency, particularly for large manufacturing, extraction and processing industries (e.g. forestry, oil and gas, electric utilities, etc.);
- Minimize pollution at the source, conserve valuable raw materials and utilize post-consumer materials in place of virgin inputs;
- Provide cost-effective alternative energy sources. The forestry industry, for example, is developing applications for biomass, while other sectors are interested in industry-specific small hydro, wind and solar applications that will result in bottom-line benefits; and
- Encourage the use of alternative fuels, particularly for the transportation sector.

Of note are a number of factors which will have an impact on the strength and speed at which this potentially significant driver will influence the environmental market:

- **The final rules.** Although targets have been agreed upon, the actual policies, regulations and measures to reach the proposed targets, both on a domestic and international front, have not been resolved.
- **The complexity of the agreement.** The diversity of "agendas" and the large number of countries involved in this agreement may create numerous log jams that could result in delayed action.
- **Public perception.** Scientific understanding of climate change is slowly evolving. However, public concerns (rightly or wrongly) are increasing at a faster rate and their requests for action are becoming louder. Government policy response may in turn be a knee jerk reaction rather than a reasoned position.
- **Industrial perception.** Many companies are not waiting for the final results and are "hedging their bets" by investing now in technologies that may offer them solutions or provide a value-added addition to their services to address the climate change issue.
- **Developing countries.** As developing countries become more engaged in the Kyoto negotiations, increased demand may result as countries sign onto the agreement and the need for clean sustainable energy and technologies grows.

3.4.7 Deterioration of Physical Infrastructure

Massive infrastructure built over the last 50 years across North America, and more importantly in Canada, is rapidly deteriorating and requiring repair and upgrades. Although billions of dollars were spent by the federal, provincial and municipal governments to construct this infrastructure they did not put in place the necessary fiscal strategies to address the "perpetual care" required for landfills, roads, piping, etc. This lack of planning has resulted in a pent up demand for services such as construction and engineering consulting that will spur on related spending. Population growth and aging infrastructure

in urban centres such as Halifax and St. John's is also creating additional demand for new infrastructure including water and wastewater treatment facilities, piping systems to service growing urban development, and waste management processing centres for leaf, yard and expanded recyclable materials.

As a result, emerging infrastructure needs will become an important driver for environmental technologies and services for two reasons (Delphi – Technology Partnership Canada's report 1997):

- The waste management and water and sewage infrastructure sectors represent the largest components of Canada's environment industry. Atlantic Canada firms have successfully taken advantage of opportunities in local, regional and international markets arising from the ongoing need for environmental infrastructure; and
- According to the Transport Association of Canada, between 6-10% of infrastructure capital requirements and 3-7% of ongoing infrastructure related expenditures are a result of environmental regulations and conservation.

Overall infrastructure costs for new roads, bridges, water and sewage systems renewals and upgrades are estimated at \$240 billion over the next 15 years in Canada alone (Sources: NRTEE, Transportation Association of Canada).

3.4.8 International Expansion of Resource Industry Companies

Principal clients of environmental firms located throughout Atlantic Canada are involved in resource extraction and processing (mining, forestry, natural gas, etc.). The majority of these large corporations are active elsewhere in Canada, and more importantly in developing countries around the globe. As environmental awareness in these countries rises, so too does the public pressure to maintain environmentally responsible operations. As such, emerging government regulations and the increased understanding of multinational corporations of the need to properly assess, reduce and mitigate potential environmental risks, in order to sustain the right to operate, is driving the demand for environmental technologies and services.

This offers a tremendous opportunity to Canadian companies who are providing value-added services and technologies to these companies at home. The requirements vary significantly depending upon the facility and processes in question, its location and the resources being processed or extracted. Nevertheless, key areas of opportunities relevant to Atlantic Canada environmental companies exist. A few examples include:

- Risk-based management, assessment and remediation;
- Environmental effects monitoring;
- Numerous technologies associated with oceanic extraction of minerals;

- Marine environments (e.g. hydrodynamic modelling, environmental impact assessment, etc.);
- Measurement and monitoring;
- Mine reclamation; and
- Innovative niche technologies that reduce pollutants at source, treat specific wastes, etc.

As global economies rebound in the regions recently hit by recessions, resource companies will increase their activities and Atlantic Canada environmental companies who are well positioned can benefit from significant opportunities. However, to be successful Atlantic Canadian companies must be willing to enter into partnerships and strategic alliances, and stretch beyond domestic borders. Other skills that will be required include language capabilities, knowledge of the targeted geographic markets and their regulations, familiarity with multinational organizations and a heightened awareness of priority environmental issues abroad.

3.4.9 Urban Environmental Markets

Infrastructure in developing countries is an even greater priority than that of industrialized nations, as nations attempt to provide citizens with the basic services of sanitation, communication and transportation. Of particular interest is the urban environmental management (UEM) market and related areas of urban planning, air monitoring, sustainable transportation, water and wastewater treatment, waste management, etc. A quote from "World Resources 1996-97: The Urban Environment"³ illustrates the importance of UEM:

"..... Urban environmental conditions are important to the health and quality of life of a city's inhabitants and can impose significant costs on economic and social development. The impact of urban areas on the surrounding environment is also an issue of growing concern. More than half of humankind will live in urban areas by the end of the century, and 60 percent by the year 2020. In most nations, cities generate a majority of the economic activity, ultimately consume most of the natural resources, and produce most of the pollution and waste. Thus, urban environmental issues, although often overlooked, are important both locally and on national and global scales"

For these reasons, UEM opportunities will drive a large portion of the demand for environmental technologies and services in the developing world as we enter the new millennium. Integrated solutions and packaged technologies and services will be required to ensure that development is balanced with enhanced environmental and health conditions.

³ Jointly published by the World Resources Institute (WRI), The United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and the World Bank.

3.4.10 Projects Funded by International Financial Institutions

International Financial Institutions (IFIs) such as the World Bank and its agencies, and regional development banks (ADB, IADB, African Development Bank) are having a profound impact on environmental technology markets [The Delphi Group, 1997]. Large development projects are often required to meet international standards set by the funding body (e.g. World Bank). Specific to the focus of this report, borrowing requirements from these institutions now carry a number of environmental stipulations which are driving demand for environmental technology. Further, IFIs are also active in actual lending for numerous environmental initiatives. For example:

- The World Bank has created a US\$ 300 Million fund for industrial hazardous waste clean-up and prevention in India.
- The Inter-American Development Bank is financing a number of water and wastewater projects in Latin America such as the Rural and Small City project in Ecuador.
- The Asian Development Bank has undertaken extensive environmental framework development in the Mekong River Region. Coastal and Marine Environment Management Plans are being developed for those areas bordering the South China Sea.
- The World Bank has instigated a dedicated environmental source of financing called the Global Environment Fund. This Fund is ancillary to existing projects, ensuring that additional environmental considerations are part of project planning and implementation.

Most of these initiatives encourage private sector driven environmental technology transfer, and lead to the creation of new joint ventures relationships between domestic and offshore firms.

3.5 Emerging Industrial Market Opportunities

Due to many of the forces discussed above, a number of industry-specific niche environmental opportunities are emerging. *Environmental Business Canada* highlighted many of these opportunities in its recent Spring 1999 issue. These are presented in Table 2 which follows.

Table 2

BUSINESS OPPORTUNITY		
Issues creating demand for suppliers of environmental products and services		
<p>Automotive</p> <ul style="list-style-type: none"> • auto shredder residue • used automotive filters • polyurethane foam • bumper covers • body side mouldings <p>Autoparts</p> <ul style="list-style-type: none"> • Reduce/reuse water & effective pretreatment management for oil, grease, pH, metals, alkalis, acids and suspended solids. • management and reduction of volatile organic compounds • energy efficiency <p>Chemical Industry</p> <ul style="list-style-type: none"> • reduction and management of a broad range of persistent, toxic and bioaccumulating substances • cradle to cradle management • monitoring and estimating hazardous and toxic waste emissions • assessing toxicity levels of products • prioritizing environmental improvement options • audits, verifications, third party expertise • risk-based remediation services and cost-effective clean-up technologies • reduction and management of endocrine modulators and chlorine-based chemical <p>Plastic Products</p> <ul style="list-style-type: none"> • polyurethane foam in household furniture • lumber wrap • polyurethane strapping • videotapes (polyester with oxide coating) • X-ray films (silver content) 	<p>Oil and Gas</p> <ul style="list-style-type: none"> • reducing oil content of drilling mud and cuttings • benzene • trace emissions PM 2.5 Nox • sulphur in fuel • climate change • eco-efficiency • life cycle value assessment <p>Forestry</p> <ul style="list-style-type: none"> • sludge and bark management • PM 2.5 (particulates) • noticeable odour • minimal impact manufacturing • communications and public consultation • environmental effects monitoring • climate change <p>Mining</p> <ul style="list-style-type: none"> • heavy metal recovery, treatment and disposal • site reclamation • Comprehensive Environmental Management (start to finish) • prevention and minimization of water contamination, such as acid rock drainage • tailings management including the design of effective tailings impoundments • measurement and monitoring • erosion and dust control • eco-efficiency processing technologies • more energy efficient processes and forms of transportation • community consultation and local planning 	<p>Electronics</p> <ul style="list-style-type: none"> • coordination and logistics of recycling, take back and re-manufacture of obsolete computer hardware • reduction and management of persistent organic pollutants and volatile organic compounds • electronic circuit boards • cathode ray tubes • variety of plastics <p>Pulp and Paper</p> <ul style="list-style-type: none"> • bestialities or sledges from water waste treatment systems and deinking processes • water (BOD and toxicity) • monitor and then reduce PM 10. PM 2.5 and Nox emissions • endocrine disruptors • climate change <p>Smelting, Refining and Processing Steel and Other Metals</p> <ul style="list-style-type: none"> • BOF and EAF slag and dust • spent pickle liquor and waste chromium solutions • recovery of waste iron oxides and chrome • BOF and oily sledges • PACS, benzene, dioxins and furans • flvash. PM 10. PM 2.5 • foundry sands
Sources: The Delphi Group , OCETA, Tomorrow Magazine		

4.0 Atlantic Canada's Environment Industries—Strengths, Weaknesses, Opportunities and Threats



4.1 Atlantic Canada and Global Competitiveness

The nature of business over the past few decades has become increasingly competitive, with pressure arising not only from suppliers within a locale, but from goods and service producers in far flung corners of the globe. To build on competitive advantages and develop strategies for growth, industrial sectors require a thorough understanding of their strengths, weaknesses, opportunities and threats through the process of SWOT analysis.

The following section profiles the regional environment industry as well as the environment industries in New Brunswick, Nova Scotia, Newfoundland and Prince Edward Island. Each of the provincial profiles is followed by detailed SWOT analyses, focusing on primary factors that impact the overall industry. These factors - particularly those seen as detrimental to the competitive positioning of the regional environment industry - are addressed in Section 5.0 through the Strategic Framework and Action Plan.

Economic features of the Atlantic Canada region are discussed in Annex C as additional context.

4.2 Overview of the Canadian Environment Sector

The existing Canadian environment industry (similar to many industrialized countries) can be characterized as follows:

- **Fragmented** – In general, companies in Canada's environment industry operate in numerous independent “silos” with little alliancing. The number and areas of expertise of companies along with their range of "environmental" services and technologies continues to grow. Many firms do not believe they form part of the same sector, let alone the same industry⁴.
- **Wide Range in Size and Capacity** – The environment industry is comprised of a few large players dispersed among a sector made up of predominantly small and medium-sized niche technology manufacturers and service providers:

⁴ For example, a computer software company providing system optimization programs which increase the efficiency of boiler may now consider itself an environmental firm, while a waste hauling company may classify itself as a transportation company not an environmental company.

- the large companies as well as some of the medium-sized firms often provide a range of technologies and services, cover a broad geographic area, have depth in terms of resources and capabilities and offer multidisciplinary teams and solutions. These firms are generally well-prepared or currently positioned in the international marketplace.
- the majority of small and medium-sized companies are often focused on a niche geographic or sector-specific market, providing unique and high quality technology(ies) or services. Those with superior products or services are well positioned to take advantage of international opportunities. However, many do not possess the in-house business skills or resources to take the leap.
- the remaining small companies often have limited but focused expertise, and generally do not venture outside of the Canadian (or often local) marketplace.
- **Consolidating** – Mergers, acquisitions and bankruptcies across the country continue to consolidate the Canadian environment industry. Medium and large firms are broadening their in-house expertise or product lines to meet increasing buyer demands, and expanding geographic coverage by acquiring small firms with specialized technologies or niche markets.
- **Strong in Niche Markets** – The majority of Canadian firms who have been successful in both domestic and international markets provide innovative and often leading edge technologies or value-added services that meet a particular need in a cost-effective manner.

These trends are generally true, if not exaggerated, in many areas of Atlantic Canada. For example, the profiles of the size and scope of companies comprising the environment industry in the four provinces presents the picture of an industry with a larger proportion of small companies as compared to the national average and a lower percentage of large companies (over 100 employees).

4.3 The Environment Industry in Atlantic Canada

Environmental companies in the Atlantic Canada region account for approximately 4% of Canada's environment industry revenues. Similar to the rest of the country, these firms produce a wide variety of products and services that are sold to a large number of industrial clients locally, nationally and internationally. As a result, the regional (and local) environment sector in Atlantic Canada is not immune to the changing global market forces that are reshaping this industry. In fact, confronted with a small local marketplace, and surrounded by larger competitors in Quebec, Ontario and the northeastern US, Atlantic

Canadian environmental technology and service companies face a number of challenges.

As the region itself is unique, so too is the environment industry which has prospered and led the charge in innovation and service in many areas. Companies in Atlantic Canada have not only succeeded locally, they are now recognized as leaders in the much broader marketplace.

4.4 Atlantic Canada Regional Environment Industry Profile and SWOT Analysis

A number of innovative environmental companies, many of which are considered global leaders, are based in Atlantic Canada. The environment industry as a whole has a multitude of strengths which if leveraged will result in continued growth of the sector as regional, domestic and international opportunities are exploited. This continued prosperity can be further enhanced if key stakeholders remain focused on principal strengths, are selective about which opportunities to pursue and work towards mitigating the primary weaknesses of the regional environment industry.

4.4.1 Enterprise Characteristics

Similar to the industry found across the country, environmental technology and service firms located in Atlantic Canada range significantly in size and revenue from solo operators with revenues of less than \$100,000 to larger firms employing over 50 people. Based on the results of the survey undertaken for this report, the vast majority of the firms in the Atlantic environment industry are very small, with 68% employing less than 10 people (37% of these have less than five employees). Only 4% of the companies have more than 50 employees. For comparison, a recent survey of environmental companies in southern Ontario (including Cambridge, Guelph, Kitchener and Waterloo) found that 71 per cent of companies employed less than 21 people, 60 per cent employed less than 13, and 34 per cent employed less than 4 people (Ontario Centre for Environmental Technology Advancement, 1997). In total it is estimated that the Atlantic Canada environment industry is comprised of slightly more than 500 companies.

The average company in the Atlantic Canada environment industry has been in business for between 10 to 15 years. The median age for companies producing goods is 15 years, while it is a little less for service providers (10 years) and companies that provide both products and services (12 years)⁵. This is generally slightly higher than the national average for Canadian environmental companies. As an example, a recent survey conducted in BC found that the median age of environmental companies was only 11

⁵ The median is the point at which half the companies fall on one side of the point and half on the other side. The average age is slightly older, especially for goods-producing companies, since some companies have been around since the early 1900s.

years, even though over 80% of the companies surveyed had been in business for more than 5 years.

4.4.2 Products and Services Offered

Other general characteristics of the Atlantic Canada environment industry, based on survey results⁶ include:

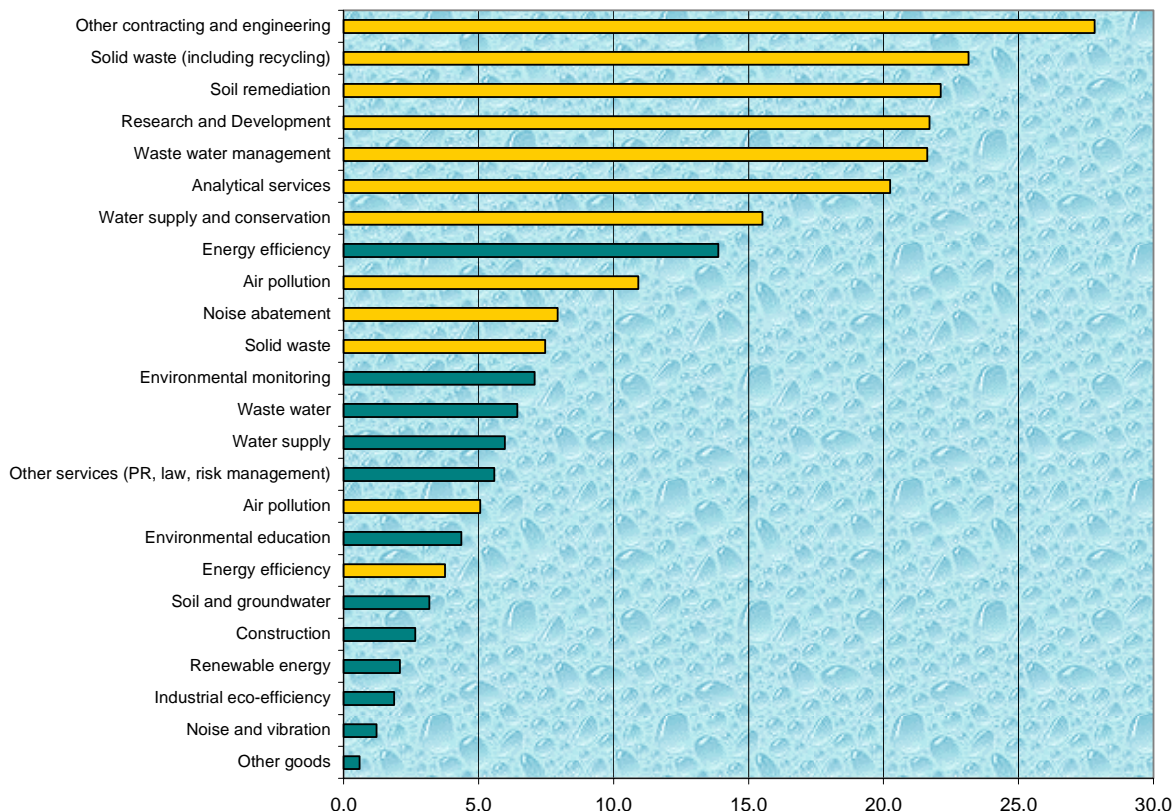
- Approximately 68% of regional environmental firms provide services only, 12% provide environmental goods, and the remaining 20% provide both products and services.
- The largest companies (with over 50 people) are generally service providers, whereas small companies with fewer than five employees are predominantly providers of both products and services. About one-third of the companies that provide goods are distributors for products made by other manufacturers.
- 85% of Atlantic Canada environment companies produce goods that fall into more than one category. These categories include solid waste products, environmental monitoring equipment, waste water technology, air pollution devices, water supply products, construction materials, soil and groundwater measures, energy efficiency units, industrial eco-efficiency products, renewable energy devices, noise and vibration equipment and others. The breakdown of these goods by category is shown in Figure 3 below.
- Service providers tend to take a broader approach to the market as each company surveyed on average provides services in 3 to 4 categories. The three most common services provided are:
 - solid waste management (which includes recycling);
 - soil remediation; and
 - wastewater management

Other categories of services provided include environmental contracting and engineering, research and development of environmental products, water supply and conservation, laboratory analytical services, energy efficiency, air pollution and noise abatement. There

⁶ The survey included only those environment industry participants whose business was commercial in nature, with 5% of gross revenues gained from environmental products or services. The following provincial profiles are predicated on this definition of company inclusion, as well as on the random sampling techniques standard for a general survey. Because of the multi-faceted nature of the industry, and the random nature of the sampling, some services or goods were not referenced during the survey. The goods or services that are absent from the survey but present in a provincial industry are noted in each of the profiles. The primary utility of the survey is the compilation of data gathered during phone interviews which provides detailed snapshots of industry practitioners in each province. Other estimates on the industry can be found in the literature such as Statistics Canada most recent environmental surveys which were not available for this study but are slated for release in the near future.

are several companies in Atlantic Canada that derive a substantial portion of their revenue from environmental law. Many companies also indicated that they carried out environmental education activities as well as services such as emergency response planning and risk analysis. The range of services is represented in Figure 3 below.

Figure 3
Environmental Products and Services
Atlantic Canada



4.4.3 Market Characteristics

- The major source of demand for Atlantic Canada environment industry products and services is industry, with 54% of the goods producers and 51% of the service providers marketing to the private sector. The most important sector of demand in the region is the oil and gas industry, which is a client of 70% of the service providers and 50% of the environmental products producers. Other important regional sectors include fisheries, oceans industries, manufacturing and food processing.
- 32% of the environment industry companies in the region sell products and services outside Canada, but 56% expect to do so in the future. Eastern Europe appears to be an area of expected opportunity, with 20% of companies expressing an intention to focus aspects of their marketing efforts there. On the whole, only 14% of Atlantic

Canada environment industry firms think that foreign sales will be a major source of growth for their company in the near future, although 22% of environmental product companies rank this source as their most important option for future sales.

