

# Sustainable Technology Sector

Opportunities for Investment, Talent and Enterprise



Ministry of  
Economic Development



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PARIS

BEIJING

SEOUL

TOKYO

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British  
Columbia

Canada

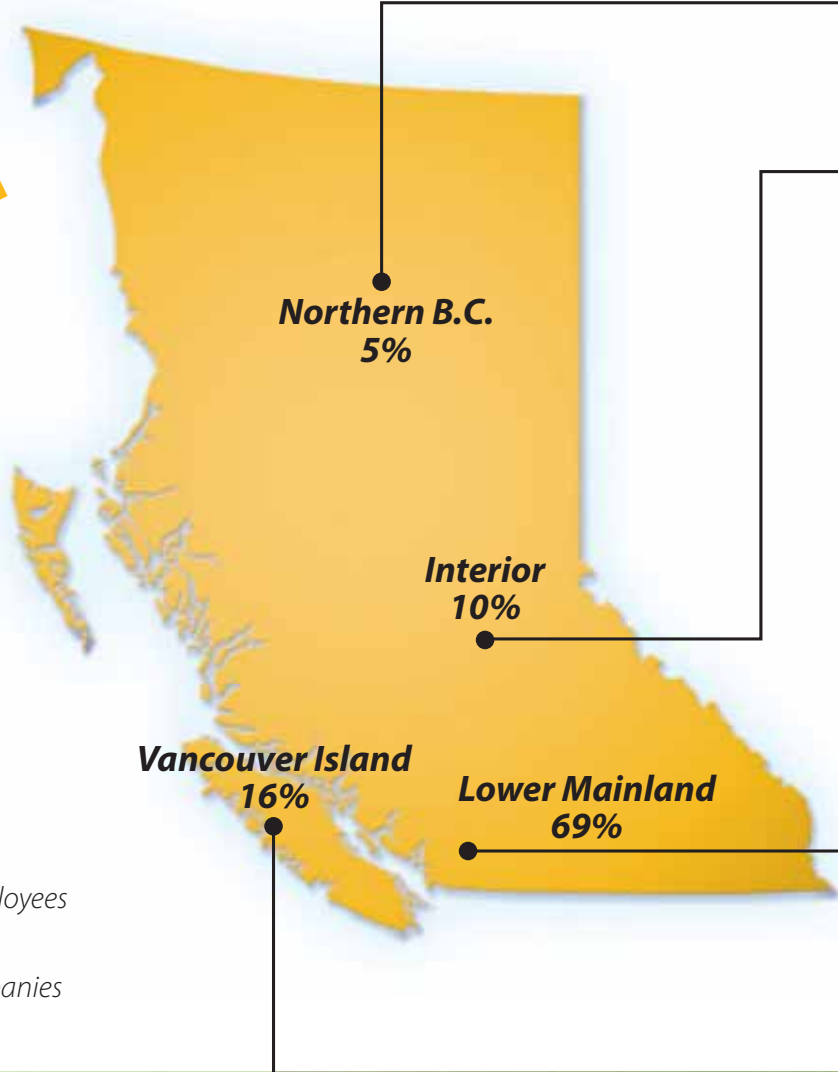
VANCOUVER


BOSTON


SAN DIEGO

Pacific  
Ocean

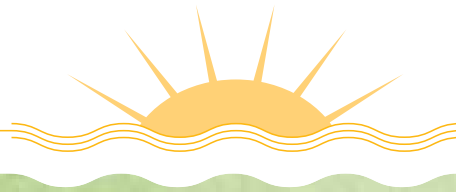
**Sustainable Technology Sector: Opportunities for Investment, Talent and Enterprise**



 = 100 Employees

 = 20 Companies





## Message from the Minister



British Columbia is home to a thriving sustainable technology industry; in fact, we are world leaders in environmental technologies. In B.C. there are close to 1,300 companies active in the sustainable technology industry across the province, employing about 18,000 people—and this number is expected to grow.

We realize that solutions to climate change lie in innovation. With this innovation, come opportunities for businesses and our world-class talent.

These opportunities have not gone unnoticed by the investment community. Venture capitalists invested \$3.9 billion into green and clean technology ventures in North America last year, almost doubling their investment from 2005, helping to drive this industry to become one of the fastest-growing sectors in the North American venture capital market.

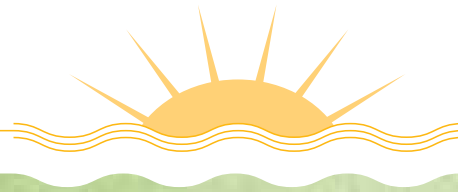
We have built our industry by investing in our world-class research institutions. B.C. is home to 15 research centres of excellence and other clean technology research institutes. Backed by our research and innovation infrastructure, our companies provide sustainable technology solutions and practices in both domestic and export markets. Global economic growth combined with B.C.'s position on the Pacific-Rim means there are many opportunities in the Asia-Pacific region to address issues relating to urbanization, mining, forestry, waste water and contaminated waste.

With easy access to markets in Asia, Europe and the U.S. and an unparalleled quality of life, B.C. is truly a beautiful environment for sustainable technology businesses to thrive.

A handwritten signature in black ink that reads "Colin Hansen".

Colin Hansen  
Minister of Economic Development

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# 1

## Executive Summary



British Columbia is a world leader in environmental technologies. There are approximately 1,300 companies active across the province generating revenues of \$1.9 billion and employing about 18,000 people. In addition to B.C.'s corporate activity, the province has significant capacity for research and innovation and is home to 15 research centres of excellence and other clean technology research institutes.

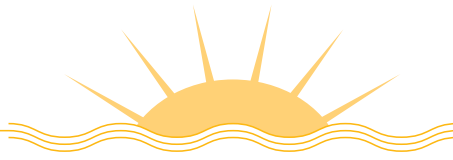
B.C. is also home to a number of world leading technology companies, many of which have been spun out of our universities. Examples of some of B.C.'s world leaders are: Carmanah Technologies Corp., a leading manufacturer of energy-efficient light emitting diode (LED) lighting systems; Xantrex Technology Inc., a world leader in advanced power electronics; and Power Measurement (a Schneider Electric company), which provides energy management solutions to control the cost, quality and reliability of energy.

B.C. is also a centre for innovative urban design with a number of large infrastructure developments incorporating sustainable technologies. As a result, B.C. has 22 LEED certified projects, more than any other province in Canada.

B.C.'s expanding sustainable technologies sector is extremely diverse. Backed by our research and innovation infrastructure, our companies provide sustainable technology solutions and practices in both domestic and export markets. Global economic growth combined with B.C.'s position on the Pacific Rim means there are many opportunities in the Asia-Pacific region to address issues relating to urbanization, as well as provide sustainable solutions in the mining and forestry industries, as well as waste water, and contaminated wastes.

## Opportunities for Growth and Development

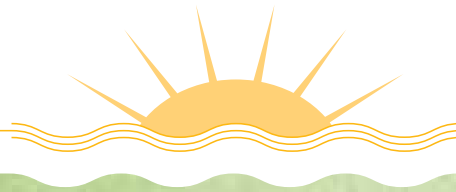
- The Vancouver Convention Centre Expansion project will triple the convention centre's existing capacity by 1.1 million square feet with all levels of government contributing to this \$1 billion expansion project. Most notably, the expanded Convention Centre facility will include a six-acre living roof, one of the largest living roof systems in the world. The roof and other surfaces will be shaped and landscaped to enhance the ecological diversity with measurable change in density and host species relative to the predevelopment condition. Additional sustainable initiatives for this project include building to LEED Gold standards and achieving a Green Globes<sup>i</sup> certification for the project.
- Southeast False Creek and Olympic Village (SEFC) will be a model sustainable community built on 32 hectares (80 acres) of formerly industrial and commercial land. Based on environmental, social and economic principles, SEFC will be a mixed-use community with 80,000 square feet of commercial and retail space and 1,000 residential units of which 250 will be designated as affordable housing. Scheduled completion of Phase I buildings will be timed for the 2010 Vancouver Winter Games when the Village buildings will be available for the exclusive use of the Games housing up to 2,800 athletes and officials.