- Large companies are found predominantly in the waste management business and environmental and engineering consulting.
- A correlation between the dominant industry in each province and the number of companies providing products and services which fill environmental requirements specific to this industry can be made. This also accounts for the large number of firms reporting products and services in some categories which appear to be province specific.
- The interest in diversification of products and services is in line with the industry dynamic which ensures that standard practices and products in fact have a very limited shelf life as the industry changes and matures, increasing its ability to scan global environmental products and services on offer. Strategic alignments will become increasingly important as corporate buyers lengthen their time lines and incorporate environmental procedures into operating practices. High end services are required to ensure decreased corporate risk from potential environmental damages which come to both public and political attention.

4.4.4 Regional SWOT Analysis for Atlantic Canada's Environment Industries

The diversity of Atlantic Canada presents both similarities and differences in economic conditions and current constraints. More specifically, various characteristics cut across and shape the Atlantic Canada environment industry. The following section illustrates these similarities by presenting an integrated SWOT analysis for Atlantic Canada in both diagrammatic and descriptive form. It should be noted that although the described strengths, weaknesses, opportunities and threats are "generalities" made for the entire regional environment industry, all characteristics are unlikely to apply to every environmental supplier. This is also true for the four specific SWOT analyses that are presently subsequently for each Atlantic Canada province.

It is important to remember that a SWOT analysis can provide different interpretations, since a strength can also be a weakness and an opportunity can also be a threat. For example, a strength of the region may be that there are a large number of well-established environmental firms in the area providing a broad range of skills and expertise. The weakness with this, however, is that these companies are primarily small firms, fragmented across a broad range of sub-sectors making it difficult for many of them to compete in international markets.

Integrated SWOT Analysis for Atlantic Canada's Environment Industries

<p><u>Strengths</u></p> <ul style="list-style-type: none"> • Firms well established (average age of 10 to 15 years) • Large number of regional companies (in excess of 500 companies) • Presence of some larger companies which often provide leadership • Presence in a range of market segments making the industry more robust • Strong industrial/resource client base • Strong project execution capacity • Marine/Ocean-based technology and services World Class • Global leaders offering niche technologies and services • High quality post-secondary education institutions • Strong environment industry associations 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> • The local market is small with numerous companies • Broad business focus with many individual companies providing services/technologies across a broad range of sectors (i.e. fragmented industry) • Heavy reliance on local/regional markets • High reliance on resource extraction industry • Limited goods production capacity and limited technology development capacity • Few firms form strategic alliances to penetrate export markets • Lack of in-house financial and business expertise to, for example, access and gain capital, or to identify and pursue export markets
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> • International municipal and industrial infrastructure developments demand for project execution capacity • Canadian/global markets for environmental products and services within the resource extraction industry • Prime geographic markets including the NE US, Caribbean, Latin America, targeted European countries and other coastal regions • Sectoral niche opportunities include marine and oceanic-based projects, water and wastewater markets, remediation, risk assessment and emerging waste management markets • Climate change and health and environment markets • Increased Canadian market sales 	<p><u>Threats</u></p> <ul style="list-style-type: none"> • Lack of Inter-provincial Cooperation among companies and key stakeholders • Lack of targeted export market focus by companies and supporting organizations • Cyclical nature of regional markets • Limited capital investment in technology R&D • Limited regional value-added in production of goods • Limited understanding around internal financial management for growth • Need for additional in-house business capacity

Strengths

Strengths are those characteristics that currently provide (or can be leveraged to provide a future) competitive advantage for Atlantic Canada companies competing in both the domestic or international marketplaces.

Through the 1990s, it is evident that Atlantic Canada's environment industries have become stronger. A range of developments, notably in the resource and infrastructure sectors, has allowed the industry to demonstrate its competence and capabilities in large projects throughout the Atlantic Canada region. In addition, a few companies have begun exploring export markets. Other key aspects of strength in the region are as follows:

1. *Companies are well established.* A large number of Atlantic Canadian environmental companies are veterans in the field; the majority being around for more than five years and many with 15+ years of experience. This indicates that the industry has a high capacity, professional expertise, and well-developed consistent leadership. In addition, companies that are older tend to have a more established client base and well developed relationships with buyers, provincial regulators and other key players.
2. *There are a large number of companies in the region.* It is likely that there are 700 - 800 environmental companies in Atlantic Canada. This signals a strong demand for environmental products and services. In addition, it also equates to a broad range of expertise and skill sets, providing the companies with an opportunity to partner and compete for larger projects that demand multi-disciplinary skills - something that buyers on both the domestic and international front are demanding more and more.
3. The sector includes some larger companies, as well as a large number of smaller companies with under ten employees each. Large companies are found predominantly in the waste management business and environmental and engineering consulting. Although small companies tend to form the foundation of the sector, the larger firms are a generally the ones which venture out of the domestic market first and provide the leadership and impetus for other companies in the region to expand on both a marketing and technology development standpoint.
4. *The industry has a presence in a wide range of market segments.* Throughout the region, virtually every environmental segment has some domestic activity and supply capacity. This makes the sector versatile, allowing the industry to survive and adapt quickly when demand shifts or a key purchasing sector slows down. It also results in a broader range of skills, which can be a strength if the "expertise" within these companies grows, or a weakness if the number of true experts remains low and the number of "generalists" increases.
5. The industry as a whole has *substantial experience in working for key industrial and resource clients* including the pulp and paper sectors, oil and gas sectors, mining and mineral sectors and infrastructure (harbours, bridges, water and wastewater) sectors.
6. There is *demonstrated project execution capacity* that can bring together the range of skill sets (environmental impact analysis, project development, legal/contracting, design and planning, construction, technology application, marketing and assessment, etc.) to undertake large projects, particularly on the resource and ocean-based fronts (e.g. offshore gas exploration).
7. *The strength of the region in ocean/marine and coastal based environmental services and technologies is world class.* This includes areas such as wastewater treatment for aquaculture, environmental effects monitoring, modeling,

hydrodynamics, harbour clean-up, remote sensing, GIS systems, environmental assessment, impacts mitigation, restoration and remediation, etc. This area has been driven primarily by large resource-based projects, however, Atlantic Canada's unique location has resulted in a greater understanding of the oceans, associated ecosystems and the impacts (and mitigation strategies) that result from large projects located in coastal regions or the ocean itself; this can translate into a competitive advantage when bidding for projects in similar coastal regions around the globe.

8. *Niche Technologies and Services.* There are a number of companies located in Atlantic Canada that are known for their expert consultative skills or niche technologies both inside and outside of the region. Key areas include ocean/marine-based products and services, wastewater treatment, waste management, engineering consulting, etc. A niche-focus often provides companies with a market advantage. Please refer to individual provincial SWOT for more information.
9. *Strong environment industry associations.* New Brunswick, Newfoundland, and Nova Scotia all have active industry associations. PEI does not have a formal association, however, it does have a number of active industry representatives.

Weaknesses

Weaknesses include characteristics or areas where the industry in general lacks capacity, resources or focus to be competitive on the domestic or international front. Although the Atlantic Canada environment industry has shown a number of strengths, weaknesses in key areas can lead to problems which undermine the industry as a whole. Some of the principal weaknesses include:

1. *Small, fragmented industry with limited consolidation.* The large number of companies (the majority of which have less than 10 employees) makes it difficult for them to compete for many large projects, particularly outside of the region or on the international front unless partnerships are formed. In addition, many large buyers are shifting more towards sole-source contracts on a regional, national and sometimes international level to one firm that can provide the skills, financial backing and resources to meet their needs in a given area. For example, Noranda Inc. currently utilizes one geotechnical firm for all operations across North America.
2. *Broad Business Focus* without the resources or specific expertise required to competitively compete in all areas, particularly outside of the region. Many firms provide services and products across several key areas and sectors. The industry has a very broad business base. This is similar to other regions in Canada. Typically, this is a reflection of the diversity of domestic demand for environmental products and services. Although a benefit particularly for larger firms who have the

resources to focus in on each area, it is often a weakness for smaller companies. The level of skill required to become "the experts" is never realized in many small firms because resources are spread too thin. Winning contracts, competing internationally and charging rates that provide significant margins all become more difficult without an "expert" reputation and marketing focus. Competitiveness improves as industry sectors in a region become focused on supplying a few (generally less than 5) key markets. Specific areas where the regional supply capacity is weak include:

- Air pollution control and prevention technologies for indoor and outdoor emissions, including greenhouse gas reduction. This will be a rapidly expanding market both nationally and internationally.
 - Strategic front-end consulting such as management-based approaches which integrate environmental concerns into corporate risk management. Although a few large firms in the region have this capacity and many smaller firms understand RBCA, the majority cannot provide the "high end" strategic risk-assessment and management services that many large corporations demand.
 - Eco-efficiency and pollution prevention technologies and services.
 - Complete solutions for "design, build, operate" projects or large infrastructure projects where multi-disciplinary teams and/or extended financing are essential components.
3. *Heavy reliance on local/regional markets.* While there has been some increase in export market activity on the part of regional companies, there appears to be a significant reliance on regional markets. Through the 1990s, this is not surprising as many large resource projects were in full swing. For example, regional markets have been exemplified by major projects including the Confederation Bridge, the development of pulp and paper, oil and gas facilities in New Brunswick and Nova Scotia, harbour clean-up, and initial environmental and design work for new resource industries, such as Voisey Bay and the lower Churchill Falls. Clearly there is a softening in these markets as some major projects are concluded. While there are potential projects and possible expansions (e.g. Sable Island and George's Bank), high reliance on regional markets by Atlantic Canada environmental companies will pose threats to industry's future viability and growth.
4. *High reliance on resource extraction industries.* Clearly, the strength of the industry in the resource sector is a plus, particularly as opportunities for global growth increase as corporations continue to enhance environmental standards. However, it can also be detrimental as resource projects are finite and typically have requirements that change throughout the life-cycle of the project (i.e. demands for certain types of environmental assessment services limited after construction phase). In addition, the resource industries are subject to cyclical economic

movements. For example, the pulp and paper sector in many regions was recently going through a major down-turn, which dramatically reduced capital expenditures on environmental goods and services in comparison to when the industry was at its high point earlier in the 1990s.

5. *Limited goods and production capacity.* Apart from weaknesses in terms of exports, there is a critical weakness in the environment industry in Atlantic Canada with respect to technology development and local goods production. In general, goods are imported from outside the region and assembly and installation is done within Atlantic Canada. This puts local firms at a disadvantage as control over technology innovation, development, distribution and market share is limited. Industry studies by Environmental Business Canada and the Environmental Business Journal, have definitively proven that future competitiveness in the global environmental market will be largely determined by technology competitiveness. There is, therefore, a critical need to augment and increase the level of technology in the environment industries in the Atlantic region.
6. *Limited use of strategic alliances.* Very few suppliers work in partnership to exploit regional, domestic or international opportunities. This limits growth because the capacity within many of the smaller firms does not exist to competitively bid or compete for larger projects such as those funded by the World Bank. In turn, large areas of opportunities have become unavailable to Atlantic Canada firms.
7. *Lack of in-house financial and business expertise.* Many Atlantic Canada companies do not possess the necessary in-house business expertise to assess and exploit emerging market opportunities (particularly on the international front), move new innovations from the R&D phase to commercialization (e.g. tap into available resources such as IRAP or TPC), properly protect intellectual property outside of Canada, or access capital investments. This is a common trait throughout the Canadian environment industry, however it is a major obstacle to growth and future success in both domestic and global marketplaces.

Opportunities

Opportunities are not simply potential environmental markets. They are areas which, if exploited with the proper resources, are "high percentage" winners for environmental companies within the Atlantic Canada region. Given global market trends, the following opportunities emerge for the Atlantic region.

1. *International need for large and small project institution capacities notably for environmental services and products for the resource industries.* There is major growth in these segments of the industries in the United States, Latin America and also Asia as these regions emerge from the sector down-turn. Strategic alliances among local firms are required to exploit the larger of these opportunities.

2. *Canadian/global markets for environmental products and services within the resource industries*, particularly in the Latin American markets. The greatest opportunities exist for niche technology suppliers and for those companies that pool their expertise through partnerships that can provide the necessary resources (i.e. financing, skills, etc.) to be competitive.
3. *Primary international geographic markets for Atlantic Canadian firms are the Northeast United States, Caribbean countries, Latin America and targeted European countries.* Coastal regions around the globe also offer a unique opportunity for many Atlantic Canadian firms. Other potential geographic markets are very company-specific, and dependent upon the technology/service provided and the identified demand.
4. *Marine, ocean and coastal based projects* requiring environmental assessment, environmental effects monitoring, restoration and remediation, risk-based management techniques, aquaculture treatment, etc.
5. *Water and wastewater markets* particularly in terms of new systems designed (as model on the development in Halifax/Dartmouth and Moncton) or for specific industry sectors (e.g. the food processing sector companies like ADI).
6. *Remediation technologies* for harbour clean-up and contaminated soils and *risk-based corrective action (RBCA)* services.
7. *Waste management* processing systems for post-consumer materials.
8. *Niche engineering consulting* particularly in the areas associated with resource and ocean/marine-based projects.
9. *Niche technologies* that can be applied to a number of the geographic and sectoral-based markets noted above, along with other areas such as aquaculture, small hydro, instrumentation, etc.
10. *Climate change and health & environment markets.* Although relatively weak in this area, Atlantic Canada firms should begin to identify areas of opportunities in these two areas and assess how capacities to compete on an international level can be developed. As indicated in Section 3.0, climate change and the integration of health and environmental issues will be two of the primary forces shaping the environment industry as we head into the new millennium.
11. *Increased Canadian market sales.* Targeting other Canadian markets outside of the region will be beneficial for a number of Atlantic Canada firms as it appears that they can provide price competitive advantages for some technologies/services in demand (e.g. wastewater treatment for the food industry and small communities or niche technologies for waste management). Primary focuses should be in central Canada (Quebec and Ontario) because of the close proximity and size of market.

BC also represents opportunities for marine/ocean and resource based projects, although distance may prove a barrier for some.

Threats

Threats are factors, which if not addressed, can inhibit growth or severely impact the competitiveness of the industry as a whole. The threats facing the Atlantic Canada environment industry either mirror or reflect the weakness noted earlier.

1. *Lack of inter-provincial cooperation among Atlantic Canada firms and key stakeholders.* A number of the suppliers (particularly firms that are currently expanding abroad) indicated that the strong provincial disposition that exists is often detrimental to business growth. This occurs on two levels: i) between firms located in different provinces; and ii) between provincial associations and governments. For example, divergent regulations across the region can increase the effort required for Atlantic Canada firms trying to expand and stay on top of what's coming down the legislation pipe. In addition, a competitive bias often develops for local companies. This is not totally negative as it allows local firms more access to the local market. However, it can also impede export growth as local firms (particularly small companies) and other provincial stakeholders become more insular and competitive among themselves (i.e. across provinces) rather than working together to, for example, form strategic alliances that allow them to be competitive outside of the region (e.g. for World Bank or large resource-based projects).
2. There is a *lack of targeted export market focus* for the Atlantic Canada environment industry as a whole. Individual provinces and the federal government appear to have different preferences ranging from the US, Caribbean, Latin America, West and Eastern Europe, Asia and the rest of Canada. It would be preferable if some market specific environmental strategy focus, based on 2-3 primary (and 2-3 secondary) regions/segments of other markets could be developed. For example, Team Canada currently focuses its strategies on market opportunities such as Japan and Latin America, which represent the greatest potential for Canadian companies. Team Canada does not spread itself all over the world nor does it focus on small markets that may provide a few small gains. The region requires a "Atlantic Canada Team" approach where all organizations are working cooperatively to identify and assess the most opportunistic geographic markets for the Atlantic Canada environment industry.
3. In addition, *individual companies lack geographic focus* when attempting to identify new opportunities. Having strength in, for example, a niche environmental technology applicable to the resource sector means that the potential global market is enormous. The challenge is to identify and develop a targeted and focused marketing strategy. Many companies will spread themselves too thin, attempting to penetrate several international markets at once which is a costly proposition, particularly for small and medium-sized enterprises. In addition, the approach is

often ad hoc, and conducted without sound research and preparation. Sound market intelligence is key.

4. Given a *cyclical nature of regional markets*, especially those relying on resource industries, it is highly desirable to diversify the sales to reduce the likelihood and major impacts during down-turns in regional and resource economies.
5. The *lack of capital allocation to technology R&D* is a long-term weakness that is being manifested today. The larger Canadian companies that are growing and performing exceptionally well in the export markets include Trojan Technologies, Stantec Inc., Zenon Environmental and Ballard Power Systems. One of the key components of their success is "technology" which is where capital needs to be invested. Consulting companies in particular need to leverage their services with a niche technology in order to give them a competitive edge. However, to do this means that the capital (see below) and the business skills to develop, commercialize and integrate this technology into the overall company business strategy must be established.
6. *Limited regional value-added in the production of goods*. Although a number of local firms hold patents on niche technologies, much of the environmental technology, notably large equipment, in major infrastructure resource projects is imported. As a technology continues to become a greater and more important component of the environment sector, Atlantic Canada firms will be increasingly threatened. Therefore, it is valuable to determine whether or not greater local project design, manufacturing and assembly is possible, even in situations when core equipment/goods are imported from outside the region. In addition, provincial procurement policies can play a vital role in establishing a "more local" base of technology.
7. *Limited understanding around internal financial management for growth*. Apart from technology, export market development and overall business capacity requires capital for growth. As many Atlantic Canada firms are small and medium-sized, the investment capital (money and time) are often not available to successfully complete all the necessary steps (gather market intelligence, establish partnerships in foreign country, trips to potential markets, etc.). More importantly, however, is the lack of understanding and strategic planning around finances for growth (e.g. technology equity, trade financing, project financing, etc.). As such many firms are unaware of the sources of capital and do not understand the relationships needed to access capital. In addition, many environmental companies do not properly build an effective internal financial infrastructure or develop the appropriate strategies needed to effectively manage the capital once it has been obtained. Finally, when looking for capital, environmental companies tend to look to government, then the private sector, and finally internally for growth capital. When, in fact, companies should initially be looking for ways to re-invest earnings in boosting company capacity competitiveness before looking to the private sector or government for capital. This approach builds a strong and innovative investment foundation within

the company, which in turns enhances competitiveness, particularly over the long-term. Ongoing capital re-investment in corporate capacity is critical if Atlantic companies are not to be squeezed out of either export or possibly Atlantic Canadian markets.

8. *Lack of business skills to address other key areas of business* is often inhibiting the growth of many Atlantic Canada firms; this is similar to their counterparts in the rest of Canada. As CCHREI stated in a recent Environmental Business Canada article, "the ongoing success of environmental SMEs is dependent to a large extent upon management, whose background is customarily in engineering or science. The lack of "business" training within these disciplines, particularly in areas such as marketing, strategic planning, human resource management, communications and public relations can often seriously curtail the company's ability to expand." Other more specific areas where firms need assistance includes how to successfully: access finance; gather market intelligence; assess and identify market opportunities; develop winning marketing strategies; establish strategic alliances; and, protect intellectual property. To compete effectively in international markets and ensure long-term growth, this skills gap must be addressed and closed within most Atlantic Canada (and Canadian) firms.

4.5 Provincial Environment Industry Profiles and SWOT Analyses

The SWOT analysis of the Atlantic Canada environment industry does not differ markedly from those for each of the provinces in the region. Clear differences for each province are described below, while similarities presented in the previous section are simply noted. The reader is referred to the Atlantic Canada SWOT for more detail.

As with the Atlantic Canada SWOT, the provincial SWOTs provide a general overview of the strengths, weaknesses, opportunities and threats for the entire provincial sector. As such, detailed information such as contract-specific opportunities is not practical as this level of detail would benefit one or two companies in the province only. The objective is to provide broader analysis about factors that describe and shape a large portion of the sector within each province.

4.5.1 New Brunswick Environment Industry Profile

Most firms in the New Brunswick Environment Industry are small. 69% have less than 10 employees (38% of these have fewer than five employees). Nine percent of companies have more than 50, but less than 100 employees.

The average company in the environment industry has been around for up to 20 years. The mean age for companies producing goods is only 8 years, but for service and mixed companies is 20 and 21 years, respectively⁷.

Of the companies surveyed 67% provide services only, 13% provide environmental goods, and the remaining companies provide both products and services. This mirrors the regional profile. The largest (with over 50 people) are service companies. Those that provide both products and services follow the regional pattern of being predominantly small companies with fewer than five employees. About two-thirds of the companies providing goods are resellers of products made by other manufacturers—a significantly higher proportion than in the other three provinces.

Most (81%) companies produce goods that fall into more than one category. Diversity of offering is even more common among service companies, where each company on average provides services in 6 to 7 categories, almost double the level of diversification in the other Atlantic Canada provinces.

New Brunswick environment industry supply side economics are driven predominantly through demands in solid waste management (over 40%), soil remediation (33%), air pollution (25%) and energy efficiency measures (25%). Other major product sectors include waste water technology (almost 15%), water supply products (8%) and construction materials (7%). No companies taking part in the survey reported producing goods related to renewable energy, noise and vibration, or industrial eco-efficiency.

⁷ The mean age is slightly greater than the median age, especially for goods-producing companies, since some companies have been around since the early 1900s.