- Located in Victoria, Dockside Green is a mixed-use project of residential, office, retail and industrial space being developed on 15 acres of former industrial land with a planned total of 1.3 million square feet of building space, it is the first community to target LEED Platinum certification for buildings developed in a master planned community.
- Centre for Interactive Research on Sustainability (CIRS), scheduled to open in 2008 on the Great Northern Way campus provides opportunity for research and development, community engagement and industry collaboration in sustainable technologies and sustainable building design within an urban context.
- The Mountain Pine Beetle infestation presents an opportunity for alternative uses of timber resources. As infected timber becomes unsuitable for lumber, other uses are being developed, such as bioenergy and biofuel production. Development of these technologies on a large commercial scale would utilize otherwise waste products and transform them into usable energy products.
- The Wood Pellet Association of Canada, located in Prince George, B.C., is promoting their members and the products they produce as not only environmentally impeccable, but cost-effective. Innovative pellet manufacturers are respected by customers in Sweden, Denmark and Finland, with demand so strong, most Canadian producers sell their entire annual production before the start of a new year.







## 2

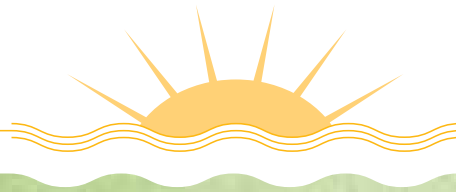
# Sector Description and Overview in British Columbia



## Sector Highlights

- Canada's first free-stream tidal power project has been installed at the Race Rocks site offshore of Vancouver Island in British Columbia. The project uses a 65 kW tidal turbine generator developed by North Vancouver's Clean Current Power Systems Inc., and will convert surrounding ocean currents and tidal energy to electric power.
- Carmanah Technologies Inc., headquartered in Victoria, has rapidly become a world leader in the design, manufacture and supply of solar powered LED lighting solutions.
- Stantec (acquired Keen Engineering) are specialists in green buildings and are among the largest sustainable development engineering consultancies in North America. In B.C., Stantec has locations in Vancouver, Surrey, Abbotsford, Kelowna and Kamloops.
- Catalyst Paper Corporation uses biomass fuel derived from bark, wood shavings, sawdust and wood residuals from the pulping process to generate approximately 63 per cent of its energy requirements.
- TallOil was the successful bidder for several large licenses to salvage pine beetle damaged timber in Northern B.C. TallOil Canada will be constructing a \$30 million pellet plant for the Vanderhoof area, the first of four to be built in the region. The Vanderhoof plant will start production in 2007 followed by a second plant near Fraser Lake. Two more pellet plants are planned for the Quesnel area.
- B.C. is home to several forestry institutes that are active in sustainability research, including the Forest Engineering and Research Institute of Canada (FERIC), Forintek Canada, the Pacific Forestry Centre, and the Pulp and Paper Research Institute of Canada (Paprican).
- B.C. leads all Canadian provinces with 22 LEED certified projects, which is 42 per cent of all the LEED certified projects in Canada. B.C. has the only Platinum level project in Canada. LEED® Certification distinguishes building projects that have demonstrated a commitment to sustainability by meeting higher performance standards in environmental responsibility and energy efficiency.





### 3

## Profile of 20 Largest B.C. Companies

The following table profiles the twenty largest companies in the Sustainable Technologies sector in B.C. The rankings are based primarily on revenues and secondarily on employment.<sup>ii</sup> The list includes both public and private companies that are headquartered in B.C., as well as those with locations in B.C. but headquartered elsewhere.

Many sustainable technology companies throughout B.C. are privately held; therefore, information on company revenues and employment is often not available. Following the list of twenty companies is a table with the names of several privately-held companies with a brief description of their technology focus. This list of privately-held companies is included to illustrate the diversity of innovative technologies available in this sector.



*Sustainable Technology Sector: Opportunities for Investment, Talent and Enterprise*

<b>Rank</b>	<b>Company</b>	<b>Revenue</b> <i>Most recently reported annual. CAN \$M unless otherwise specified.</i>	<b>Employment</b>	<b>Specialty</b>	<b>Background</b>
1	<b>Stantec Inc.</b> www.stantec.com	\$618.02	BC: 371 Global: 4,400	Green Buildings	Recently acquired Green Building specialists Keen Engineering to become one of the top Green Builders in North America
2	<b>Newalta Corporation</b> www.noramainc.com	\$132.6	BC: n/a Global: 900	Water & Wastewater Technology / Hazardous & Solid Waste Remediation	Specializes in recovering saleable materials from industrial waste
3	<b>Ledcor Construction Inc.</b> www.ledcor.com	\$61.5	BC: n/a Global: 250	Green Buildings	Ledcor is an employee-owned company that pioneered LEED green building initiatives. Some of Ledcor's projects include the B.C. Cancer Research Centre, Shaw Tower and Vancouver International Airport. In addition to its construction division, Ledcor also has industrial and fabrication divisions, with offices throughout B.C., Alberta, Ontario, California, Florida, Hawaii, Illinois, Nevada, and Texas.
4	<b>Pacific Regeneration Technologies</b> www.prtgroup.com	\$15.3	BC: n/a Global: 120	Sustainable Resource Management	Reforestation company producing in excess of 220 million seedlings per year.
5	<b>Toxco, Inc.</b> www.toxco.com	\$11.2	BC: n/a Global: 95	Sustainable Resource Management	One of the most diverse battery recycling companies in the world.

Rank	Company	Revenue	Employment	Specialty	Background
6	<b>Seacor Environmental Inc.</b> www.seacorcanada.com	\$10.5	BC: n/a Global: 110	Sustainable Resource Management / Hazardous & Solid Waste Remediation	National, employee owned, environmental consulting firm, providing engineering and technical services to public and private sector.
7	<b>Hatfield Consultants Ltd.</b> www.hatfieldgroup.com	\$5.2	BC: n/a Global: 32	Water & Wastewater Technology	Founded in 1974, specializes in aquatic environmental monitoring. Joint venture companies in Indonesia and Bangkok.
8	<b>Rescan Environmental Services Ltd.</b> www.rescan.com	\$44.6	BC: n/a Global: 40	Sustainable Resource Management	Provides engineering, environmental and socio-economic services to resource development projects world-wide.
9	<b>International Water-Guard Industries Inc.</b> www.water.aero	\$3.13	BC: n/a Global: n/a	Water & Wastewater Technology	World's leading provider of flight-certified potable water treatment units and innovative potable water system solutions.
10	<b>BioTeQ Environmental Technologies</b> www.bioteq.ca	\$2.76	BC: n/a Global: 22	Water & Wastewater Technology	Developed the biosulphide process for water treatment and sulphide reagent production.
11	<b>International Bio-Recovery Corp.</b> www.ibrcorp.com	\$1.69	BC: n/a Global: n/a	Hazardous & Solid Waste Remediation	Develops biological products for conventional agriculture to increase crop yields.
12	<b>Sonic Environmental Solutions</b> www.sesi.ca	\$1.24	BC: n/a Global: n/a	Hazardous & Solid Waste Remediation	Engaged in commercializing its sonic generator technology for use in environmental processes.
13	<b>Brinkman &amp; Associates Reforestation Ltd.</b> www.brinkman.ca	Privately Held: n/a	BC: n/a Global: n/a	Sustainable Resource Management	Canada's oldest and foremost reforestation company, in over 35 years of operation it has planted over 800 million trees.

*Sustainable Technology Sector: Opportunities for Investment, Talent and Enterprise*

<b>Rank</b>	<b>Company</b>	<b>Revenue</b>	<b>Employment</b>	<b>Specialty</b>	<b>Background</b>
14	<b>EcoFluid Systems Inc.</b> www.ecofluid.com	Privately Held: n/a	BC: n/a Global: n/a	Water & Wastewater Technology	Inventor of award winning USBF™ process for wastewater treatment.
15	<b>Joule Microsystems Canada Inc.</b> www.joulemicro.com	Privately Held: n/a	BC: n/a Global: n/a	Water & Wastewater Technology	Specializes in water-monitoring technologies.
16	<b>Paradigm Environmental Technologies Inc.</b> www.paradigmenvironmental.com	Privately Held: n/a	BC: n/a Global: n/a	Water & Wastewater Technology	Inventor of Microsludge process for water treatment.
17	<b>Quantum Environmental Group Inc.</b> www.quantumgroup.ca	Privately Held: n/a	BC: n/a Global: n/a	Water & Wastewater Technology / Hazardous & Solid Waste Remediation	Founded in 1992, Quantum is a full service, environmental remediation and hazardous waste materials contracting company.
18	<b>Radiant Technologies Inc.</b> www.radiantinc.com	Privately Held: n/a	BC: n/a Global: n/a	Sustainable Resource Management	Uses microwave energy efficiently to extract solvents from renewable biomass based on a natural product extraction technology known as MAP™.
19	<b>Noram Engineering &amp; Constructors Ltd.</b> www.noram-eng.com	Privately Held: n/a	BC: n/a Global: n/a	Sustainable Resource Management	Established in 1988, specializes in wastewater and sludge digestion technologies.
20	<b>RST Instruments Ltd.</b> www.rstinstruments.com	Privately Held: n/a	BC: n/a Global: n/a	Sustainable Resource Management	Manufactures and distributes monitoring equipment.