New Brunswick companies provide services to fill existing market niches in soil remediation (58%), waste water management (52%), solid waste management (51%), and environmental technology research and development (47%). Other service niches include environmental education (41%), public relations/law/risk management (39%), water supply and conservation (38%), energy efficiency (29%), noise abatement (27%), air pollution (27%) and analytical services (24%). The category of "Other contracting and engineering services" is reported as the largest service area for 63% of New Brunswick companies.

4.5.2 SWOT Analysis for New Brunswick

In general, New Brunswick's environment industry can be characterized by the SWOT chart below. A discussion of specific strengths, weaknesses, opportunities and threats unique to New Brunswick follows the chart.

Figure 4
Categories of products provided by the New Brunswick Environment Industry

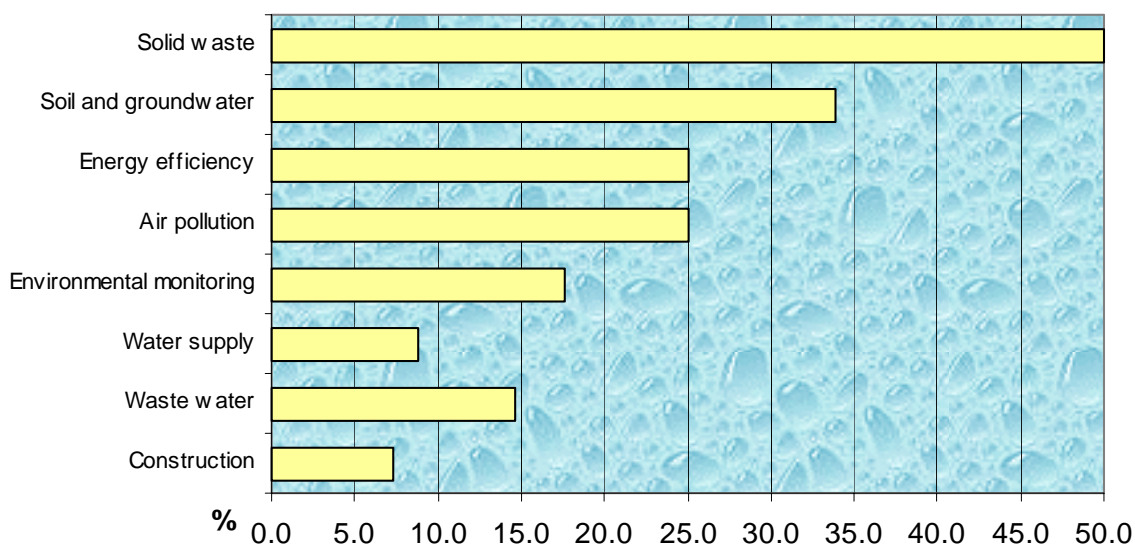
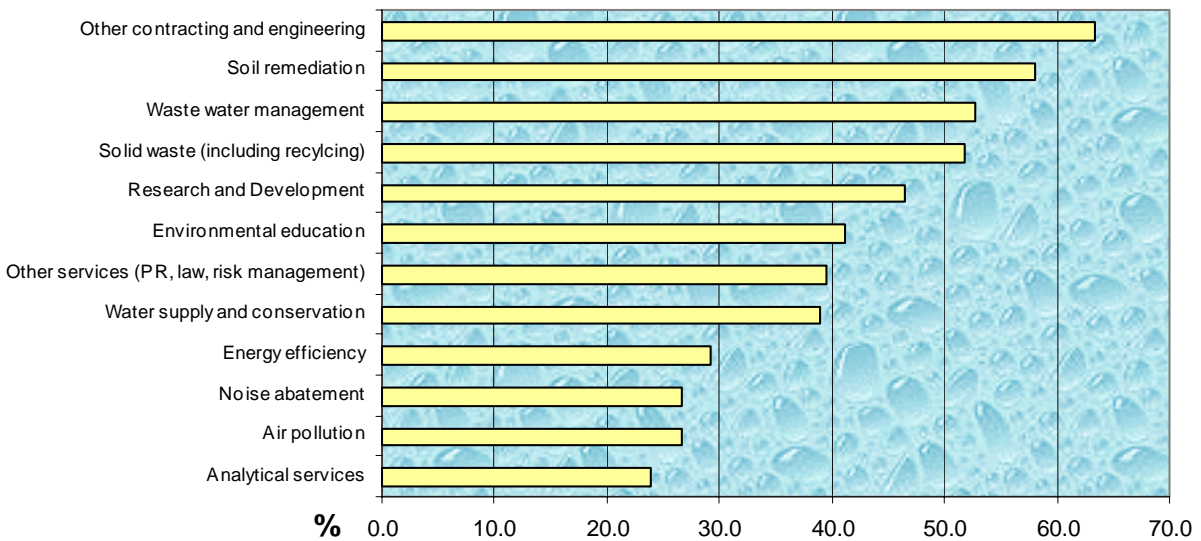


Figure 5
Categories of services provided by the New Brunswick Environment Industry



SWOT Analysis for New Brunswick

<p><u>Strengths</u></p> <ul style="list-style-type: none"> • Niche technologies and services (water and wastewater, remediation, risk assessment) that offer buyers unique solutions at a competitive price • Understanding of French language and culture provides a competitive advantage to NB firms in various geographic markets • Diversity of sectors/segments served by an average company results in a robust industry that can adapt to changing demands • Strong resource - based expertise in the provision of technologies and services which offers significant worldwide opportunities in a sector that is currently in a stage of rapid growth • Well established firms with many firms having 15+ years of experience which indicates substantial depth in experience and skills • Significant number of companies which illustrates a broad range of skills and expertise 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> • Lack of Regulatory Framework • Limited presence in eco-efficiency and air pollution prevention and control markets, which are areas of significant future growth • The local market is small with numerous companies providing services and technological solutions for a wide-range of issues (i.e. fragmented industry). This reduces competitiveness and makes it more challenging to develop industry-based growth strategies • Broad business focus can inhibit export/growth because specialized expertise is not developed to the point that a competitive advantage is established in specific targeted markets • Heavy reliance on local markets means many firms are not export ready. These markets cannot sustain the large number of companies, particularly as the resource projects reach an end • Reliance on resource industries which can be very cyclical in nature • Limited goods production and technology development capacity reduces future competitiveness as global environmental markets will be largely driven by innovative technology • Do not leverage joint expertise which reduces opportunity to compete for international projects • Business expertise weaker than technical which inhibits growth as skills to access capital identify potential markets, etc. are not well-established
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> • Targeted environmental service/technology markets for the global oil and gas industry requiring specialized expertise found in NB • NE US, Quebec and Ontario pulp and paper and food processing industries • French-speaking countries requiring niche technologies and services provided by NB firms • Local waste market • Niche technologies and services in areas such as remediation markets, risk-based assessment, water and wastewater treatment, specialized resource-based engineering consulting • Climate change and health and environment • Increased Canadian market sales 	<p><u>Threats</u></p> <ul style="list-style-type: none"> • Limited capital investment in technology development • Lack of Inter-provincial Cooperation among companies and key stakeholders • Cyclical nature of local, domestic and international resource-based industries • Larger outside firms taking regional work from local companies • Limited regional value-added in production of goods • Limited understanding around internal financial management for growth • Limited capital for growth and export market penetration • Need for additional in-house business capacity • Very diverse geographic focus • Limited local/regional market demand • Limited capital investment in technology R&D

Strengths

Unique strengths to NB firms include:

1. *Niche technologies and services.* Although a number of NB firms are "general" environmental companies, there are pockets of expertise in the province, both in terms of technology and services and sector-specific. Some of these include:
 - Risk Based Corrective Action (RBCA) which has been adopted by a number of provinces and US states as the most practical means to assess contaminated sites.
 - Remediation technologies (e.g. bio-remediation) particularly for the petroleum industry.
 - Engineering consulting, primarily associated with resource based industries (pulp and paper, forestry, petroleum, mining and power generation).
 - Water and sewage treatment (e.g. organic wastewater treatment for the food processing and dairy industries, anaerobic digestion, arsenic removal, aquaculture).
2. *Good Understanding of French Culture.* Many of the individuals operating environmental companies in NB are not only bilingual, but they also have a very good understanding of the French speaking culture. These attributes give NB companies an advantage over many Atlantic Canada, Canadian, and international firms when competing in the province of Quebec, and other francophone regions around the globe.
3. *Diversity of sectors/segments served by an average company.* Providing services to a broad range of sectors often protects a company in case one sector slows down. It also provides a greater range of expertise which can be a strength if the company continues to expand its internal "expert" capacity, or be a weakness as the company becomes a "general" consultant (see below).

Similarities to Atlantic Canada companies in general are noted below and described in detail in the Atlantic Canada SWOT presented previously:

- *Strong resource-based expertise.*
- *Firms well established.* A large number of the environmental companies are veterans in the field; the majority being around for more than five years and many with 15+ years of experience.
- *Significant number of companies.*

Weaknesses

The weaknesses of the NB environment sector mirror those of the regional industry and are discussed in the Atlantic Canada SWOT analysis. However, two areas that should be elaborated include:

1. *Limited presence in eco-efficiency and air pollution prevention and control markets.* Two weaknesses that several buyers noted was the lack of expertise in NB (and other Atlantic Canada provinces) in the areas of air pollution control and eco-efficiency or pollution prevention (i.e. front-end solutions). Both of these are primary areas of growth for the global environment industry, and as such, may be a significant "missed opportunity".
2. *Lack of regulatory framework.* A number of suppliers and buyers of environmental products and services indicated that the current legislative framework is unclear in areas such as air pollution control, remediation and waste management. In addition, it is very difficult to identify where the government is going with future legislation. This makes it difficult for local companies to "ramp-up" their internal expertise and meet current and potential future local markets; this often puts them at a disadvantage to outside firms that may have already developed the capacity based on legislation in their region.

Opportunities

Many of the opportunities open for Atlantic Canada companies in general, are also available to NB firms. Key areas where NB may have a specific interest or advantage include:

1. *Environmental market for the global oil and gas sector.* With a strong expertise in the oil and gas sectors (e.g. remediation, environmental assessment, etc.), a number of NB companies have the opportunity to successfully compete on the world market (particularly in Latin America). The challenge is to:
 - Identify targeted markets and buyers where success is most likely. Oil and gas firms are operating around the world and competition from the US, Alberta, and European countries is tough. Thus, good solid market intelligence is needed to exploit this opportunity.
 - Identify specific firms with the resources, willingness and capacity to venture out, or those that are willing to form strategic alliances with other Atlantic Canada companies with complimentary skills.
2. *NE US, Quebec and Ontario forestry (primarily in the pulp and paper sector), food processing industries and waste (specifically in Quebec)* appear to be high priority focuses and areas of strength for several prominent NB firms. These sectors, along

with various niche markets in the manufacturing sector (e.g. specialized water recovery and treatment technologies) provide specific longer-term opportunities in the noted geographic markets. BC and the western US may also provide opportunities in these areas, however, distance will be an impeding factor. As with the oil and gas sector, established competition is very tough and thus specific niche opportunities need to be properly identified for individual companies (or strategic alliances) interested in venturing outside the region (see above bullet point).

3. *French-speaking countries.* Understanding the culture and speaking the language provides NB firms with a key advantage that should be leveraged for various French-speaking markets including Quebec, France and many developing francophone regions. Specific market intelligence is again needed to identify the most promising opportunities within those geographic markets.
4. *Remediation technologies and risk-based assessment services* markets primarily in Canada and the NE US as brownfield developments continue and the fact that these markets may get additional cash boosts from governments in the near future.
5. *Water and wastewater treatment* for food processing industries, small communities and niche applications.
6. *Engineering consulting* primarily in the resource-based sectors such as forestry, mining, oil and gas industries.
7. *Local waste market* if appropriate legislation (similar to Nova Scotia) was put in place.

Threats

As with the weaknesses of the provincial industry, the threats facing the NB environment sector mirror those of most Atlantic Canada firms. Please refer to Atlantic Canada SWOT analysis. A few points that should be re-emphasized for NB include:

1. *Companies and provincial organizations need to remain focused.* Market intelligence and focused strategies targeted at specific markets are needed to be successful in penetrating international marketplaces.
2. *Need for capital and capacity building.* Penetrating new markets can be a costly venture, particularly if they are located half way around the world. Companies need the "business" expertise, resources and finance to identify, assess, and enter new markets and remain competitive at home.
3. *Technology will be the key driver in future environmental markets.* NB firms need to compliment consulting expertise with technologies that are home grown.

4. *Regional markets are limited.* In order to grow and prosper as we head into the new millennium, NB firms must branch out beyond regional borders, as the local and regional markets will be unable to sustain the current industry, particularly as major resource projects shift phases or wind down.

4.5.3 Nova Scotia Environment Industry Profile

Most firms in the Nova Scotia industry are small, with 65% employing less than 10 people (40% of firms have less than five employees). Only 6% of the companies have more than 50 but less than 100 employees.

The average company in the environment industry has been in business for up to 20 years. The mean age for companies producing goods is 30 years, while it is a little less for service and mixed companies (17 and 15 years, respectively)⁸.

Of the companies in the Nova Scotia environment industry, 72% provide services only, 11% provide environmental goods, and the remaining 17% provide both products and services. The largest firms (with over 50 people) are service companies. Those that provide both products and services are predominantly small companies with fewer than five employees. About one-third of the companies providing goods are resellers of products made by other manufacturers.

Most companies (85%) produce goods that fall into more than one category. This diversity of market focus is even more common among service companies, where each company on average provides services in slightly more than 3 categories.

Nova Scotia environment industry supply side economics are driven predominantly through demands in waste water (32%), solid waste (27%), water supply (23%), environmental monitoring (23%), construction (23%), industrial eco-efficiency (18%), air pollution (18%), renewable energy (9%), noise and vibration (9%), energy efficiency (9%), and soil and groundwater (4%). Companies provide services to fill existing market niches in the following categories: environmental education (43%), other services including public relations, law, risk management (42%), solid waste including recycling (35%), soil remediation (34%), other contracting and engineering (31%), research and development (28%), air pollution (25%), water supply and conservation (24%), analytical services (23%), waste water management (22%), energy efficiency (21%) and noise abatement (4%).

⁸ The mean age is slightly greater than the median age, especially for goods-producing companies, since some companies have been around since the early 1900s.

Figure 6
Categories of products provided by the Nova Scotia Environment Industry

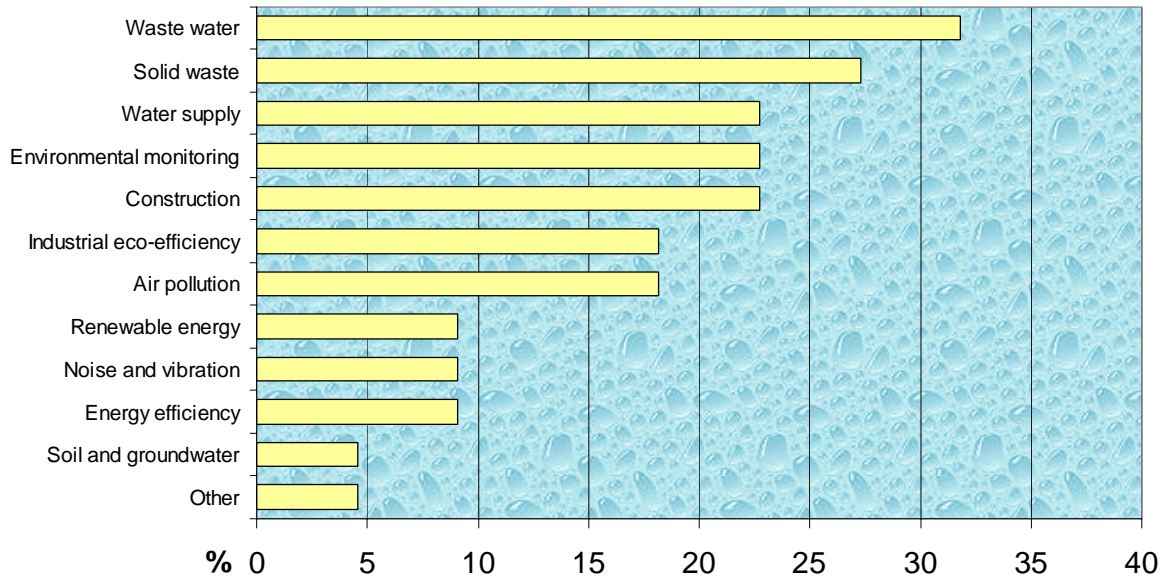
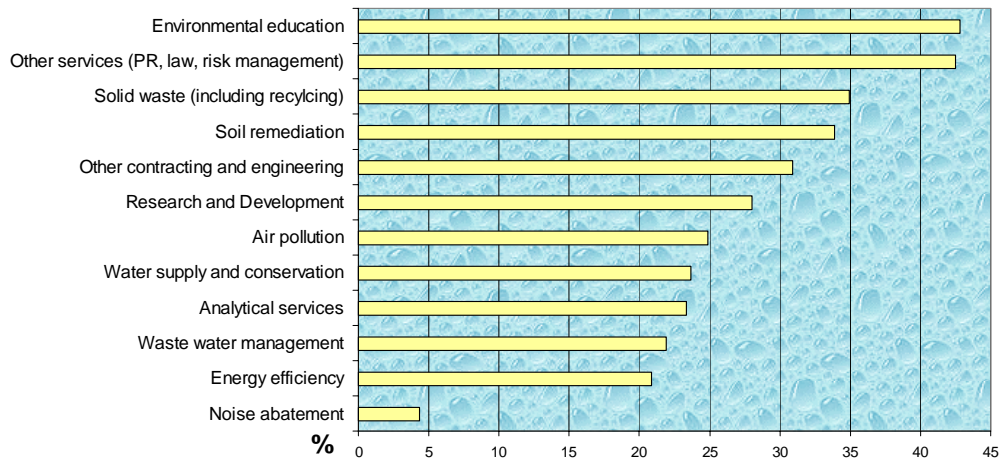


Figure 7
Categories of services provided by the Nova Scotia Environment Industry



4.5.4 SWOT Analysis for Nova Scotia

The SWOT chart below illustrates the general characteristics of Nova Scotia's environment industry, while unique attributes of the local environment sector are noted after the diagram.

SWOT Analysis for Nova Scotia

<p><u>Strengths</u></p> <ul style="list-style-type: none"> • Niche technologies and services (water and wastewater treatment, water resource management, instrumentation, air monitoring services and technologies, solid waste management, geomatics, engineering consulting) that offer buyers unique solutions at a competitive price • Geographic position and close proximity to large NE US market and closest to Europe • Close ties with Caribbean community (and several European countries) which provides a competitive advantage to NS firms in this market • Activity in technology R&D • Diversity of sectors/segments served by an average company results in a robust industry that can adapt to changing to demands • Strong resource - based expertise in the provision of technologies and services which offers significant worldwide opportunities in a sector that is currently in a stage of rapid growth • Firms well established with many firms with 10+ years of experience indicating substantial depth in experience and skills • Marine/Ocean-based technology and services are world class • Significant number of companies which illustrates a broad range of skills and expertise 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> • High reliance on public sector projects • The local market is small with numerous companies providing services and technological solutions for a wide-range of issues (i.e. fragmented industry). This reduces competitiveness, and makes it more challenging to develop industry-based growth strategies • Broad business focus can inhibit export/growth because specialized expertise is not developed to the point that a competitive advantage is established in specific targeted markets • Heavy reliance on local markets means many firms are not export ready. These markets cannot sustain the large number of companies, particularly as the resource projects reach an end • Few firms form strategic alliances to penetrate export markets • Lack of in-house financial and business expertise to, for example, access and gain capital, or to identify and pursue export markets
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> • Global water/wastewater treatment and niche solid waste markets • Niche technologies and services markets (water resource management, instrumentation, geomatics, engineering consulting) that offer buyers unique solutions at a competitive price • Geographic markets including the Caribbean, NE US and Europe (particularly coastal regions) • Global oil and gas sector and other resource sectors where competitive NS niche environmental technologies and services provide a competitive advantage • Increased Canadian market sales • Climate change and health & environment markets 	<p><u>Threats</u></p> <ul style="list-style-type: none"> • Lack of targeted Export focus • Limited demand from provincial/regional public and private buyers • Lack of Inter-provincial Cooperation among companies and key stakeholders • Limited regional value-added in production of goods • Limited capital for growth and export market penetration • Cyclical nature of regional markets • Need for additional in-house business capacity • Cyclical nature of local, domestic and international resource-based industries • Very diverse geographic focus

Strengths

Similar strengths to the general Atlantic Canada environment sector are noted in the above SWOT chart and described in the Atlantic Canada SWOT section. Unique strengths of NS firms are described below:

1. *Niche Technologies and Services.* A number of NS companies provide specific expertise, both in terms of technology and services, and sector-specific. Some of them include:
 - Water/wastewater treatment technologies and processes. For example, niche systems for small communities (e.g. under 10,000) or on-site treatment of sewage for rural or small residential complexes and small commercial/industrial sites.
 - Water resource management, particularly with regards to resource projects in coastal regions.
 - Instrumentation such as computer software optimization package for water/wastewater treatment plants and power generation facilities.
2. Technician-based services such as air and water monitoring and laboratory analysis.
3. Risk Based Corrective Action (RBCA), which has been adopted by a number of provinces and US states as the most practical means to assess contaminated sites. Nova Scotia firms are strong in gasoline storage and contaminated site clean-up.
4. Solid waste management, particularly with respect to "municipal waste management systems", and the recovery, recycling (or composting) or post-consumer materials.
5. Small niche consultants and environmental technology companies focusing on the resource sector (e.g. dissolved air flotation, packaging for hazardous waste, peat-based oil absorbent, radar sat - real-time data collection and management, etc.).
6. *Geographic position.* NS's close proximity to the large NE US market and Europe (i.e. relative to other Canadian provinces) provides a small competitive advantage over many firms located in other areas of Canada.
7. *Close ties with the Caribbean community and specific European countries.* NS has well-established relationships with a number of Caribbean and European countries. Along with these relationships, many NS companies have a thorough understanding of the culture and a strong knowledge of these markets. These factors provide a significant competitive advantage over other Canadian and international firms.