*\$CAN based on the monthly average \$CAN/\$US exchange rate of the last month of the company's fiscal year. Where revenues are not from a company's annual report, the annual 2005 exchange rate is used to convert the revenues to \$CAN.*

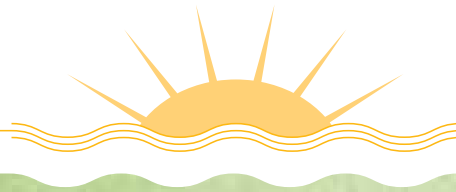
## Privately-held Sustainable Technology companies

(names compiled by PwC in conjunction with industry associations and other related sources)

<b>Company</b>	<b>Technology/Area</b>	<b>Description</b>
<b>Terra Cognita Software Systems</b> www.terracognita.ca	Information systems solutions	Develops resource management software specializing in land use management applications.
<b>West Creek Silviculture Ltd.</b> www.westcreekltd.com	Information systems solutions	Develops software and GIS solutions for the resource industry.
<b>Hermery Opto Electronics, Inc.</b> www.hermeryopto.com	Scanning and sensing technology	Develops and markets scanning and sensing solutions for sawmill log optimization.
<b>ConeTec, Inc.</b> www.conetec.com	Soil testing equipment	Designs, builds and operates advanced in-situ testing equipment for land use.
<b>Canadyne Technologies Inc.</b> www.canatec.com	Oil containment booms and skimmers	Designs, manufactures and supplies advanced oil spill response equipment.
<b>Quantum Environmental Group</b> www.quantumgroup.ca	Environmental remediation	Provides solutions to the safe management of hazardous waste materials and environmental remediation.
<b>International Thermal Research</b> www.itrheat.com	Clean, efficient heating solutions	Develops powered and non-powered liquid fuel burners and related heating equipment.







# 4

## Centres for Research and Innovation

In the Sustainable Technologies sector, the physical infrastructure is made up of forestry technology centres, research institutes as well as specialized educational institutions and their facilities.



## **Research Facilities**

### **British Columbia Institute for Technology (BCIT)**

#### **Centre for the Advancement of Green Roof Technology**

<http://commons.bcit.ca/greenroof/>

Conducts applied research on how green roofs perform in Vancouver's climate. The centre is developing a Regional Infrastructure Network to prepare an inventory of green roof performance and is developing a Roofing Evaluation Module (REM) to provide third party testing of product performance and climatic functioning.

### **University of British Columbia (UBC)**

#### **Centre for Advanced Wood Processing (UBC)**

[www.cawp.ubc.ca](http://www.cawp.ubc.ca)

Canada's national centre of excellence for education and research related to wood products processing and advanced wood products manufacturing. The centre's goal is to produce high quality education, service, and research activities, with emphasis on value-added wood products manufacturing.

#### **Institute for Resources, Environment & Sustainability (IRES) / Sustainable Development Research Institute (UBC)**

[www.sdri.ubc.ca](http://www.sdri.ubc.ca)

IRES is an interdisciplinary research institute and a major interdisciplinary graduate education program at UBC. The centre is currently active in the following research projects: Eco-Risk Research Unit, Offsetters Climate Neutral Society, Westwater and the Canadian Water Network.

#### **Centre for Environmental Research in Minerals, Metals and Materials (UBC)**

[www.ipmm.mining.ubc.ca/cerm3/](http://www.ipmm.mining.ubc.ca/cerm3/)

The goal of the Centre for Environmental Research in Minerals, Metals and Materials (CERM3) is to be Canada's leading environmental research facility for the mining industry. Its researchers will conduct research on: legacy sites abandoned in the past that are creating problems today; operating mines that currently suffer from pollution control problems; and, innovations in mining and milling to reduce or eliminate environmental problems.

## Research Facilities

### University of British Columbia **Clean Energy Research Centre (CERC)**

(UBC) (cont.)

[www.cerc.ubc.ca](http://www.cerc.ubc.ca)

Opened in November 2006, the centre is Canada's only interdisciplinary facility that focuses on improving existing energy technologies and developing new sustainable energy sources. Located in the Faculty of Applied Science, the centre supports faculty and graduate students from the departments of Chemical and Biological Engineering, Electrical and Computer Engineering, Materials Engineering, and Mechanical Engineering.

### University of Northern British Columbia **Natural Resources and Environmental Studies Institute (NRES Institute)**

(UNBC)

[www.unbc.ca/nres](http://www.unbc.ca/nres)

Promotes investigative research on natural resource systems and human uses of the environment, including specific issues relevant to northern regions. Its main goal is to integrate perspectives to gain a better understanding of the functions, viability and values of natural resource systems.

### **Northern Land Use Institute**

[www.unbc.ca/nlui](http://www.unbc.ca/nlui)

Supports research focused on land issues relevant to Northern B.C. Among its objectives are to promote collaborative, interdisciplinary research in partnership with public agencies, the private sector, local communities and First Nations.

### **I.K. Barber Enhanced Forestry Lab (EFL)**

[www.unbc.ca/efl](http://www.unbc.ca/efl)

Supports controlled environment research activities and houses the UNBC Tree Ring Lab. The Enhanced Forestry Lab includes four greenhouse compartments with temperature control, HPS lighting control, heating/venting control and humidity sensing.

### **Aleza Lake Research Forest**

<http://alrf.unbc.ca>

Located 60 km east of Prince George, the 9,000 hectare research forest supports multidisciplinary research and education programs in partial cut harvest systems, biological diversity, climate change and environmental monitoring in small forest tenures.

## **Research Facilities**

### **University of Northern British Columbia (UNBC) (cont.)**

#### **John Prince Research Forest**

<http://researchforest.unbc.ca/jprf/jprf.htm>

This research forest covers over 13,000 hectares in Northern B.C. It is the only research forest on North America that is jointly managed by a university and a First Nation community. Activities at the forest include the promotion of interdisciplinary research.

#### **Quesnel River Research Centre**

[www.unbc.ca/qrrc](http://www.unbc.ca/qrrc)

Located on a 21.5 hectare site downstream of Quesnel Lake, the main focus of this research station is a Chair in Landscape Ecology. Other research opportunities are available in several areas, including the following: watershed restoration; First Nations approaches to resource management; fish/mining interactions; soil remediation and site restoration; community forest management; integrated resource management; bioengineering and site restoration.

### **Royal Roads University (RRU)**

#### **Royal Roads University, Division of Science, Technology and Environment**

[www.royalroads.ca](http://www.royalroads.ca)

Royal Roads University is host to the Westcoast Onsite Wastewater Training Centre. The centre offers professional development courses that have been developed in partnership with the British Columbia Onsite Sewage Association and with support from Environment Canada through the Georgia Basin Ecosystem Initiative and the Ministry of Health.

### **Simon Fraser University (SFU)**

#### **Energy and Materials Research Group (EMRG)**

[www.emrg.sfu.ca/EMRGweb/index.php](http://www.emrg.sfu.ca/EMRGweb/index.php)

The EMRG focuses on the analysis of new technologies, strategies, behaviours and policies that lead to a sustainable flow of energy and materials use. It also houses the Canadian Industrial Energy End-Use Data and Analysis Centre. Activities conducted by EMRG include technologically explicit and behaviourally realistic simulation modeling as well as data collection on energy and materials characteristics, systems and infrastructure.