8. *Activity in technology R&D.* It appears that NS firms are re-investing more money in R&D than their regional counterparts, and that an initial technology development foundation is being built; based on the survey and key informant interviews.

Weaknesses

The weaknesses of the NS environment sector mirror many of those noted for the regional industry and are discussed in the Atlantic Canada SWOT analysis. One additional weakness that was identified:

1. *High reliance on public sector projects.* Although public sector projects equate to a large proportion of the Canadian environment industry's revenue stream, NS firms appeared to rely more heavily on these types of projects. This can often negatively impact competitiveness and create a potential threat should government pull back on spending.

Opportunities

Many of the opportunities open for Atlantic Canada companies in general, are also available to NS firms. Key areas where NS may have a more specific interest include:

1. *Global water/wastewater treatment and niche solid waste markets,* particularly for technologies and processes that can be applied to small coastal communities and small commercial/industrial sites. Prime geographic markets include rural communities and in particular coastal regions of areas such as the Caribbean, Latin America and possibly Europe.
2. *Water resource management,* particularly with regards to resource projects in coastal regions.
3. *Instrumentation* such as computer software optimization package for water/wastewater treatment plants and power generation facilities.
4. *Risk Based Corrective Action (RBCA) and niche remediation services* (e.g. gasoline storage and contaminated site clean-up) particularly for the petroleum and forestry industries.
5. *Niche technologies* such as processing of post-consumer solid waste materials (e.g. composting, recycling of plastics, etc.). Although many North American and European markets are saturated, potential opportunities exist in the Caribbean, Latin America, and other developing regions.

6. *Small niche consultants and environmental technology* companies focusing on the resource sector (oil and gas, aquaculture, etc.).
7. *Caribbean, NE US, Europe (UK, Ireland and other coastal countries)* are potential "established" market targets. Latin America is also a potentially opportune marketplace, particularly for resource-based environmental technologies and services.
8. *Environmental technologies and services for the global oil and gas sector.* With a strong expertise in the oil and gas sectors (e.g. water treatment, resource management, environmental assessment, etc.), a number of NS companies have the opportunity to successfully compete on the world market (particularly in Latin America).

The challenge with all of these opportunities is to identify targeted markets or clients where success is most likely. Good solid market intelligence is needed to exploit this opportunity. In addition, specific NS firms must be identified with the resources, willingness and capacity to venture out, or those that are willing to form strategic alliances with other NS/Atlantic Canada companies with complementary skills.

Threats

As with the weaknesses of the provincial industry, the threats facing NS environmental companies generally mirror those of most Atlantic Canada firms. Please refer to the Atlantic Canada SWOT analysis. A few points that should be re-emphasized for NS include:

1. *Market Focus.* Companies and supporting stakeholders must assess the demand for technologies and services within a limited number of geographic markets. Once demand is established, specific potential opportunities for individual firms must then be identified, along with focused action plans which may include developing strategic alliances and gaining adequate financing to enter a given market.
2. *Capital and Management Skills for Growth.* To be successful in the international marketplace, companies require sufficient capital, along with the expertise to gain it and manage it. This is a threat to all environmental companies wanting to export who don't have a good understanding of the financial and in-house resources required to expand and penetrate global markets.
3. *Lead with Technology.* NS companies need to leverage their services with technologies that are developed locally.

4. *Expand Exports.* Local and regional markets are too small to continue ongoing growth. As such, NS companies need to identify potential opportunities outside of Atlantic Canada, particularly as major resource projects shift phases or wind down.

4.5.5 Newfoundland Environment Industry Profile

Most firms in the Newfoundland environment industry are small – 70% of companies employ less than 10 people (38% of these have less than five employees). Eleven percent of companies have more than 50 but less than 100 employees.

The average company in the environment industry in Newfoundland has been in business for up to 16 years. The mean age for companies producing goods is 32 years, but for service and companies providing both products and services it is 19 years and 8 years⁹ respectively.

64% of Newfoundland environment industry firms provide services only, 13% provide environmental goods, and the remaining 23% supply both products and services. The largest firms (with over 50 people) are service companies. Those that provide both products and services are predominantly small companies with fewer than five employees. About 42% of the companies providing goods are resellers of products made by other manufacturers.

83% of Newfoundland companies produce goods that fall into more than one category. This diversity is even more common among service companies which, on average, provide services in 3 to 4 categories.

Newfoundland environment industry supply side economics are driven predominantly through demands in environmental monitoring (50%), water supply (25%), waste water (25%), solid waste (25%), construction (25%), soil and groundwater (13%), noise and vibration (13%) and air pollution (13%). No companies in the sample reported products in renewable energy, industrial eco-efficiency, or energy efficiency.

Companies surveyed reported providing services to fill existing market niches in the following categories: a grouping of services which includes public relations, law, risk management (41%), solid waste including recycling (38%), environmental education (38%), research and development (28%), analytical services (28%), other contracting and engineering (26%), noise abatement (19%), energy efficiency (17%), waste water management (12%), soil remediation (12%), air pollution (9%) and water supply and conservation (7%).

⁹ The mean age is slightly greater than the median age, especially for goods-producing companies, since some companies have been around since the early 1900s.

Figure 8
Categories of products provided by the
Newfoundland Environment Industry

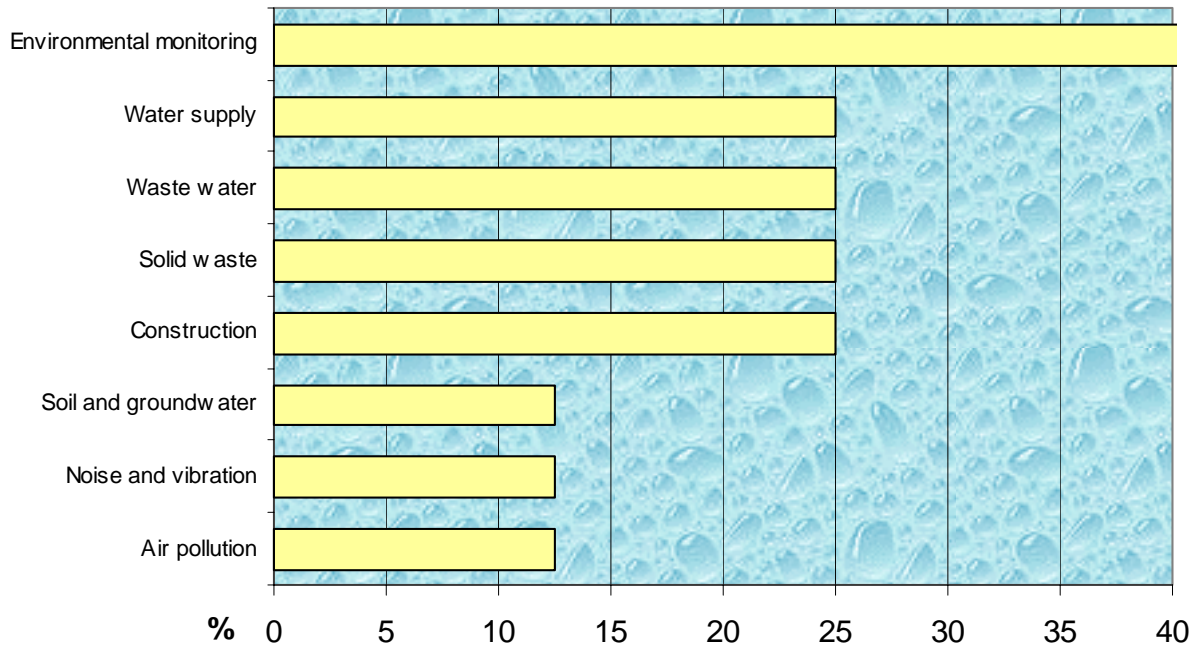
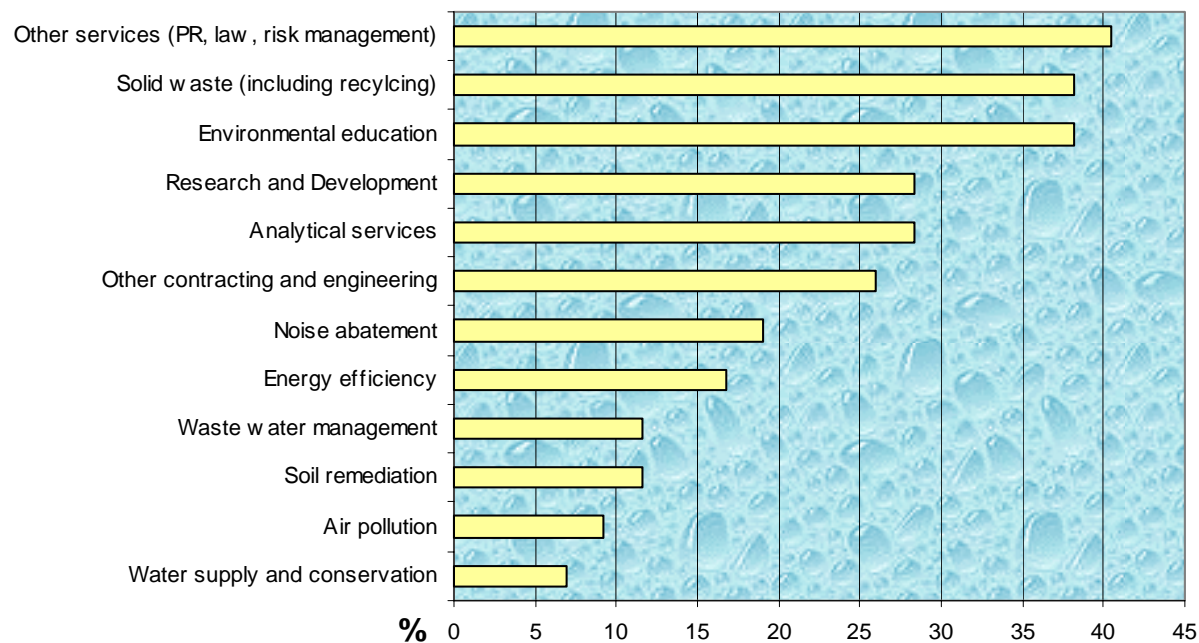


Figure 9
Categories of services provided by the
Newfoundland Environment Industry



4.5.6 SWOT Analysis for Newfoundland

Key aspects of Newfoundland's environment industry are highlighted in the following SWOT chart, while specific strengths, weaknesses, opportunities and threats unique to Newfoundland are discussed on the following pages.

SWOT Analysis for Newfoundland

<p><u>Strengths</u></p> <ul style="list-style-type: none"> • Niche technologies and services making a few Newfoundland companies global leaders • Marine/Ocean/Coastal-based technology and services are world class • Firms well established (average age of 15+ years) • Presence in Europe • Presence of some larger companies which often provide leadership • Presence in range of market segments making the industry more robust • Strong resource -based expertise in the provision of technologies and services which offers significant worldwide opportunities in a sector that is currently in a stage of rapid growth • Strong project execution capacity (impact assessment, legal, monitoring, etc.) • High quality environmental R&D/academic institutions 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> • Lack of regulatory framework and direction in areas such as waste management, water treatment and air quality • Limited presence in eco-efficiency and air pollution prevention and control markets (including climate change) • Cyclical nature of resource industries • The local market is small with numerous companies providing services and technological solutions for a wide-range of issues (i.e. fragmented industry) • Broad business focus with many individual companies providing services/technologies across a broad range of sectors • Heavy reliance on local/regional markets • High reliance on resource extraction industry • Limited goods production capacity and Limited technology development capacity • Few firms interested in export markets • Lack of in-house financial and business expertise to, for example, access and gain capital, or to identify and pursue export markets
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> • Sectoral niche opportunities include marine, coastal and oceanic-based projects, water and wastewater markets, small hydro, niche consulting • Local environmental markets provided that provincial government enhances its current environmental legislation • International municipal and industrial infrastructure developments demand for project execution capacity, particularly mining, petroleum and hydro generation • Canadian/global markets for environmental products and services within the resource extraction industry • Prime geographic markets including the NE US and Latin America and other coastal regions • Climate change and health and environment markets • Increased Canadian market sales 	<p><u>Threats</u></p> <ul style="list-style-type: none"> • Escalating environmental problems and lack of legislative direction • Shortages of skilled workers • Lack of Inter-provincial Cooperation among companies and key stakeholders • Lack of targeted export market focus by companies and supporting organizations • Cyclical nature of regional markets • Limited capital investment in technology development • Limited regional value-added in production of goods • Limited capital for growth • Need for additional in-house business capacity

Strengths

Similar strengths to the general Atlantic Canada environment sector are noted in the above SWOT chart and described in the Atlantic Canada SWOT section. Unique strengths of Newfoundland firms are described below:

1. *Niche Technologies and Services.* A number of Newfoundland companies firms provide specific expertise, both in terms of technology and services. Some of them include:
 - Water/wastewater treatment technologies for coastal and large resource-based projects such as mining and oil and gas exploration.
 - Small hydro.
 - Small niche consultants and environmental technology companies focusing on the resource and power generation sectors (e.g. environmental impact assessment, environmental monitoring services oil/gas production waste management services and technologies, etc.).
 - Remediation technologies particularly for the petroleum industry.
 - Engineering consulting, primarily associated with resource-based industries (petroleum, mining, power generation and aquaculture).
2. *World Class Coastal, Marine/Ocean-based Environment industry.* A number of Newfoundland firms provide both services and technologies that revolve around the monitoring, protection and mitigation of the marine and coastal environment which are cost-competitive on a domestic and international basis.
3. *Healthy Academic and Research Capacity.* A strong academic R&D capacity within Newfoundland on a range of environmental issues, with a primary focus around marine and resource-based industry solutions.
4. *European Presence.* A number of Newfoundland companies are currently active in eastern and western Europe providing a "foot in the door" for other potential opportunities in this expanding marketplace.

Weaknesses

The weaknesses of the Newfoundland environment sector mirror many of those noted for the regional industry and are discussed in the Atlantic Canada SWOT analysis. Additional weakness that were identified include:

1. *Limited presence in eco-efficiency and air pollution prevention and control markets*
Two weaknesses that several buyers noted were the lack of expertise in Newfoundland (and other Atlantic Canada provinces) in the areas of air pollution control (including climate change) and eco-efficiency or pollution prevention (i.e. front-end solutions). Each of these areas are primary growth sectors within global environmental markets, and as such, may be a significant "missed opportunity" for the provincial industry.
2. *Lack of regulatory framework.* A number of suppliers and buyers of environmental products and services indicated that the future direction of the provincial government with respect to environmental legislation is uncertain, particularly in the areas of solid and hazardous waste management, wastewater treatment, resource conservation and monitoring. As such, many suppliers are reluctant to enhance their internal capacities or increase R&D until they have a better understanding of where regulations (and hence demand) is going. This often puts them at a disadvantage to outside firms that may have already developed the capacity based on legislation in their region.
3. *Limited number of firms wanting to export.* A weakness, only with respect to industry growth, many Newfoundland companies expressed the desire to stay local. This "regional" focus is a challenge that could impact the local industry as the current market is very small. If new regulations are passed, a lack of export experience may result in the loss of local market share as more experienced and skilled "outside" firms may be able to provide better value at a lower cost.

Opportunities

Many of the opportunities open for Atlantic Canada companies in general, are also available to Newfoundland firms. Key areas where Newfoundland may have a more specific interest include:

1. *Local environmental markets.* Although the current Newfoundland market is very small, proactive initiatives to bring the province in line with other Canadian provincial regulations could create a strong demand for local environmental expertise in several areas (e.g. resource conservation, water and wastewater treatment, air pollution control, solid and hazardous waste management, monitoring, remediation to name a few). The challenge is to instill confidence within the local industry to invest and enhance internal capabilities. If this confidence is not restored and legislation is passed, local firms will be unable to competitively compete with firms located outside of the province.
2. *Water/wastewater treatment technologies* for coastal and large resource-based projects such as mining and oil and gas exploration.

3. *Small hydro* projects across Canada, the NE US and a number of developing markets such as Latin America.
4. *Small niche consultants and environmental technology* companies focusing on the resource and power generation sectors (e.g. environmental impact assessment, environmental monitoring services, oil/gas production, waste management services, and technologies, etc.).
5. *Remediation technologies* particularly for the petroleum industry.
6. *Engineering consulting*, primarily associated with resource-based industries (petroleum, mining, hydro-power generation and aquaculture).
7. *Coastal, Marine/Ocean-based Projects requiring specialized environmental products and services* that can be provided by Newfoundland firms at a cost-competitive level on both a domestic and international basis.

The challenge with all of these opportunities is to identify targeted markets or clients where success is most likely. Good solid market intelligence is needed to exploit this opportunity. In addition, specific Newfoundland firms must be identified with the resources, willingness and capacity to venture out, or those that are willing to form strategic alliances with other Newfoundland/Atlantic Canada companies with complementary skills.

Threats

The threats facing Newfoundland environmental companies generally mirror those of most Atlantic Canada firms. Please refer to the Atlantic Canada SWOT analysis. A few points that should be re-emphasized for Newfoundland include:

1. *Escalating environmental problems and lack of legislative direction.* Continuing provincial government inaction on many environmental issues (waste management, wastewater treatment, conservation, monitoring, etc.) could result in a greater threat to both the local environment industry's competitiveness (both on regional and international level) and on other key sectors such as tourism, aquaculture, etc. which rely on strong environmental legislation to prosper.
2. *Shortage of skilled workers in the local environment sector.* This appears to be an ongoing problem for the province, particularly as it relates to highly skilled personnel with expertise in risk assessment, hazardous and solid waste management, advanced computer skills, finance and marketing, etc. A skilled workforce is vital to grow a strong environment sector within the province.
3. *Regional markets are limited.* In order to grow and prosper as we head into the new millennium, Newfoundland firms must branch out beyond regional borders, as the

local and regional markets will be unable to sustain the current industry, particularly as major resource projects shift phases or wind down.

4. *Growth Strategies.* In-house capacities need to be enhanced in order to properly assess international opportunities, gain required capital and market intelligence and develop focused market penetration strategies. Many companies do not understand that to be successful in export markets requires substantial investment, both in terms of time and money. In addition, companies must be selective in where they target their exports. This means initially identifying a need, developing in-house capabilities, and then establishing a targeted marketing strategy.

4.5.7 Prince Edward Island Environment Industry Profile

The PEI environment industry is the smallest within the region. Interviews were conducted with 29% of the companies to ensure valid representation of perspectives and concerns.

All of the companies surveyed have less than 25 employees. The average environment industry company in PEI has been in existence for about 15 years. About one third of the companies produce goods only, one third supply services only and one third supply both products and services. About half of the companies resell goods made elsewhere.

PEI environment industry supply side economics are driven predominantly through demands in solid waste (50%), environmental monitoring (27%), renewable energy (22%), industrial eco-efficiency (22%), and energy efficiency (22%). None of the firms surveyed provided goods in water supply, waste water, soil and groundwater, noise and vibration, construction or air pollution.

Companies provide services to fill existing market niches in the following categories: environmental education (44%), solid waste including recycling (37%), energy efficiency (37%), soil remediation (22%), other services such as public relations, law, risk management (22%), air pollution (22%), water supply and conservation (18%), waste water management (18%), and other contracting and engineering (18%). Firms surveyed did not provide services in noise abatement, research and development and analytical services.