## Research Facilities

### Forest Engineering and Research Institute of Canada (FERIC)

#### Forest Engineering and Research Institute of Canada (FERIC)

[www.feric.ca/en](http://www.feric.ca/en)

Mandated by its members to work within a framework of sustainable development to improve Canadian forestry operations relating to wood harvesting and transportation, growing of trees and managing wild-land fires.

### Forintek Canada

#### Forintek Canada

[www.forintek.ca](http://www.forintek.ca)

Develops innovative processes and products in the wood product sector to support the forestry industry in optimizing manufacturing processes, extracting higher value products, and meeting customer's expectations for performance, durability, and affordability.

### Pacific Forestry Centre

#### Pacific Forestry Centre

[www.pfc.forestry.ca](http://www.pfc.forestry.ca)

One of five Canadian Forest Service research and development centres committed to the sustainable development and competitiveness of the Canadian forest sector. The centre hosts the largest pathology herbarium and insectary collections in western Canada, one of the largest natural resource libraries in western Canada, and state of the art research greenhouses.

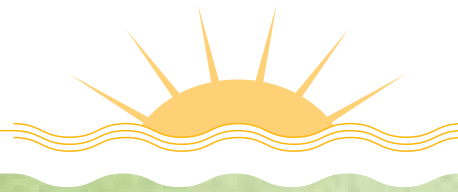
### Pulp and Paper Research Institute of Canada (Paprican)

#### Pulp and Paper Research Institute of Canada (Paprican)

[www.paprican.ca](http://www.paprican.ca)

Paprican has capabilities in physical testing, analytical chemistry, microscopy and image analysis, and optics and standards. Its services focus on areas such as product quality and value, cost competitiveness, environment and sustainability.





# 5

## Skilled Workforce

The number of undergraduate and graduate students enrolled in science and engineering programs is an indication of the skill level and depth of knowledge and experience in a region. The following table illustrates the number of graduate students enrolled in a range of engineering, science, and specialized environmental science or forestry masters programs in B.C. universities from 2001-2002 to 2005-2006.





**Number of Graduate Students Enrolled in British Columbia Universities**

<b>Graduate Students</b>	<b>2005/06</b>	<b>2004/05</b>	<b>2003/04</b>	<b>2002/03</b>	<b>2001/02</b>
Master of Engineering	129	143	166	195	177
Master of Applied Science	586	632	609	575	506
Master of Science	2,080	2,074	1,894	1,894	1,794
Master of Forestry	n/a	2	6	7	9
Master of Resource Management	69	88	82	92	86
Master of Environmental Toxicology	12	11	21	21	23
Bachelor of Applied Science/ Master of Engineering	9	8	6	7	10

*Source: The University Presidents' Council of British Columbia (TUPC). Data as of September 2006.*

Listed in the following table are the number of undergraduate science and engineering students enrolled in B.C. universities from 2001-2002 to 2005-2006.

### **Number of Undergraduate Students Enrolled in British Columbia Universities**

<b>Undergraduate Students</b>	<b>2005/06</b>	<b>2004/05</b>	<b>2003/04</b>	<b>2002/03</b>	<b>2001/02</b>
Bachelor of Applied Science	3,883	3,623	3,387	3,062	2,813
Bachelor of Engineering	764	770	777	731	720
Bachelor of Environmental Design	48	49	36	-	-
Bachelor of Science	16,018	15,581	15,382	14,492	14,714
Bachelor of Science in Forestry	71	71	94	98	70
Bachelor of Science in Global Resource Systems	106	92	84	63	34
B.Sc. in Natural Resources Conservation	159	135	124	94	99
Bachelor of Science (Tech BC)	-	726	542	233	-

Source: The University Presidents' Council of British Columbia (TUPC). Data as of September 2006.

### **Areas of Specialization**

This section focuses on the research strengths of B.C.'s Sustainable Technologies sector describing the public research available and the funding awards provided to sector companies.

### **Research Chairs**

There are twelve Canada Research Chairs in Sustainable Technologies held in the province as well as three NSERC Research Chairs. There is also one outstanding invited proposal for the Leading Edge Endowment Fund in this sector.