Figure 10
Categories of products provided by the PEI Environment Industry

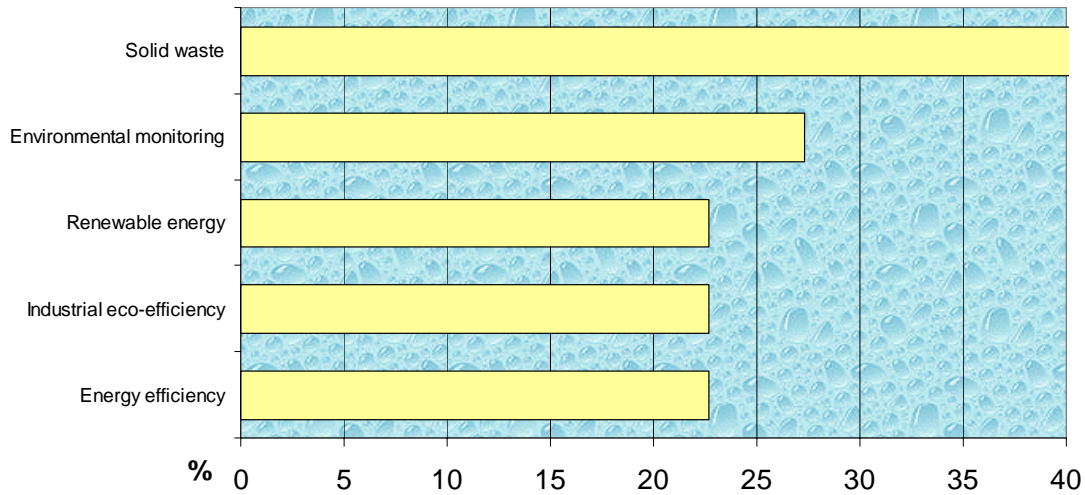
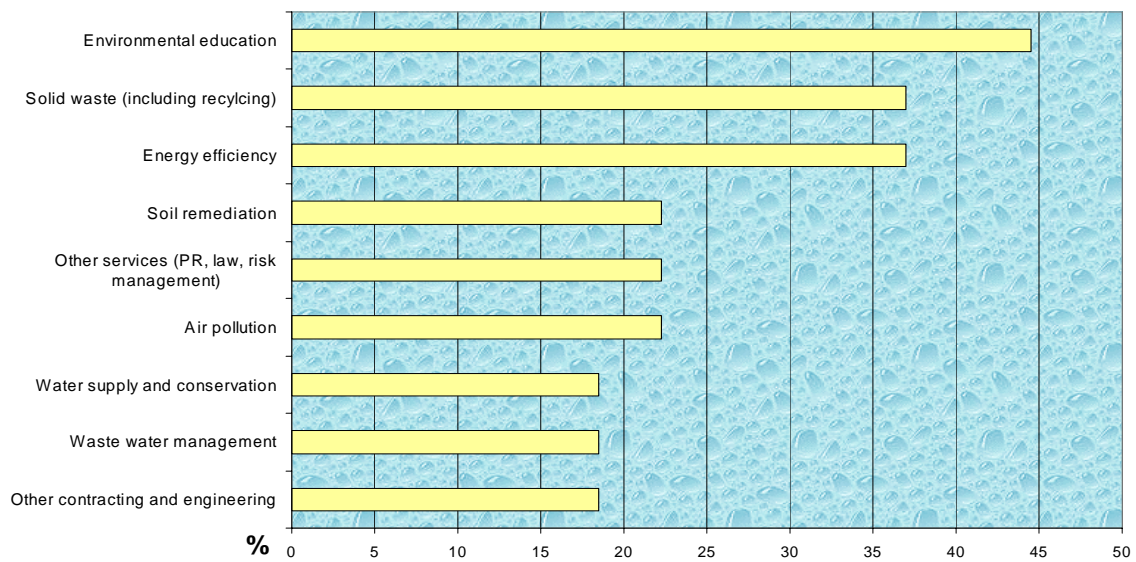


Figure 11
Categories of services provided by the PEI Environment Industry



4.5.8 SWOT Analysis for Prince Edward Island

In general, Prince Edward Island's environment industry can be characterized by the SWOT chart below. Unique characteristics are then discussed in further detail on the following pages.

SWOT Analysis for Prince Edward Island

<p><u>Strengths</u></p> <ul style="list-style-type: none"> • Firms well established (average age of 15 years) • Strong Island/coastal marine/Ocean-based niche technologies and services • Niche Technologies and Services making PEI firms leaders in key niche areas such as water treatment for the aquaculture sector, waste management processes, environmental monitoring, renewable energy, remediation and energy efficiency • Desire to establish an industry association 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> • No larger companies or industry association which often provide leadership • The local market is very small with a small number of companies • Broad business focus with many individual companies providing services/technologies across a broad range of sectors • Heavy reliance on local/regional markets • Limited goods production capacity and Limited technology development capacity • Few firms form strategic alliances to penetrate export markets • Lack of in-house financial and business expertise to, for example, access and gain capital, or to identify and pursue export markets
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> • Prime geographic markets including the Caribbean and other island/coastal regions • Sectoral markets for niche technologies and services in key niche areas such as water treatment for the aquaculture, waste management processes, environmental monitoring, renewable energy, remediation and energy efficiency • Climate change • Increased Atlantic Canada and Canadian market sales 	<p><u>Threats</u></p> <ul style="list-style-type: none"> • Lack of Inter-provincial cooperation among companies and key stakeholders • Lack of targeted export market focus by the majority of companies • Limited capital investment in technology development • Limited regional value-added in production of goods • Limited capital for growth • Need for additional in-house business capacity

Strengths

Prince Edward Island's (PEI) environment industry has a few internal strengths similar to the Atlantic Canada environment sector as noted above. On an industry basis, however, unique strengths of PEI firms include:

1. *Niche Technologies and Services.* A number of PEI companies provide specific expertise, both in terms of technology and services, and sector-specific. Some of them include:

- Water/wastewater treatment technologies, including the aquaculture and agriculture industries.
 - Waste management technologies for the re-manufacture of post-consumer materials, and specialized waste management processes (e.g. Waste Watch).
 - Environmental monitoring for resource, fisheries, agriculture and large infrastructure projects.
 - Wind energy.
 - Specialized remediation technologies and services.
 - Small niche consultants (e.g. energy efficiency, hazardous waste clean-up, biofiltration, groundwater monitoring and treatment, etc.).
2. *Strong island/coastal marine/ocean-based niche technologies and services.* A few PEI firms offer competitive services and technologies that focus on monitoring, protection and mitigation of marine and coastal environment. The knowledge and understanding of an island culture is also a unique strength of many PEI environmental firms.
 3. *Willingness to work together.* Although a local industry association is not established, there is a strong desire to build or cooperate with an established organization which would carry out activities such as sharing information, helping to identify potential opportunities, increasing internal capacities and forming partnerships to compete for larger projects.

Weaknesses

The weaknesses of the PEI environment sector mirror many of those noted for the regional industry and are discussed in the Atlantic Canada SWOT analysis. Additional weaknesses that were identified:

1. *No larger companies in the province or an industry association.* Larger companies often provide leadership to smaller companies, assisting them venture out beyond the borders and defining new market opportunities. Industry associations allow companies to share information, work together more closely, identify opportunities, and develop strategies to enhance the overall sector.
2. *Very small local market and a small number of firms.* PEI (as with the rest of Atlantic Canada) provides a small marketplace for environmental suppliers. In addition,

there are a relatively small number of firms making it difficult for PEI to form a critical mass which is often required to become internally competitive.

Opportunities

Key areas where PEI may have a more specific interest include:

1. Sector-specific opportunities in targeted geographic markets:
 - Water/wastewater treatment technologies, including the aquaculture and agriculture industries.
 - Waste management technologies for the re-manufacture of post-consumer materials, and specialized waste management processes (e.g. Waste Watch).
 - Environmental monitoring for resource, fisheries, agriculture and large infrastructure projects.
 - Wind energy.
 - Specialized remediation technologies and services.
 - Small niche consultants (e.g. energy efficiency, hazardous waste clean-up, biofiltration, groundwater monitoring and treatment, etc.).
2. *Targeted geographic markets may include the Caribbean, Iceland, other small islands and rural communities* where demand for specialized technologies and services can be met cost competitively by PEI firms. The NE US and opening markets in eastern Europe (e.g. for waste management and water treatment) may also offer opportunities for specialized PEI firms.
3. *Regional and Domestic Markets.* PEI companies have the opportunity to expand closer to home as many firms indicated that they focus primarily on the provincial market. This may be a more successful first step for PEI companies wanting to venture off the island to expand their business.
4. *Climate Change.* PEI has a unique opportunity with its expertise in wind energy to tap into a rapidly expanding global marketplace. Targeted markets again include island states, Latin America and emerging economies in eastern Europe.

The challenge with all of these opportunities is to identify targeted markets or clients where success is most likely. Good solid market intelligence is needed to exploit this opportunity. In addition, specific PEI firms must be identified with the resources, willingness and

capacity to venture out, or those that are willing to form strategic alliances with other PEI/Atlantic Canada companies with complementary skills.

Threats

The threats facing PEI environmental companies generally mirror, but in many cases are more severe than those of most Atlantic Canada firms. Refer to the Atlantic Canada SWOT analysis. A few points that should be re-emphasized for PEI include:

1. *Local and Regional markets are limited.* In order to grow and prosper as we head into the new millennium, PEI firms must branch out beyond local and regional borders, as these markets will be unable to sustain the current industry, particularly as major resource projects shift phases or wind down.
2. *Need to enhance internal capacities.* Sustaining market share, adapting to changing markets and penetrating the international scene requires depth and strong management. Companies need to enhance internal skills, particularly around issues such as financing, human resource development, market intelligence and strategic planning if they want to gain continued success in the future.
3. *Technology Driver.* PEI firms need to complement consulting expertise with technologies that are home grown.

5.0 A Strategy for Atlantic Canada's Environment Industries



5.1 The Vision of the Environment Industries in Atlantic Canada

The environment industry in Atlantic Canada has a vision based on the following principles:

- *High value job creation.* The industry will create new, higher value jobs, especially of a professional/technical nature, in the environment industry which will have a major multiplier effect throughout the Atlantic region.
- *Sustained industry growth through diversification.* Atlantic Canada's environment industries will diversify into new market segments. Export markets will strengthen their ability to sustain growth, especially through resource based economic cycles.
- *Targeted export promotion.* Environmental and clean energy markets in Canada are mature and limited in size. Growth will largely come from exports to targeted global markets, providing additional revenue for the sector and the local economy. Companies will develop focused strategies to penetrate these markets, particularly where demand is high and Atlantic Canada firms can provide a price or quality-competitive advantage.
- *Enhancement of technology development capacity.* Atlantic Canada will enhance its technology development capacity. Recognizing that new technology, or intellectual property, will be one of the major factors defining competitive success in both the domestic and global marketplaces for the year 2000 and beyond.

To move towards the achievement of this vision of success and to ensure that growth takes place in a holistic manner, evenly distributing resources towards a sustainable future economy, five foundational pillars upon which to build the Strategy are recommended. These pillars are essential building blocks, representing strategic issues, and go hand-in-hand with Strategy implementation.

The following section describes these five "pillars" or thematic issues upon which the Strategy must be founded if the vision is to be achieved. Drawing upon the findings of the SWOT analyses, and building on the pillars, a set of 4 Strategic Goals are described. Mechanisms for the achievement of each Strategic Goal are detailed through the establishment of Strategy Options and associated actions.

The section concludes with an Action Plan which integrates all Goals, Strategy Options and actions, both for the region and individual provinces. A diagrammatic representation of the strategic framework is provided in Figure 12 below.

5.2 Strategic Pillars

In order to develop a strategy which is founded in reality and built on principles which reflect the current state of the industry in Atlantic Canada while also reflecting competition, the global market and a business approach, extensive consideration has been given to those issues which are fundamental to the environment industry of the future. The five underlying requisite capacities are represented as "pillars" and are the essential strategic issues which go hand-in-hand with strategy implementation. Aspects of issues raised in this section are reflected in the Strategic Options.

Pillar #1 Human Resource Development

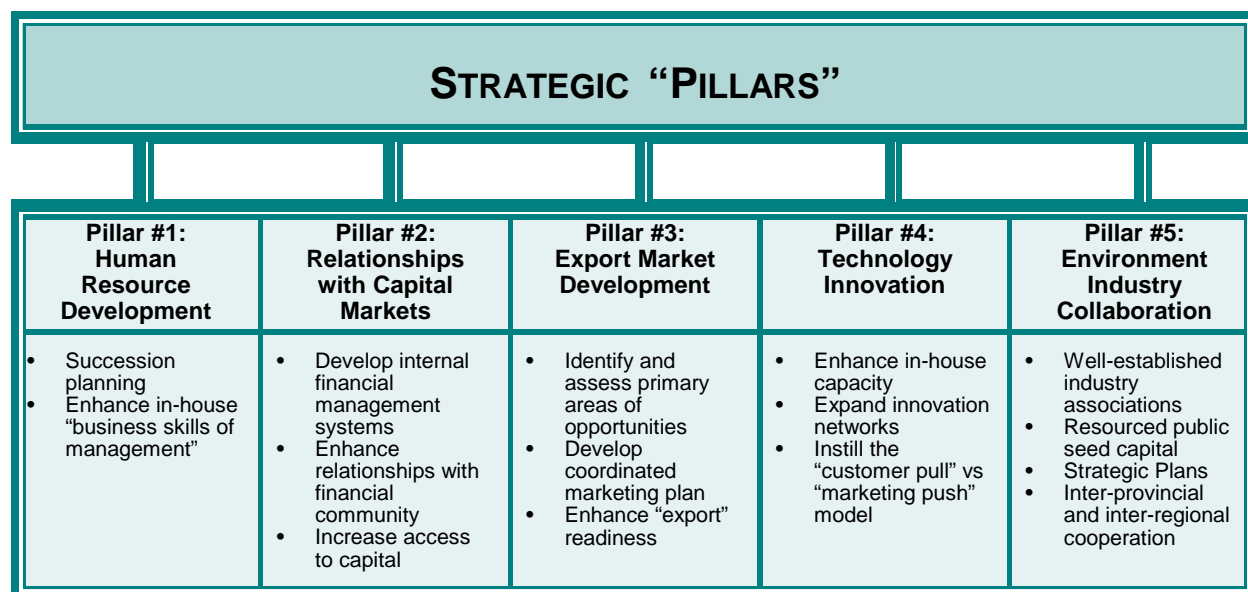
Pillar #2 Relationships with Capital Markets

Pillar #3 Export Market Development

Pillar #4 Technology Innovation

Pillar #5 Environment Industry Collaboration

Figure 12



Pillar #1: Human Resource Development. Well established firms are currently a regional strength. In fact, a number of large Atlantic Canada environmental firms possess a strong internal business capacity which has allowed them to become regional and international leaders. However, a two-fold challenge exists:

- Firstly, over the long term this strength may become a weakness as principals of these firms age (the average age of a chief executive of an Atlantic Canadian company is estimated to be late 40's to late 50's) and no succession planning is integrated into the overall strategic planning process. As the more mature individuals leave the company so too do their experience and business relationships. This often results in a reduced return on investment for the principals of the company, and a loss in market share as the internal skills can no longer meet buyer demands. Growth in capacity, therefore, needs to be enhanced through the strengthening of younger, more junior staff and the creation of new managerial and executive positions, including those with technology development experience from outside the region and from other industries. This would provide the needed mentors to train young talent, reduce the current regional outflow of skilled workers and assist the companies with ongoing expansion.
- Secondly, the majority of firms are small and medium-sized companies, many of which lack the in-house business skills required to successfully position the company for sustained growth well into the next millennium (e.g. penetrating global markets). Management personnel within these companies typically have an engineering or science background with little or no business training. In turn, strategies are required to enhance this expertise, particularly as it relates to market strategy development, accessing and leveraging financing, technology development, commercialization and the protection of intellectual property.

Pillar #2: Relationships with Capital Markets. Many small and medium-sized firms have a general lack of understanding about how to successfully access investment and working capital, develop the necessary internal financial architecture and effectively manage the capital that is obtained in order to bolster R&D efforts and expand into export markets. In addition, the financial community is just starting to recognize the environment sector as an investment opportunity. Since a wide variety of capital (e.g. technology equity, trade financing, corporate banking, working capital, etc.) is a prerequisite for growth within this sector, there is a need to engage the financial community at different levels and develop relationships between the environment industry and capital markets in and outside of the Atlantic Canada region. These financial market relationships will assist in providing key resources - both knowledge and dollars - for expansion and technology development.

Pillar #3: Export Market Development. The federal government recently announced in its throne speech that it plans to increase support for trade promotion in strategic sectors with "high export potential" including the environment sector. Similar to other regions across Canada, the Atlantic Canada environment industry is diverse, consisting of a large number of companies located in different provinces. To truly make an impact on the global stage, there is substantial value in planning an export strategy that is more focused and

targeted. For example, the Federal government emphasized a north-south focus, mentioning in the throne speech their objective to establish a Free Trade Area of the Americas by 2005. For Atlantic Canada, focus would be best attained through inter-provincial cooperation among key stakeholders and action by companies to:

- identify and assess primary areas of opportunity for the Atlantic Canada environment industry to exploit;
- develop an export market plan for the region that would create an Atlantic Canada presence and mass in identified markets; and
- assist companies and strategic alliances prepare for export and penetrate identified markets.

Pillar #4: Technology Innovation. Innovation is the backbone of all high-tech sectors including the environment industry and is often the greatest asset of a knowledge-based firm. A constant evolution in technology is required to maintain market share and meet the changing demands of today's customers. This is particularly true in the environment and clean energy sectors where technology is playing a greater role than ever in addressing increasingly complex environmental issues. The challenge is two-fold:

- The development of technology is often ad hoc, with many firms spending time and resources creating a technological solution that may or may not have a demand (i.e. "market pull"). In the majority of cases this approach is unsuccessful because the developer did not first start with the customer and determine what they need and at what cost. This challenge is again often overcome through in-house capacity building.
- Once a technology is developed, it often flounders at one or more stages on the road to successful commercialization. Firstly, raising capital is generally an obstacle throughout the cycle. Secondly, the process of moving the technology from the R&D stage to production is often a challenge. Successful technology development is based upon innovation networks which create relationships between the wide variety of players that are needed to bring a new technology to market. At present, there is a disconnection between many environment research/academic institutions and the business world. These networks need to be more formally developed within Atlantic Canada's environmental and clean energy sector. Finally, marketing the technology and protecting intellectual property can also be a stumbling block which is not properly addressed.

Pillar #5: Environment Industry Collaboration. Well established industry associations and strong collaboration among stakeholders are key to successful industry growth in areas such as: technology development, market penetration and export development. Currently there are three industry associations located in Atlantic Canada. The strength of these organizations and the industry they support can be enhanced through:

- Resourced public seed capital for a 2 - 4 year period;
- Strategic plans around the ongoing industry association development/growth;

- Inter-provincial cooperation between associations and other key stakeholders, particularly with respect to the growth of domestic markets; and
- Inter-regional, national and even international cooperation around issues such as export market development, and technology innovation. Stakeholders including governments at all levels, industry associations, environmental companies, etc. need to work together to establish and more importantly, implement a coordinated Atlantic Canada Environment Industry Strategy that is practical and beneficial to the majority of local environmental companies.

Along with the efforts to strengthen the strategic pillars, additional business development strategies are required to achieve the proposed environment industry strategic goals as identified in the Strategic Framework. These Business Development Strategies are discussed in the following section.

5.3 Strategic Framework - Goals, Strategies and Actions

The previous section identified those issues which are fundamental to industry growth and development, representing cross cutting themes essential to the presentation of a Strategy for Atlantic Canada's Environment Industries. This section of the document describes the Strategic Framework which comprises the core of the Strategy.

The Strategic Framework is centered around four Strategic Goals which are the defining focus for the suggested Strategy Options and recommended actions. The four Strategic Goals are:

- **Building capacity and enhancing competitiveness**
- **Leveraging capital for expansion**
- **Targeting markets for growth**
- **Enhancing technology innovation and development**

Strategic Framework Atlantic Canada's Environment Industries Competitiveness Strategy

Strategic Goals For Atlantic Canada			
A. Building Capacity and Enhancing Competitiveness	B. Leveraging Capital for Expansion	C. Targeting Markets for Growth	D. Enhancing Tech. Innovation and Development



Strategy Options			
S.O. #1: Enhancing the Skills of Existing Personnel	S.O. #5: Enhancing Investor Relations	S.O. #7: Driving Domestic Markets	S.O. #13: Enhancing Product Import Substitution
S.O. #2: Understanding Customer Needs	S.O. #6: Tapping into Export Financing	S.O. #8: Leveraging Skills Through Strategic Alliances	S.O. #14: Demonstrating and Profiling Local Technologies
S.O. #3: Understanding Potential Export Markets		S.O. #9: Exploiting Opportune Export Markets	
S.O.# 4: Attracting Skilled Personnel		S.O. #10: Focusing Efforts Around Sectoral Strengths	
		S.O. #11: Leveraging Emerging Drivers	
		S.O. #12: Targeting the Americas First	

Strategic Goal A: Building Capacity and Enhancing Competitiveness

Goal Statement: Atlantic Canada's environment industries will enhance the skills, knowledge and entrepreneurial orientation of its human resources at all levels.

Strategy Option #1: Enhancing the Skills of Existing Personnel

A number of individuals commented on the high-level of experienced personnel within Atlantic Canada's environment industry. However, it also became clear that there were a number of "skill gaps", particularly in the small and medium-sized companies, that were inhibiting their growth. To address this issue it is recommended that a number of capacity-building actions be undertaken to enhance the skill levels of future leaders of "up-and-coming" Atlantic Canada firms. Suggested actions are:

Action 1. Establish formal or informal groups of local champions, leaders of successful local environmental companies who are willing to share their experience with enthusiastic companies in the early stages of growth. Individuals may have a wide range of backgrounds (e.g. legal, financial, marketing) and experience (e.g. successfully penetrated an export market, developed and commercialized a successful technology, etc.). Small breakfast meetings, presentations or site visits could be arranged by various stakeholders. Several key informants indicated that they would be willing to participate in this type of event.

Action 2. Establish a "mentorship" program within the environment industry community. This is similar to action #1, but is more focused on individual company needs and carried out on a one-to-one basis (i.e. not as a group). For example, leaders would be brought in to assess the business plans and operations of up-and-coming companies. This approach would not only assist companies to increase their level of knowledge, it may also help in gaining financing, developing a marketing strategy, etc.

Action 3. Work with companies to help them establish internal human resource development plans. Currently, most environmental companies do not think about, let alone develop, formal human resource strategies, or hire experienced HR personnel early in their growth to help them plan for the future. On the other hand, this is a key component of success for many larger firms in other sectors.

Action 4. Work with various agencies including local colleges and universities to conduct training needs assessments and develop practical, hands-on training programs or manuals for business leaders and more junior staff. Some have already been developed locally or in other jurisdictions across

the country. For example, the Industry Associations may put together an information package on obtaining financing (or simply a list of local investors), or methods for gathering valuable market intelligence.

Action 5. Identify ways in which Atlantic Canadian companies can participate in a "Mid-Career Program" supported by HRDC and executed by CCHREI. This program would fill a gap in skills by providing essential training for technical and middle manager staff in many of the business skills needed to prosper.

Strategy Option #2: Understanding Customer Needs

In a similar vein, Atlantic Canada environmental companies need to better understand how purchasers make decisions and what they value. Insights in this area may be enhanced through:

Action 1. Set-up a range of face-to-face meetings or small seminars between environmental companies and industrial buyers to allow suppliers to gain a better understanding of specific customer needs. In addition, the venues can be used to increase buyer awareness and profile Atlantic Canada environmental companies to overcome the belief of many larger buyers that Atlantic Canada companies can only meet a very small fraction of their needs.

Action 2. Action 1 could be supplemented by establishing a secretariat that posts technology requirements, potential contracts or other major opportunities by major industries. This is currently partially accomplished through various agencies and information bulletins, however, a central location for all of Atlantic Canada may be more effective.

Action 3. Initiate small missions to major industry sector trade shows (e.g. forestry industry, or petroleum industry), not environmental events. The sector specific industries have unique needs which can be better understood by attending industry events.

Action 4. Support special environmental technology showcase events in conjunction with major industry trade shows held in Atlantic Canada that focus on major industrial sectors, such as forestry, oil & gas, mining, marine, etc.

Action 5. Host special events to bring together interested environmental companies and representatives of CIDA, IADB, and other large development agencies. The purpose would be to:

- inform suppliers of how these agencies work;
- identify potential projects on which Atlantic Canada firms could bid;

- initiate the formation of strategic alliances to compete for these types of projects.

From these events or other forums, companies also need to gain a better understanding of the factors driving environmental markets inside and outside the region. This knowledge has a profound impact on competitiveness, as companies need to adapt to the changing marketplace. For example, climate change and health issues will be major market drivers as we head into the next millennium but presently very few Atlantic Canada firms are positioned in either of these areas.

Strategy Option #3: Understanding Potential Export Markets

Suppliers must understand what potential markets offer, how they should best access that market and the level of effort and resources that are required.

Action 1. Face-to-face breakfast meetings, small seminars, etc. could be hosted to bring interested environmental companies together with individuals knowledgeable about specific geographic markets. Objectives could be to:

- hear from local companies who successfully, or unsuccessfully, entered a particular market;
- gain a better understanding of the culture, how business is done, sources of information;
- provide market intelligence on the region or help companies find that information; and
- identify potential partners for strategic alliances.

Action 2. Assist interested and export-ready companies participate in missions to geographic markets that offer identified opportunities.

Strategy Option #4: Attracting Skilled Personnel

Several Atlantic Canada environmental companies expressed the opinion that a lack of skilled personnel was an obstacle to technology development and growth. A primary factor is the lack of "dollars" available to adequately compensate experienced, skilled personnel and give them the incentive to join a new or small technology company, particularly at an early stage of growth. This said, a couple of actions can be carried out:

Action 1. As a component of prospecting and investment materials, prepare a specific presentation package on Atlantic Canada's (or individual provinces) environment industry highlighting the range of scientific, technical and business skills needed and the benefits of coming east. This could be

showcased at various trade shows and events which these individuals attend.

Action 2. Continue to support the strong local environmental and other complementary academic programs that currently are offered in the region.

Action 3. In addition to supporting local academic programs, the region also wants to encourage graduates to stay and work at home. To accomplish this requires high caliber jobs which result from increased economic activity spurred on by various actions noted throughout this section (e.g. government procurement programs that favour "locally-purchased" products and services). Programs such as professional youth experience opportunities should be initiated and industry participation promoted.

Strategic Goal B: Leveraging Capital for Expansion

Goal Statement: Atlantic Canada's environment industries will enhance their access to growth capital through actions focused on improved investor relations and the ability to tap into export financing.

Strategy Option #5: Enhancing Investor Relations

Expanding a company requires capital. However, the majority of small and medium-sized environmental companies have a lack of understanding about how to access investment capital. In addition, the required capital is not often readily available within the firm's internal coffers, particularly for small and newly started enterprises. As a result, companies need to branch out and be seen in the "capital market" domain. There is a small and growing group of investors that are showing more interest in the environment industries sector. Located primarily in Europe and eastern North America, these investors are looking for innovative companies (at all stages of growth) to invest in. Establishing links with these organizations will take some time and effort, however, the benefits will be well worth the investment.

- Action 1.** Assist in identifying and engaging regional private investors interested in putting their money into local environmental firms. An informal "angel" environmental investment group might then be developed and introduced to up-and-coming local firms. These investors will provide a valuable source of capital, but they might also provide a source of needed business skills to assist local companies grow.
- Action 2.** Work with key brokerage houses to introduce them to Atlantic Canada environmental companies seeking capital, perhaps through a special session on the matter. Examples of a few institutions showing interest in the environment sector include Scotia Capital Markets, Acuity Funds, Loewen Ondaatjee McCutcheon, Kearns Capital, and CanAccord.
- Action 3.** Work with brokering agencies in the US that profile environmental companies to investors (e.g. Environmental Capital Incorporated) to introduce more Atlantic Canada companies to venture investors south of the border. Engaging a brokerage agency allows a company to gain wider exposure. These institutions work with numerous investors which are often too difficult to approach and meet on an individual basis.
- Action 4.** Work with federal departments such as DFAIT or Industry Canada to identify and engage larger international investment funds with green or ethical orientations. Communications between these groups and the Atlantic

Canada environment industry could then be facilitated through one or more stakeholders.

- Action 5.** Put together a promotional package on the market potential of key Atlantic Canada technology companies. This is done routinely by other sectors (e.g. information technology). Distribute the package to institutional investors, brokerage firms, financial analysts and the media.

Strategy Option #6: Tapping into Export Financing

The majority of Atlantic Canada companies are not aware of, or do not take advantage of, export financing from institutions such as EDC, Canadian Commercial Corporation (CCC) and the Industrial Cooperation Division (INC) of CIDA. As these organizations often fund large infrastructure and resource-based projects, it is an area of opportunity that may prove fruitful for a few Atlantic Canada firms. The challenge is to educate local firms about how to access these agencies and how to identify projects which are best suited to their expertise and experience. This can be addressed by:

- Action 1.** Holding seminars or workshops, as noted previously, on support which is available. This might include a one or two day hands-on "dry run" of the application, approval and subsequent implementation process surrounding submissions/bids to EDC, CCC, EB, IFIs and CIDA INC in order to competitively address the agency requirements.
- Action 2.** Informing Ottawa or regionally-based government officials, and members of the Canadian Executive Directors' offices in the IFIs of Atlantic Canada strengths and interests.
- Action 3.** Assisting local/regional companies identify potential projects and assemble the required team to be competitive.

Strategic Goal C: Targeting Markets for Growth

Goal Statement: Atlantic Canada environment industry will expand its collective market access through an action plan which includes advocacy for the development and enforcement of environmental regulations, building strength through alliances, exploiting opportune export markets and focusing on its sectoral strengths.

Strategy Option #7: Driving Domestic Markets

Regulations and public policy have a profound impact on markets for environmental products and services. For example, legislation such as CEPA, and proposed regulations around specific pollutants such as PM2.5, benzene, and sulphur are illustrative of the increasing emphasis on environmental health issues which in turn is changing the types of solutions required (e.g. integrative approaches, pollution prevention, etc.). This link between human health and the environment was also noted several times in the recent throne speech.

In Canada, those jurisdictions that have taken a proactive approach and introduced new regulations have in turn increased demand and, in many cases, helped forge innovation, expertise and growth within specific niche sectors. During this study it was noted that the region as a whole does not take a coordinated approach to environmental policy. As such, there is a disconnection between various provincial industry sectors in terms of competitiveness/capabilities in different areas. In addition, industry representatives mentioned on several occasions that they are unaware of what direction the provincial governments are taking with respect to future policy. This makes it difficult for the industry to gear up and invest in areas where capacity should be enhanced. To address these concerns and positively influence local market demands, it is recommended that the following activities be carried out:

- Action 1.** Develop a strong legislative framework which illustrates to the industry where regulation is going. This will not only be beneficial to suppliers, but it will also assist buyers in the region.
- Action 2.** Track changes to policy that are occurring in other jurisdictions across North America and Europe. This will provide a heads-up as to where the market is going. For example, climate change and health issues are fast becoming key priority issues. If local companies have solutions to emerging problems which are leading to new regulatory frameworks, investment should be made in these areas, policy developed, and local solutions profiled. Policy around these issues would help local companies test out their solutions and gain a head start on the competition.

Action 3. Be aware of national and international "hot buttons" that may lead to regulatory changes or increased support. Then, assess how Atlantic Canada companies can best leverage their expertise to address emerging issues or tap into this increased support. For example, there appears to be strong commitment from the federal government to put more money into:

- clean-up of federal sites;
- enhancing existing infrastructure, including municipal wastewater treatment facilities; and
- meeting Canada's Kyoto commitments.

Strategy Option #8: Leveraging Local Skills Through Strategic Alliances

To be successful on the export scene over the long-term requires resources (time and money), and more often than not, the capability to provide multidisciplinary solutions. Both of these are difficult to accomplish for most Atlantic Canada firms, the majority of which are small and medium sized. In fact, relative to other environment companies across Canada, Atlantic Canada's industry is less likely to establish formal alliances/consortia to penetrate export markets. Several actions that will help alter this situation include:

Action 1. Enhance local, regional and national cooperation between Atlantic Canada firms and those organizations that provide complementary technologies and services to meet an identified demand. By encouraging and promoting the formation of viable strategic alliances and partnerships, companies gain access to markets that were not previously viable, the industry gains exposure and experience, and the local economy benefits. When developing this approach, priority should be given to those approaches that most effectively form long-term business partnerships for export markets. Many practical models are available. For example, Industry Canada has a model for Strategic Alliances and Public Private Partnerships, both of which may be appropriate for Atlantic Canada companies. Industry Canada is also currently working on a Sustainable Cities Initiative, which could provide opportunities for local firms with specialized expertise.

Action 2. Enhance cooperation among provincial, regional and federal stakeholders who promote the Atlantic Canada industry. For example, Atlantic provincial industry associations should work closely in developing and implementing a number of the strategies noted herein. They should also cooperate with CEIA to enhance their efforts on national issues. By collaborating to identify regionally-beneficial opportunities, and firms that can work together, the potential for winning contracts from competitive partnerships will increase.

Action 3. Help companies identify effective foreign partners, who can provide a foot into the market, open doors and assist in developing market opportunities that will lead to sales.

Strategy Option #9: Exploiting Opportune Export Markets

The global market is huge, so identifying where to focus can be a difficult task. Companies and stakeholders have to be proactive. Detailed market assessments should be conducted initially. The results of these are then used to "match" opportunities with local/regional supply capacity and the financial and human resources required to convert market opportunity into a business transaction. To help companies be more focused and identify prime opportunities, it is suggested that:

Action 1. Market assessments of foreign markets be conducted or financed in part by provincial and regional organizations. Other useful research documents may include guides identifying:

- who to talk to at home and abroad about specific geographic markets;
- what are the "real" opportunities;
- what marketing and sales tools are available and how can they be accessed; and
- what financing is attainable and how does a company apply for it.

Action 2. Intense 2-3 day educational programs for local companies seeking to penetrate international markets be organized. The sessions should have a concrete output (e.g. an export strategy framework for participating companies).

Action 3. Profile export successes on trade missions, to Canadian Trade Commissioners and foreign contacts in targeted countries.

Action 4. Start to develop a coordinated export strategy for the region (or individual provinces) based on the identified sectoral strengths and market opportunities in specific geographic markets such as central Canada, NE US, Caribbean, Latin America and specific European countries.

Action 5. Inform Canadian Trade Officers in targeted countries of the skills and expertise of export-ready Atlantic Canada environmental companies. Also, work with them to identify potential local partners.

Action 6. Consider the role of SAGIT in the expansion and growth of Atlantic Canada's environment industry.

Action 7. Continue to work closely with GLOBE and Americana to forge relationships with potential buyers or partners and heighten the profile of Atlantic Canada companies at these conferences through special events, meetings, presentations, etc.

Strategy Option #10: Focusing Efforts Around Sectoral Strengths

Atlantic Canada's environment industries have demonstrated their competencies, in quality, performance and cost terms, in a range of specialized expertise focused around three primary sectoral markets. The specific niche technologies and services have been identified in SWOT analyses found in Section 4.0.

- *Infrastructure projects* revolving around major construction, resource extraction and processing, and environmental assessment, monitoring and mitigation over the past decade. Many of these projects are world class. Of more relevance is the fact that export markets are also undergoing infrastructure renewal (such as in the Northeast region of the US) or infrastructure development (as in the mega cities of Latin America). This strategy involves the "bundling" together of Atlantic Canadian expertise in the design, environmental assessment, construction and monitoring of major projects in all spheres of an economy.
- *Global Resource Markets.* As infrastructure develops, Atlantic Canada's environment industries have demonstrated their ability to serve the resource extraction and processing sectors, including: oil and gas, mining, metals processing, and pulp and paper. Many Canadian companies active in these sectors are now adding properties to their portfolios in export markets, notably in developing countries. These potential clients in new markets should be a key focus of Atlantic Canada's environment industry.
- *Global Marine Markets.* One of the unique features of Atlantic Canada's environment industry is its comprehensive capacity to deal with marine issues, either to address environmental concerns generated by economic activities or in managing fee-based resource extraction and transport. For example, markets in the Americas, notably the Caribbean, Central America and maritime nations of South America have many similarities to Atlantic Canada. Identifying market opportunities in this region and around the globe for marine based technologies and services is a major potential business development area for Atlantic Canada's environment industry. It also builds on strong historical ties that already exist in some of these regions.

The challenges with all of these emerging opportunities are to identify specific opportunities and ensure that Atlantic Canada companies have the capacity to be competitive. That is, companies wanting to exploit these opportunities must be able to:

- finance the bid and completion of the project;

- provide the required in-house expertise, outside skills gained through partnerships or technology to solve the issue at hand in a cost competitive manner; and
- allocate the human resources including management staff to carry out the project on time and within budget.

As the majority of Atlantic Canada firms are small and medium sized, accomplishing this task will require more substantial alliances/consortia among regional firms to offer the skills needed, gain the necessary financing and boost overall competitiveness. As noted above these partnerships could include other firms from anywhere in Canada or foreign firms who offer unique skills. Again, the integration of project financing capacity as part of this process is of key importance.

Strategy Option #11: Leveraging Emerging Drivers

Three areas of significant growth opportunity exist on both the domestic and global fronts. These include:

- *Industrial Eco-efficiency Markets.* The resource extraction and processing industries in Atlantic Canada are large and growing. Given global pressures on resource commodities prices, mining, oil and gas and pulp and paper companies are continually exploring ways in which to produce products more efficiently. One way of approaching this is through eco-efficient technologies which produce environmental and economic dividends through the more effective use of energy and other resources, and the reduction of waste by-products. Given the win-win of such a strategy, it deserves serious consideration for implementation throughout the region to improve the overall competitiveness of environment industry companies and industry at large.
- *Climate Change Markets.* This report notes the critical role that climate change forces are playing in shaping environmental markets. Atlantic Canada has unique strengths in this area, such as renewable energy and energy efficiency. However, this market is subject to continued technology innovation as there is a major attempt to improve the overall efficiency of technologies in either consuming energy or generating electricity.
- *Health and Environment Markets.* As noted previously in this report, health drivers magnified by associated economic risks and benefits and public perceptions are increasing the demand for cleaner and healthier environmental solutions domestically and around the globe. This is primarily driven by our increasing understanding of the link between pollution and health issues, rising health costs, and a continuous evolution of corporate concern regarding liability and risks.

The challenge in exploiting these markets is threefold. On the one hand, expertise and technological solutions for these problems are present in niche areas but very limited in Atlantic Canada at this time, particularly with respect to air pollution prevention and control. Secondly, there is a general lack of knowledge among most Atlantic Canada firms about what is driving environmental markets outside the region, and in some cases inside individual provinces. This has a profound impact on competitiveness, as companies need to adapt to the changing marketplace. Thirdly, local environmental policy in some areas is stagnant or unclear, particularly in emerging issues such as climate change. To address these challenges, it is recommended that the strategies noted elsewhere in this report be implemented along with the following actions:

- Action 1.** Identify and engage companies within the region that are strong in these areas and establish means to encourage their growth through various strategies such as those listed throughout this section. For example, put together special marketing packages profiling industry strengths in key market areas such as climate change or "marine solutions".
- Action 2.** Encourage companies to profile the health, climate change (e.g. tonnes of CO₂ reduced), and efficiency (e.g. reduced energy costs) benefits in the application of their technologies and services to industry buyers.
- Action 3.** Work collaboratively with the Ministries of Health to develop a policy framework which promotes clean air in the provinces and possibly greenhouse gas (GHG) reduction.
- Action 4.** Work with the municipalities, many of which are actively involved in the National Climate Change process, to develop GHG reducing strategies that include the implementation of local solutions.
- Action 5.** Work collaboratively with the federal government to promote R&D incentives for companies that provide technological solutions to climate change, health issues such PM2.5 and ozone, or that increase efficiencies in specific industries.
- Action 6.** Inform the health and/or environment sector NGOs, particularly environment health networks (e.g. Lung Association, Provincial Public Health Associations, Asthma Society of Canada, Canadian Environmental Network, etc.), of the benefits of Atlantic Canada environmental technologies.

Strategy Option #12: Targeting The Americas First

While Europe and Asia should be targeted in terms of country specific or niche markets, there clearly appear to be compelling reasons to make North and South America the prime target for the Atlantic Canada environment industry. Specifically:

- there are major opportunities in the Americas for sectoral strengths of Atlantic Canada (e.g. resource, infrastructure, marine);
- the existing Canada-US-Mexico economic relationship through NAFTA and the movement towards a continental free trade zone provides significant benefits;
 - the cultures are very compatible; and
 - there have been a multitude of Canadian and Atlantic Canada successes entering markets from the northern tip of Alaska to the southern tip of Chile. Thus primary geographic market targets for Atlantic Canada should be:
- *Central Canada.* Many Atlantic Canada environmental companies sell products and services to central Canadian markets. Together these regions represent almost 2/3 of the domestic market for environmental products and services. As previously noted, there are also unique drivers which will increase the size of these markets. It is important, at a minimum, for the Atlantic Canada industry to maintain its market share in Ontario and Quebec, and preferably through more aggressive marketing strategies to see market share rise. It is recognized that local competition can be tough and entrenched. However, Atlantic Canada firms can offer competitively priced skills, expertise and technologies in sectors such as forestry and the food industry.
 - *Northeast US.* From the survey and interviews conducted for this study, it appears that the Atlantic Canada environment industry has had mixed results in US markets. There have been continued concerns about the competitiveness of Atlantic Canadian companies south of the border due to complexity of regulations and existence of local competition. However, the fact is that Canada's exports to US markets have doubled over the last 10 years since the introduction of the NAFTA trade agreement, primarily due to open borders and a low Canadian currency. It is this price competitiveness that underlies the opportunity available to Atlantic Canadian companies in the Northeast US markets. This market includes an active resource sector, is undergoing a period of infrastructure renewal and is in close proximity to Atlantic Canada. Therefore, there are compelling reasons for Atlantic Canada to develop a sound and targeted US market penetration strategy, which would primarily assist SMEs to develop their export potential. Once a company has this "close to home" experience, they will be better able to target more distance markets.
 - *Caribbean and Latin America.* South of the US represents the most promising area for export growth for Atlantic Canada environmental firms over the next decade. Well established relationships, large resource and infrastructure projects, projected market growth of 5% plus in most regions, active development focus for CIDA, IADB and the World Bank, and a number of similar coastal community concerns make this a prime target.

To assist companies better identify and access market opportunities in these markets it is recommended that the following actions be considered:

- Action 1.** Industry should seek to position themselves in these markets through existing customers which operate in those regions. For example, many large natural resource companies operating in Atlantic Canada also have operations in Chile, Argentina, etc.
- Action 2.** Encourage special showcase events at large conferences or future trade missions to Latin America that promote Atlantic Canada technologies to potential US and Latin American buyers. In addition, seminars that provide support or information on doing business in these countries should be strongly supported.
- Action 3.** Ensure Trade Officers in the US, Caribbean and South and Central America are fully aware of the environmental supply capacity that exists in Atlantic Canada. It is also important that industry continue to liaise, where possible, with executing agencies in these countries (e.g. US Department of Commerce and Environmental Protection Agency).
- Action 4.** Work to communicate to US buyers through Canadian diplomatic representation that the "buy US" policy of our southern neighbours should not unfairly penalize Canadian exports under NAFTA.

Strategic Goal D: Enhancing Technology Innovation and Development

Goal Statement: Atlantic Canada environment industries will enhance their capacity to engage in technology innovation and development through an action plan focused on the substitution of environment related product imports, demonstrating and profiling local technologies and developing a capability in urban environmental management.

Strategy Option #13: Enhancing Product Import Substitution

Most of the environmental and clean energy goods used in Atlantic Canada are imported from outside the region. In fact, on trade balance, the sector is in a negative position. This reduces the potential economic activity which could take place in Atlantic provinces. Most foreign technology companies are large well-established companies with strong domestic bases and the capital and resources to penetrate a wide variety of export markets.

- Action 1.** Identify potential areas of product import substitution, either involving local production of products or local assembly and manufacturing of product parts to add value for the region. Target and assist niche based companies which have some basis of competitive strength.
- Action 2.** Target individual companies for specific solutions supplied by Atlantic Canada environmental companies; promote the current price/value competitiveness of these firms to potential buyers.
- Action 3.** Enhance municipal, provincial and federal government procurement policies to purchase "Canadian" and more importantly locally produced products and services.

Strategy Option #14: Demonstrating and Profiling Local Technologies

Buyers of environmental technologies are looking for solutions that have been proven and tested, providing the benefits that companies claim. To make buyers more aware of the solutions available from Atlantic Canada, and to provide buyers with the high level of comfort needed to make a decision, it is recommended that a number of Profiling and Demonstration activities be carried out.

- Action 1.** Provide complimentary copies of environmental company directories to major buyers in both domestic and foreign markets.

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- Action 2.** Work with the Environmental Affairs Branch at Industry Canada to update and distribute the CES (Canadian Environmental Solutions) CD ROM and Website of national environmental firms.
- Action 3.** Encourage Industry Canada to develop an "Atlantic Canada Pavilion" on the CES CD ROM. This would act as a one-stop shop highlighting the skills and expertise in Atlantic Canada.
- Action 4.** Work with interested corporations who may be willing to invest in or demonstrate (on a joint basis) an emerging environmental technology. This is becoming more prevalent within the climate change arena as companies attempt to reduce their risk through diversification and investments in ventures that reduce GHGs.
- Action 5.** Work with the National Research Council to link more Atlantic Canada companies with the Industrial Research Applications Program (IRAP), one of the federal government's most successful programs in bringing high caliber talent into industry. Technologies Partnerships Canada is another program that should be exploited.
- Action 6.** Develop or expand existing environment industry R&D networks between universities, colleges and research institutions to give Atlantic Canada companies more access to the diverse skills in the region. For example, perhaps a joint government-industry-university Center of Excellence could be established that is devoted to R&D in a specific environmental area (e.g. air pollution prevention & control).
- Action 7.** Establish an Environmental Technology Centre of Excellence for Canada linking academic capacity and knowledge with industry to develop new and more competitive clean energy and environmental technologies. Ensure that Atlantic Canada institutions play a primary role in this Centre.
- Action 8.** Provincial and municipal governments should be encouraged to employ and/or demonstrate local environmental technologies which can then be promoted on the international and domestic front as companies venture out of the region.
- Action 9.** Establish an Atlantic Canada Demonstration Program which would supplement current activities of Technology Partnerships Canada and IRAP; although they both provide some support for technology demonstrations, very little of this money is being directed to Atlantic Canada environmental companies.

Action 10. Use the local, regional, national and international business media to publicize the successes of Atlantic Canada companies. Options include mainstream publications and tailored ones such as Science and Engineering, Environmental Business Canada, and Hazwaste.

5.4 Regional and Provincial Action Plan

The above Strategies and Strategic Options identify major opportunities available to the Atlantic Canada environment industry to increase exports, build local jobs and economic activity, enhance the development and use of innovative technologies, and sustain industry growth. The key to these benefits however will be the leadership demonstrated and the action taken among all Atlantic Canada environment industry stakeholders. Increased and sustained cooperation will make the environment industry vision a reality.

Existing members of the Atlantic Canada Environment Industry Steering Committee who provided input and direction towards the development of this report will be key players in the drive to implement the Atlantic Canada Environment Industry Strategy. Agencies and organizations assuming a key stakeholder role in this process include:

- Atlantic Canada Environment industry Associations - NBEIA, NSEIA, NEIA and PEI's association should one be established in the future
- Provincial departments responsible for economic development
- Provincial departments responsible for environment
- Provincial departments responsible for health
- Municipal Associations
- Atlantic Canada Opportunities Agency (ACOA)
- Department of Foreign Affairs and International Trade (DFAIT)
- Industry Canada
- Environment Canada
- NRCan
- HRDC
- Export Development Corporation
- Canadian Commercial Corporation

Some of the ancillary organization which should be considered as potential resources to the key stakeholders listed above include:

- Canadian Environment industry Association
- SAGIT
- American Waste Management Association
- Industrial (i.e. Buyer) Associations
- Atlantic Provinces Economic Council (APEC)
- Conference of Atlantic Premiers
- CCHREI
- Canadian International Development Agency

- Transport Canada
- Agricultural Canada
- Americana organizers and the Globe Foundation
- IADB and the World Bank

The first step in the implementation process will be to engage key stakeholders to identify the priority Strategic Options and required actions, develop appropriate implementation plans, assess and gain the level of resource required, and assign roles and responsibilities to move the Strategy forward. An Atlantic Canada Environment Industry Forum would provide the appropriate venue to initiate this process. Individual provincial forums would follow, allowing dialogue between government, industry and industry association stakeholders. These partnerships will continue to guide the Strategy in the years to come.

The following Regional and Provincial Action Plan summarizes the Strategic Goals and the Strategy Options outlined above, in conjunction with suggested stakeholders. In the Plan a list of potential stakeholders to successfully implement each of the proposed actions is suggested, along with the recommended lead organization which will initiate the action.

Regional and Provincial Action Plan¹⁰

Action Item	Stakeholders
A. BUILDING CAPACITY AND ENHANCING COMPETITIVENESS	
Strategy Option #1: Enhancing the Skills of Existing Personnel	
1. Establish formal or informal groups of local champions.	<ul style="list-style-type: none"> · NBEIA, NSEIA, NEIA¹¹ · local industry representatives · Local Chambers of Commerce · ACOA · Industry Canada
2. Establish a "mentorship" program within the environment industry community to develop skills of future leaders and managers (similar to #1).	<ul style="list-style-type: none"> · NBEIA, NSEIA, NEIA · CCHREI · Local Chambers of Commerce · ACOA
3. Work with companies to help them establish internal human resource development plans for succession planning and to develop younger employees.	<ul style="list-style-type: none"> · CCHREI · NBEIA, NSEIA, NEIA · HRDC · Atlantic Canada Economic Council
4. Work with various agencies including local colleges and universities to assess the need for, and develop practical, hands-on training programs or manuals for business leaders and more junior staff.	<ul style="list-style-type: none"> · CCHREI · HRDC · Institute for Environmental Research · NRC · CEIA, NBEIA, NSEIA, NEIA
5. Identify how Atlantic Canadian companies can participate in a "Mid-Career Program" supported by HRDC and executed by CCHREI.	<ul style="list-style-type: none"> · NBEIA, NSEIA, NEIA · industry representatives · CCHREI · HRDC
Strategy Option #2: Understanding Customer Needs	
1. Set-up a range of face-to-face meetings or small seminars between environmental companies and industrial buyers to allow suppliers to gain a better understanding of specific customer needs.	<ul style="list-style-type: none"> · NBEIA, NSEIA, NEIA, CEIA · Provincial environmental departments · Representatives from large "buyer" industry associations · Industry Canada · ACOA
2. Establish a Web-based clearinghouse that posts technology requirements, potential contracts or other major opportunities by major industries.	<ul style="list-style-type: none"> · ACOA · Industry Canada · Provincial environmental departments · NBEIA, NSEIA, NEIA · Representatives from large "buyer" industry associations

¹⁰ The potential stakeholders have not been confirmed. The following action plans identify possible partners. These will be determined on a province by province basis through stakeholders consultation.

¹¹ It is recognized that a formal environment industry association for PEI is currently being established. Until a formal organization is set-up, appropriate PEI industry representatives could participate in the implementation of any actions requiring environment industry association support.

Strategy Option #2: Understanding Customer Needs (continued)	
3. Set-up small missions to major industry sector (e.g. forestry industry, or petroleum industry) trade shows in Canada and the US.	<ul style="list-style-type: none"> • ACOA • Industry Canada • Provincial environmental departments • NBEIA, NSEIA, NEIA • Representatives from large "buyer" industry associations • NRCan • Environment Canada
4. Support special environmental technology showcase events in conjunction with major industry trade shows.	<ul style="list-style-type: none"> • Provincial environmental departments • Industry Canada • NBEIA, NSEIA, NEIA • Representatives from large "buyer" industry associations
5. Host special events that bring interested environmental companies together with representatives of CIDA, IADB, and other large development agencies.	<ul style="list-style-type: none"> • NBEIA, NSEIA, NEIA, CEIA • DFAIT • CIDA • IADB, EB, WB and other IFIs • ACOA
Strategy Option #3: Understanding Potential Export Markets	
1. Face-to-face breakfast meetings, small seminars, etc. could be hosted to bring interested environmental companies together with individuals knowledgeable about specific geographic markets.	<ul style="list-style-type: none"> • DFAIT • CEIA, NBEIA, NSEIA, NEIA • Industry Canada • provincial environmental departments • ACOA
2. Assist interested and export-ready companies attend missions to geographic markets that offer identified opportunities.	<ul style="list-style-type: none"> • CEIA, NBEIA, NSEIA, NEIA • Industry Canada • DFAIT • Provincial environmental departments • ACOA
Strategy Option #4: Attracting Skilled Personnel	
1. As part of the economic development materials, prepare a specific presentation package on Atlantic Canada's (or individual provinces) environment industry.	<ul style="list-style-type: none"> • ACOA • CCHREI • HRDC • CEIA, NBEIA, NSEIA, NEIA • provincial environmental and economic development departments
2. Continue to support the strong local academic programs that currently are offered in the region.	<ul style="list-style-type: none"> • Local academic institutions • CCHREI • HRDC • CEIA, NBEIA, NSEIA, NEIA • provincial environmental and economic development departments • ACOA
3. Encouraging graduates to stay at home.	<ul style="list-style-type: none"> • NBEIA, NSEIA, NEIA • Provincial environmental and economic development departments • ACOA • Atlantic Canada Economic Council • CCHREI
B. LEVERAGING CAPITAL FOR EXPANSION	

Strategy Option #5: Enhancing Investor Relations	
1. Assist in identifying and engaging regional private investors interested in putting their money into local environmental firms.	<ul style="list-style-type: none"> · Atlantic Canada Economic Council · ACOA · Canadian Investment Dealers Association · provincial economic development departments · Industry Canada (TPC) · CEIA, NBEIA, NSEIA, NEIA
2. Work with key brokerage houses to have them introduced to Atlantic Canada environmental companies seeking capital.	<ul style="list-style-type: none"> · ACOA · Canadian Investment Dealers Association · provincial economic development departments · Industry Canada (TPC) · Atlantic Canada Economic Council · CEIA, NBEIA, NSEIA, NEIA
3. Work with brokering agencies in the US that profile environmental companies to investors to introduce more Atlantic Canada companies to venture investors south of the border.	<ul style="list-style-type: none"> · Canadian Investment Dealers Association · provincial economic development departments · ACOA · Industry Canada (TPC) · Atlantic Canada Economic Council · CEIA, NBEIA, NSEIA, NEIA · US Investment Dealers Association
4. Work with federal departments such as DFAIT or Industry Canada to identify a list of larger international investment funds with green or ethical orientations.	<ul style="list-style-type: none"> · Canadian Investment Dealers Association · Industry Canada (TPC) · DFAIT · CEIA, NBEIA, NSEIA, NEIA · ACOA
5. Put together a promotional package for financial institutions on the market potential of key Atlantic Canada technology companies.	<ul style="list-style-type: none"> · ACOA · CEIA, NBEIA, NSEIA, NEIA · provincial environmental departments
Strategy Option #6: Tapping into Export Financing	
1. Holding seminars or workshops, similar in format to those noted in Strategy #2, Action #5, of what financial support is available through various government agencies.	<ul style="list-style-type: none"> · CEIA, NBEIA, NSEIA, NEIA · ACOA · EDC · Industry Canada · DFAIT · Provincial environmental departments
2. Enhance the awareness of Ottawa or regionally-based government officials, and members of the Canadian Executive Directors' offices in the IFIs of Atlantic Canada strengths and interests.	<ul style="list-style-type: none"> · DFAIT · ACOA · Environment Canada · CIDA · IADB, WB, and other IFIs · Industry Canada · CEIA, NBEIA, NSEIA, NEIA

Strategy Option #6: Tapping into Export Financing (continued)	
3. Assist local/regional companies identify potential projects and assemble the required team to compete competitively.	<ul style="list-style-type: none"> · Industry Canada · CEIA, NBEIA, NSEIA, NEIA · ACOA · CIDA · IADB, WB, and other IFIs · Industry Canada · DFAIT · NRCan
C. TARGETING MARKETS FOR GROWTH	
Strategy Option #7: Driving Domestic Markets	
1. Develop a strong legislative framework development process which illustrates to the industry where regulation is going.	<ul style="list-style-type: none"> · Provincial environmental departments · ACOA · NBEIA, NSEIA, NEIA
2. Track changes to policy that are occurring in other jurisdictions across North America and Europe.	<ul style="list-style-type: none"> · CEIA, NBEIA, NSEIA, NEIA · Provincial environmental departments · DFAIT · Industry Canada · Environment Canada · Health Canada · ACOA
3. Be aware of national and international "hot buttons" that may lead to regulatory changes or increased support.	<ul style="list-style-type: none"> · Industry Canada · CEIA, NBEIA, NSEIA, NEIA · Provincial environmental departments · DFAIT · Environment Canada · Health Canada · ACOA
Strategy Option #8: Leveraging Local Skills Through Strategic Alliances	
1. Enhance local, regional and national cooperation between Atlantic Canada firms and those organizations that provide complimentary technologies and services to meet an identified demand.	<ul style="list-style-type: none"> · CEIA, NBEIA, NSEIA, NEIA · DFAIT · Industry Canada · Provincial environmental departments · Environment Canada · NRCan · ACOA
2. Enhance cooperation among provincial, regional and federal stakeholders who promote the Atlantic Canada industry.	<ul style="list-style-type: none"> · Provincial governments · Industry Canada · Environment Canada · NRCan · ACOA · CEIA, NBEIA, NSEIA, NEIA

Strategy Option #8: Leveraging Local Skills Through Strategic Alliances (continued)	
3. Help companies identify effective foreign partners, who can provide a foot into the market, open doors and assist in developing market opportunities that will lead to sales.	<ul style="list-style-type: none"> · DFAIT · Industry Canada · Environment Canada · ACOA
Strategy Option #9: Exploiting Opportune Export Markets	
1. Market assessments be conducted or financed in part by provincial and regional organizations of foreign markets.	<ul style="list-style-type: none"> · DFAIT · Industry Canada · CEIA, NBEIA, NSEIA, NEIA · Provincial trade and investment departments · ACOA
2. Have an intense 2-3 day educational program for local companies seeking to penetrate international markets.	<ul style="list-style-type: none"> · Industry Canada · ACOA · NBEIA, NSEIA, NEIA · Provincial trade and investment · Environment Canada · DFAIT
3. Profile export successes on trade missions, to Canadian Trade Commissioners and foreign contacts in targeted countries.	<ul style="list-style-type: none"> · Industry Canada · NBEIA, NSEIA, NEIA, CEIA · DFAIT · ACOA · Provincial trade and investment departments
4. Start to develop a coordinated export strategy.	<ul style="list-style-type: none"> · Provincial trade and investment departments · DFAIT · ACOA · CEIA, NBEIA, NSEIA, NEIA · Industry Canada · Environment Canada · NRCan
5. Inform Canadian Trade Officers in targeted countries of the skills and expertise of export-ready Atlantic Canada environmental companies.	<ul style="list-style-type: none"> · DFAIT · Industry Canada · Provincial environmental departments · ACOA · NBEIA, NSEIA, NEIA · Environment Canada
6. Consider the role of SAGIT in the expansion and growth of Atlantic Canada's environment industry.	<ul style="list-style-type: none"> · Industry Canada · DFAIT · Provincial trade and investment departments · ACOA · NBEIA, NSEIA, NEIA

Strategy Option #9: Exploiting Opportune Export Markets (continued)	
7. Work closer with GLOBE and Americana to forge relationships with potential buyers or partners and heighten the profile of Atlantic Canada companies.	<ul style="list-style-type: none"> • The Globe Foundation of Canada • Provincial trade and investment departments • Americana • Industry Canada • Environment Canada • NRCan • ACOA • CEIA, NBEIA, NSEIA, NEIA
Strategy Option #10: Focusing Efforts Around Sectoral Strengths	
1. Activities consistent with those outlined in strategies 5, 6, 8 and 9.	<ul style="list-style-type: none"> • see above strategies
Strategy Option #11: Leveraging Emerging Drivers	
1. Identify companies within the region that are strong in emerging growth areas and establish means to encourage their growth through various strategies such as those listed throughout this section.	<ul style="list-style-type: none"> • NBEIA, NSEIA, NEIA • Provincial environmental , trade and investment departments • ACOA • Industry Canada
2. Encourage companies to profile the health, climate change, and efficiency benefits in the application of their technologies and services to industry buyers.	<ul style="list-style-type: none"> • NBEIA, NSEIA, NEIA • Industry Canada • Provincial environmental departments • ACOA
3. Work collaboratively with the Ministries of Health to develop a policy framework which promotes clean air in the provinces (and possibly greenhouse gas [GHG] reduction).	<ul style="list-style-type: none"> • Provincial Ministries of Health • Provincial environmental departments • Environment and Health Canada • NBEIA, NSEIA, NEIA • ACOA
4. Work with the municipalities to develop GHG reducing strategies that include the implementation of local solutions.	<ul style="list-style-type: none"> • Local Municipalities • Provincial environmental and energy departments • NRCan • Environment Canada • FCM • Climate Change Secretariat • NBEIA, NSEIA, NEIA • Environment and Health Canada • ACOA
5. Work collaboratively with the federal government to promote R&D incentives for companies that provide technological solutions to climate change, health issues such PM2.5 and ozone, or that increase efficiencies in specific industries.	<ul style="list-style-type: none"> • Department of Finance • CEIA, NBEIA, NSEIA, NEIA • NRCan • Ministry of Trade and Commerce • Environment Canada • ACOA
6. Inform the health and/or environment sector NGOs, particularly environment health networks of the benefits of Atlantic environmental technologies.	<ul style="list-style-type: none"> • Provincial environmental and health departments (CO-Lead) • CEIA, NBEIA, NSEIA, NEIA • ACOA

Strategy Option #12: Targeting the Americas First	
1. Industry should seek to position themselves in these markets through existing customers which operate in those regions.	<ul style="list-style-type: none"> · CEIA, NBEIA, NSEIA, NEIA · DFAIT · Industry Canada · Provincial environmental departments · ACOA · Environment Canada (ETAD)
2. Encourage special showcase events at large conferences such as AMERICANA 2001 and GLOBE 2000.	<ul style="list-style-type: none"> · The Globe Foundation of Canada · Provincial trade and investment departments · Americana · Industry Canada · Environment Canada · NRCan · ACOA · CEIA, NBEIA, NSEIA, NEIA
3. Ensure Trade Officers in the US, Caribbean and South and Central America are fully aware of the environmental supply capacity that exists in Atlantic Canada. This is similar to Action #5, Strategy #9, however, more focused with respect to potential geographic markets.	<ul style="list-style-type: none"> · DFAIT · Industry Canada · Provincial environmental departments · ACOA · NBEIA, NSEIA, NEIA · Environment Canada
4. Work to communicate to US buyers through Canadian diplomatic representation that the "buy US" policy of our southern neighbours cannot unfairly penalize Canadian exports under NAFTA.	<ul style="list-style-type: none"> · DFAIT · Ministry of Trade and Commerce · CEC · Provincial environmental departments · Industry Canada · Environment Canada · ACOA · CEIA, NBEIA, NSEIA, NEIA
D. ENHANCING TECHNOLOGY INNOVATION AND DEVELOPMENT	
Strategy Option #13: Enhancing Product Import Substitution	
1. Identify potential areas of product import substitution, either involving local production of products or local assembly and manufacturing of product parts to add value for the region.	<ul style="list-style-type: none"> · Provincial environmental, trade and investment departments · DFAIT · Industry Canada · Environment Canada (ETAD) · ACOA · NBEIA, NSEIA, NEIA
2. Target individual companies for specific solutions supplied by Atlantic Canada environmental companies.	<ul style="list-style-type: none"> · Provincial environmental, trade and investment departments · ACOA · NBEIA, NSEIA, NEIA

Strategy Option #13: Enhancing Product Import Substitution (continued)	
3. Enhance municipal, provincial and federal government procurement policies to purchase "Canadian" and more importantly locally-produced products and services.	<ul style="list-style-type: none"> · Municipalities · Provincial environmental, trade and investment departments · ACOA · Environment Canada · NRCan · NBEIA, NSEIA, NEIA
Strategy Option #14: Demonstrating and Profiling Local Technologies	
1. Provide complimentary copies of environmental company directories to major buyers in both domestic and foreign markets.	<ul style="list-style-type: none"> · NBEIA, NSEIA, NEIA · Buyer Industry Associations · Environment Canada (ETAD) · Provincial environmental departments · Industry Canada · ACOA
2. Work with the Environmental Affairs Branch at Industry Canada to update and distribute the CES CD ROM and Websites of Atlantic Canada firms.	<ul style="list-style-type: none"> · Provincial environmental, trade and investment departments · Industry Canada · NBEIA, NSEIA, NEIA · ACOA
3. Development of an "Atlantic Canada Pavilion" on the CES CD ROM.	<ul style="list-style-type: none"> · Industry Canada · ACOA · Provincial environmental departments · NBEIA, NSEIA, NEIA
4. Work with interested corporations who may be interested in investing in or demonstrating (on a joint basis) an emerging environmental technology.	<ul style="list-style-type: none"> · Individual corporate buyers · Environment Canada (ETAD) and TEAM · Provincial environmental and natural resources departments · Buyer Industry Associations · Industry Canada · ACOA · NBEIA, NSEIA, NEIA
5. Work with the National Research Council to link more Atlantic Canada companies with the Industrial Research Applications Program (IRAP), along with TPC.	<ul style="list-style-type: none"> · NBEIA, NSEIA, NEIA · NRC/IRAP · Industry Canada · Environment Canada (ETAD) · Provincial environmental departments · ACOA
6. Develop or expand existing environment industry R&D networks between universities and colleges, research institutions to give Atlantic Canada companies more access to the diverse skills in the region.	<ul style="list-style-type: none"> · Local academic institutions · NBEIA, NSEIA, NEIA · industry representatives · Institute for Environmental Research · NRC · ACOA

Strategy Option #14: Demonstrating and Profiling Local Technologies (continued)	
7. Establish an Environmental Technology Centre of Excellence.	<ul style="list-style-type: none"> • Industry Canada • NRC • Environment Canada (ETAD) • industry representatives • Institute for Environmental Research • CEIA, NBEIA, NSEIA, NEIA
8. Provincial and municipal governments should be encouraged to employ and/or demonstrate (pilot) local environmental technologies which can then be promoted on the international and domestic front as company venture out of the region. This is an extension of Action #3, Strategy #13.	<ul style="list-style-type: none"> • Municipalities • Provincial environmental, trade and investment departments • ACOA • Environment Canada • NRCan • NBEIA, NSEIA, NEIA
9. Establish a Atlantic Canada Demonstration Program which would supplement current activities of Technology Partnerships Canada and IRAP.	<ul style="list-style-type: none"> • Industry Canada • Industry Canada (TPC) • NRC • Environment Canada (ETAD) • industry representatives • Institute for Environmental Research • CEIA, NBEIA, NSEIA, NEIA
10. Use the local, regional, national and international business media to publicize the successes of Atlantic Canada companies.	<ul style="list-style-type: none"> • CEIA, NBEIA, NSEIA, NEIA • media • DFAIT • Industry Canada • Environment Canada (ETAD) • NRCan • industry representatives • Institute for Environmental Research

6.0 Conclusion



“Beyond the Horizon - A Strategy for Atlantic Canada's Environment Industries” sets out the major trends, market forces and business realities of the global environment industry products and services marketplace - the marketplace of the present and of the future. Client concerns surrounding risks and liabilities plus shareholder interests will play an increasing role in the manner in which environmental business is conducted. Industrial sectors are looking for enhanced productivity and superior efficiency to improve their corporate returns. The corporate image both on the local level and on a global scale is an important dimension in making supplier decisions - decisions that are shaped and steered by strategic priorities and the requirement to maximize most benefit from all expenditures.

Public concerns centered around personal health issues as well as around eco-system and natural environment pressures create pivotal points leading to consumer movements which impact corporate financial affairs. Community demand and rising company standards are paying off in “beyond compliance” business strategies and continuous improvement regimes. The call for “end-of-pipe” solutions has waned as companies focus on preventing, rather than treating, pollution.

In this high pressure market context, environmental technology and service firms have to rethink their approaches - their products and marketing strategies must be re-engineered to address the needs of specific customers. The day of the narrow technical specialist is gone as key environmental issues - such as climate change - become more complex and their potential impacts more ominous. Suppliers of environmental products and services need to have a depth of expertise in their own field coupled with the ability to pull together the required multi-disciplinary expertise to meet a client's needs.

“Beyond the Horizon” profiles the environment industries in Atlantic Canada on a regional basis and a province-by-province basis for New Brunswick, Nova Scotia, Newfoundland and Prince Edward Island. These profiles show an industry that is similar to the Canadian industry in its preponderance of small and medium sized companies who engage in a wide range of activities, particularly in the service sector. The industry relies to a large extent upon local markets and has limited export experience. It is solidly anchored in resource utilization niches, such as monitoring, remediation, wastewater expertise and technologies with a strong marine capability. Opportunities for growth are evident.

It is the analysis of regional and provincial strengths, weaknesses, opportunities and threats that lead to the Strategy itself - a strategy which is based on 14 Strategy Options

which apply to the region, but which can be variously selected for implementation by the stakeholders involved. The selection of Strategy Options will depend on stakeholder skill sets and interests, as well as the energy and resources that are available to move the industry forward.

The implementation of the Strategy for Atlantic Canada's Environment Industries is a complex undertaking. The challenges inherent in a regional strategy are significant, but for Atlantic Canada's environment industries to grow and prosper, public and private investments of time and capital are imperative. Guided by the Strategy, these investments will be well placed to make the vision of prosperity and success a reality.

Annex A
Study Methodology

Study Methodology

Overall, the study was a complex undertaking. It involved an assessment of the technology, market and business fundamentals for the Atlantic Canada environment industry which is a challenging proposition. The sector is quite diverse in terms of products and services, technology development, industrial clients and geographic markets.

In recognition of this challenge, Management by Design and its partners utilized a number of market research and analysis methodologies to produce this report including:

- S An in-depth literature search of market intelligence reports pertaining to the Atlantic region, Canadian and global environmental marketplaces. For example, each of the provinces in the Atlantic region of Canada have studied their economies in general, and their environment industries in particular, over the past several years. The individual industry associations in each of these provinces have been actively involved in this work. These studies formed an excellent baseline against which to develop a broader Atlantic Canada environment industries strategy. In addition, the project team looked at a range of market literature on environment industries, notably from *Environmental Business Canada*, *Environmental Business Journal*, *OCETA*, *BC State of the Environmental Industry Report* and other documents to get an understanding of what other jurisdictions are considering in strategic terms for their environment industries. A list of referenced documents is provided in Annex D – Bibliography.
- A supply-side market survey of environmental technology and service companies located in the Atlantic Canada region. A total of 129 firms completed the telephone survey. Collected information was consolidated with data gathered through previous surveys as well as information provided by each provincial representative on the project Steering Committee. The quantitative information gathered during this study was used to construct a regional profile as well as the provincial environment industry profiles.
- S Over 30 key informant interviews with buyers, suppliers, industry associations and government representatives. These interviews are summarized in Annex B. These interviews highlighted more detailed information and particularly future trends which should be referenced in the course of the SWOT and the future business and competitiveness strategy for Atlantic Canada's environment industries.
- Informal consultations with Steering Committee representatives and environmental leaders within industry. This information was consolidated with numerous other interviews which have been completed for other similar studies and in the production of Canada's leading strategic environmental intelligence newsletter, *Environmental Business Canada*.

- S Analysis of data and information to assess market trends and drivers, identify competitive strengths, weaknesses, opportunities and threat to Atlantic Canada environmental companies. While the data gathering aspects of the study were time consuming, an enormous amount of time and effort went into the final value-added analysis element of the project. The analysis prompted the development of the strategic themes and directions.

Annex B
Summary of Key Informant Interviews

Summary of Demand-Side Interviews

Interviewees ¹	Strengths/Opportunities	Weaknesses/Threats
Large Forestry/Pulp and Paper Company	<ul style="list-style-type: none"> • Monitoring suppliers and technologists of high quality • Air issues (PM 2.5, NOx, etc.) - monitoring, reduction of emissions • Solutions that meet higher environmental standards, reduce liabilities • Future - climate change and endocrine modulators • pollution prevention technology to reduce BOD levels another 10% 	<ul style="list-style-type: none"> • Industry appears slightly behind rest of North America with respect to leading edge technologies • Stack testing tends to be higher priced from AC firms than those outside region
Oil Refinery	<ul style="list-style-type: none"> • Solutions that minimize risk • Air emissions (PM 2.5, ozone, benzene, NOx standards with respect to natural gas production and odour reduction) • sulphur reduction in fuels • Long-term - climate change • Wastewater treatment plant upgrades 	<ul style="list-style-type: none"> • Do not use AC companies for environmental monitoring of air or water • Technologies for application in oil refinery facilities typically purchased outside region • Like to deal with companies with deep pockets and resources
Mining and Minerals Company (site closing)	<ul style="list-style-type: none"> • Technologists who perform sampling are good and tend to use small local firms for smaller jobs requiring technologists • Technologies/solutions that improve water quality (pH and heavy metals) 	<ul style="list-style-type: none"> • Industry tends to be small and lack the internal resources and expertise required to complete large projects • Single sourcing is becoming the norm for facilities across NA • New technologies researched in-house • Use consultants from Ontario because can not find a large company in AC that can provide services required in geotechnical, ecological and geochemical consulting) • Technologies purchased through hired consultants who are often from outside region
Large Energy/Resource Company (construction phase)	<ul style="list-style-type: none"> • Local firms very strong on marine side, acid rock drainage, environmental impact assessment, niche technologies, remote sensing and acoustical expertise • Strong educational institutions/R&D centres • Short-term: Environmental assessment, monitoring, operational compliance, and community initiatives • Longer-term: technology to reduce oil in mud and cuttings to less than 1%, climate change, fugitive emissions 	<ul style="list-style-type: none"> • Weak in the areas of high-level risk assessment, air monitoring and emission control • Larger consultants tend to bring small companies into the bid for specialized expertise but then do not use them during the actual project • Should be a greater emphasis on integrated solutions that use niche technologies in conjunction with consulting services
Large Energy/Resource Company (construction phase)	<ul style="list-style-type: none"> • Strong on marine side, have specialized expertise in niche areas • Solutions that identify and address long-term impacts of projects, and minimize/prevent waste at the source • environmental effects/compliance/ecosystem monitoring • Significant opportunity as project shifts from design to operation 	<ul style="list-style-type: none"> • Suppliers must be able to meet the deliverable/objective of the project within the established time frame
Chemical Company	<ul style="list-style-type: none"> • Heighten focus on cradle to grave responsibility • Short-term: solutions that address mercury emissions to air, mercury and chromium in sludges, heavy metals, cadmium and magnesium in wastewater • Long-term: ozone-related issues 	<ul style="list-style-type: none"> • No hazardous waste management facility in region • Looking harder for proof of competence and highly qualified/certified consultants

Large Energy/ Resource Company	<ul style="list-style-type: none"> • Strengths - marine environmental monitoring equipment, meteorological/oceanographic consulting, chemical and microbiological analysis • Emerging trends: waste discharges and air quality 	
Forestry Product Company	<ul style="list-style-type: none"> • Strong analytical / technical services • Shorter-term: PM 2.5 and PM 10, VOCs, and effluent colour • Long-term: climate change • Will be outsourcing more environmentally-related tasks (e.g. monitoring/surveys/ modeling, analytical work, design engineering) 	<ul style="list-style-type: none"> • Design engineering relating to their industry emission and effluent control is not as strong as other key forestry centres (Quebec and BC) • Small market size is a limiting factor • No specific regional regulatory changes expected
Agricultural Product Enterprise	<ul style="list-style-type: none"> • Short-term: Water use and aqueous effluent is main issue, but solids disposal becoming a major concern • Long-term: nutrients and organic loading 	<ul style="list-style-type: none"> • No specific regulatory changes foreseen

Summary of Supply-Side Interviews

Interviewees ²	Strengths/Opportunities	Weaknesses/Threats
Large Service Firm	<ul style="list-style-type: none"> Highly qualified and strong niche players, some of which have innovative technologies Strong in oceanic work and offshore developments Government regulators taken a very open approach to new technologies and approaches to environmental solutions Need for higher value services and sophisticated management approaches that integrate environmental aspects into the risk base foundation of the business planning process Niche opportunities in air quality, public health and safety and factors affecting food chain (e.g. drinking water) 	<ul style="list-style-type: none"> Gaps in the high-end services provided for air and health and safety (but not low end) Small localized market means no critical mass, industry fragmented and provinces take different approaches compounding problem No mechanisms to establish critical mass/strategic partnerships, etc. to compete more effectively outside of region Market is generally mature in all industrialized countries except for niche areas where specialized technologies and services required. But competition is very strong Shift away from command and control to advance planning, management based systematic approaches to sustainability and pollution prevention Government regulators require upgraded skills and to enforce regulations more consistently
Medium-sized Technology Company	<ul style="list-style-type: none"> A number of well-positioned companies with specialized expertise focusing on industry-specific problems 	<ul style="list-style-type: none"> A gap in technology - many companies provide services without niche technology. This also stems from lack of innovation and R&D in many companies Many companies lack the awareness or business skills to tap available resources (IRAP, TPC, etc.) and create a solid business plan for growth A collective collaboration between provincial environment industries is lacking (mentality of haves and have nots) Big projects are the mainstay of AC environment industry (also strength/opportunity) Export markets are driving growth not domestic markets Too many separate export strategies (feds, prov., industry assoc, etc.)
Small High-tech Environmental Technology Company	<ul style="list-style-type: none"> Highly skilled workforce (but lack of adequate skills because of drain on US) A few very successful firms with specialized expertise 	<ul style="list-style-type: none"> Firms generally small and do not have a long-term vision or business plan for the future Disconnect between local consulting firms and local technology companies - do not promote local technologies)
Mid-sized Environmental Products and services Company	<ul style="list-style-type: none"> A number of strong leaders in the region who have capabilities and niche technologies who can compete in the global marketplace (e.g. wastewater technologies, oceanic expertise, industry-specific services to name a few) Rural background and mentality of local firms provides an advantage when penetrating markets in many emerging economies Good university/college system which turns out a lot of good technical people 	<ul style="list-style-type: none"> Lack of business depth (business affairs, marketing, etc.) within many of the local companies R&D activities not sustained at sufficient levels in many cases because lack of resources Government response to create jobs by bringing outside firms into the region rather than focusing more efforts on local expertise Provinces do not collaborate and tend to favour local firms over other firms located in region Many companies not focused
Small Environmental Engineering Firm	<ul style="list-style-type: none"> Indoor air offers opportunity in shorter-term and endocrine modulators may be an issue to watch over the longer time period Clients wanting meet higher standards (e.g. ISO 14,000) 	<ul style="list-style-type: none"> Small local market Intense competition Environmental issues are no longer a top priority to general public

Small Waste Processing Firm	<ul style="list-style-type: none"> • Niche expertise 	<ul style="list-style-type: none"> • Small local market
Small Engineering Company	<ul style="list-style-type: none"> • Increased levels of awareness regarding potential risks and liabilities (e.g. ability to borrow from financial institutions) of not mitigating specific environmental problems 	<ul style="list-style-type: none"> • Size and internal resources (expertise, breadth of technologies, etc.) of companies in general tends to be insufficient to meet current demands • Small local market is small
Environmental Monitoring & Analytical service	<ul style="list-style-type: none"> • Clients are raising their internal environmental standards, but at the same are requiring higher qualified firms (threat) 	<ul style="list-style-type: none"> • Regional market size is limiting • Changes in buyer's requirements apparently stem from cost-cutting trends and down-sizing in-house capabilities • Larger clients are contracting out more services (opportunity) but looking for one-stop shops, turnkey services and fast turnarounds
Waste Management Services Company	<ul style="list-style-type: none"> • Opportunities include climate change, ISO 14,000, private sector projects in the waste management field, consulting engineering (design./build) 	<ul style="list-style-type: none"> • High cost of international marketing and government tender evaluation process • No new regulatory issues foreseen • Competition becoming more intense

Annex C
Atlantic Canada - Economy

Atlantic Canada Economy

A number of economic studies have been commissioned by the four Atlantic provinces, each of which outlines a number of the unique characteristics of the provincial economies. The studies also tend to provide insights and projections of the local economy including opportunities for growth. A recent study prepared by ACOA entitled, "State of Small Business and Entrepreneurship in Atlantic Canada" presents discussion around a number of points relevant to the current study. Some key points are summarized below for context:

- Natural resources in Atlantic Canada provide the foundation for the region's economy. These industries and their associated processing activities account for almost half of the output in the goods-producing industries in Atlantic Canada and also generate significant economic spin-offs in the rest of the economy through the intermediate purchase of products and services. The region's exports are also dominated by natural resource products. Major commodity exports include wood pulp, newsprint, coated paper, lumber, fish products, potatoes, gasoline and fuel oil, iron ore, lead, zinc, potash and tires. Exports to the United States represent over two-thirds of total foreign exports. Other major markets include Western Europe and Japan. The resource industries are expected to continue to stimulate economic activity in the region. New mineral discoveries, offshore energy development, aquaculture and ocean industries all represent continued utilization of the region's natural resources.
- Despite the recent growth among the various traditional sectors and diversification of the economy into new areas, there are major challenges that need to be addressed to reduce regional disparity. Low productivity levels remain a problem with improvements being hindered by the slower rate of advanced technology adoption, low levels of research and development and a less educated work force.
- Real GDP in the region increased by 1.5%, up from a gain of 0.8% in 1996. Economic growth in the region was led by increased output in the manufacturing, transportation and communication industries. Despite the stronger rate of growth, it was less than the 3.5% increase in real GDP registered for the Canadian economy. This performance, relative to the national economy, is a continuation of the slow growth trend that has occurred since the 1990 recession. Over the 1991-1997 period, real GDP in Atlantic Canada increased by an average of 0.9%, compared to 1.8% for Canada.
- Private and public investment increased by 9.1% in the region in 1997, while investment for all of Canada increased by 11.6%. Investment in the region was supported by a 12.1% increase in private sector investment, while public sector investment fell by 2.3%. Regional investment in machinery and equipment increased by 22.6%, while investment in construction increased by 3%. The gain in private sector investment was a result of increased capital expenditures in the mining and

manufacturing industries. Capital expenditures in manufacturing increased by 14%, mainly due to pulp and paper investment.

- The value of foreign exports in Atlantic Canada increased by 3.2% during 1997, compared with a 7.6% increase for Canada. The gain in exports in the region was led by an increase in the export of mineral products.
- In recent studies, Atlantic Canada has been identified as a very positive investment location for enterprises considering new operations. In terms of the competitiveness of Atlantic Canada products and services both nationally and internationally, the region faces a number of challenges to improving its competitive position in the global marketplace. Studies done for ACOA on these issues specify these as:
 - ▶ A high rate of unemployment,
 - ▶ decelerating population growth,
 - ▶ the out-migration of highly educated young people,
 - ▶ In the technology area – comparatively low rates of innovation and technology adoption,
 - ▶ Low level of private sector investment in research and development and related, and
 - ▶ human resources.

In addition, Atlantic Canada needs to:

- ▶ diversify its export products, services and markets,
- ▶ increase access to equity capital, and
- ▶ improve the preparedness of the workforce in the region, including those in management positions.

Atlantic Canada Small Businesses

Small businesses provide a critical foundation for economic development in Atlantic Canada. The ACOA resource document "State of Small Business and Entrepreneurship in Atlantic Canada 1998", gives a detailed overview of small businesses within the region, providing a context from which to examine Atlantic Canada environment industries.

Specifically, the report noted that Atlantic Canada is the leader nationally in new business start-ups and in net retention rate of new businesses. From statistics available for 1995, close to 80% of all Atlantic Canada firms had five employees or fewer and nearly 95% of these businesses employed less than 100. The number of firms in the "small" category was both highest for entrants as well as exits. Over a six year period, this category accounted for almost all increases in the total number of Atlantic Canada firms. During this time frame, the number of medium-sized and large firms achieved only modest increases. Of interest to governments and planners is the finding that very few small firms entered larger size categories over time indicating that although small businesses may be prosperous in the region, internal growth was generally the exception rather than the norm.

The reasons for this lack of growth are not entirely clear, but the ACOA study presents a number of possibilities:

- Small businesses tend to have somewhat restricted access to the financial and human resources needed for expansion.
- Many small firms feel constrained by the size of local markets and find it difficult to see beyond local boundaries.
- During much of the period under review, the region experienced tough economic times.
- Finally, many small business owners choose to remain small and have no growth aspirations.

These explanations are in line with the responses obtained from the current surveys and the general findings of many environment sector reports which are assessing a specific segment or geographic sector within Canada's environment industry.

Annex D
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