Canada Research Chairs may be either Tier 1 or Tier 2. Tier 1 Chairs are awarded to outstanding researchers that are recognized by their peers as world leaders in their respective research area. These chairs are renewable, and the researcher's university receives \$200,000 annually for seven years. Tier 2 Chairs are awarded to emerging researchers that are recognized by their peers as potential world leaders in their area of research. Tier 2 Chairs are renewable once, and the researcher's university receives \$100,000 annually for five years.

<b>Canada Research Chairs</b>	<b>Research Title / Year Awarded</b>	<b>Research Chair</b>	<b>Department</b>	<b>School</b>
<b>Tier 1</b>	Environmental Fluid Mechanics in Aquatic Systems <i>July 1, 2001</i>	Gregory A. Lawrence	Civil Engineering	UBC
	Aquaculture and the Environment <i>July 1, 2001</i>	R. Scott McKinley	Land and Food Systems	UBC
	Plant Cell Biology <i>January 1, 2004</i>	Geoffrey Wasteneys	Botany	UBC
<b>Tier 2</b>	Soil and Environmental Sciences <i>May 1, 2001</i>	Joselito M. Arocena	Environmental Science and Engineering	University of Northern British Columbia
	Sustainable Shellfish Aquaculture <i>August 1, 2004</i>	Penelope Barnes	Center for Shellfish Research	Malaspina University College
	Environmental and Atmospheric Chemistry <i>November 1, 2004</i>	Alan K. Bertram	Chemistry	UBC
	Remote Sensing <i>May 1, 2004</i>	Nicholas Coops	Forest Resources Management	UBC
	Sustainable Community Development <i>September 2, 2004</i>	Ann Dale	School of Environmental and Sustainability	Royal Roads University
	Community and Ecosystem Ecology <i>August 1, 2004</i>	Lauchlan Fraser	Natural Resource Science and Biological Science	Thompson Rivers University

<b>Canada Research Chairs</b>	<b>Research Title / Year Awarded</b>	<b>Research Chair</b>	<b>Department</b>	<b>School</b>
<b>Tier 2 (cont.)</b>	Natural Plant Products <i>May 1, 2003</i>	Reinhard Jetter	Chemistry	UBC
	Advanced Biomaterials <i>July 1, 2003</i>	John Kadla	Forestry	UBC
	Global Process Modeling <i>June 1, 2004</i>	Andrew J. Ridgwell	Earth and Ocean Sciences	UBC
	Urban Sustainability and Disaster Management <i>January 1, 2004</i>	Stephanie Chang	Community and Regional Planning, Resources, Environment and Sustainability	UBC
	Climate Prediction and Predictability <i>January 1, 2005</i>	Youmin Tang	Natural Sciences and Engineering	UNBC
	Northern Hydrometeorology <i>July 1, 2005</i>	Stephen Dery	Natural Resource and Environmental Studies	UNBC
	Fisheries Assessment and Statistics <i>October 1, 2005</i>	Murdoch McAlister	Fisheries Centre	UBC
<b>NSERC Research Chairs</b>	Chemical Pulping Technology 2002	Chad Bennington	Chemical and Biological Engineering	UBC
	Insect Communication Ecology 2004	Gerhard Gries	Biological Sciences	SFU
	Environmental Management of Drinking Water 1999	Asit Mazumder	Biology	UVIC



## Technology Partnerships Canada

TPC is a Special Operating Agency of Industry Canada that makes strategic investments to support research, development and innovation. These investments are intended to encourage private sector investments in research and development.

In 2003-2004, Honeywell ASCa Inc. was awarded an \$8.7 million contribution for R&D exploring energy efficiency in pulp and paper processes.

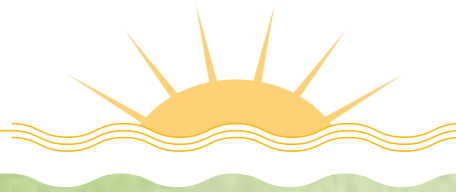
### *Technology Partnerships Canada – R&D Projects*

<i>Year</i>	<i>Company</i>	<i>Project</i>	<i>Approved Contribution</i>
2004-2005	<b>Honeywell ASCa Inc.</b>	Developing technologies to reduce the amount of materials and energy required for the pulp and paper process	\$8.7 million

## The National Research Council (NRC) Industrial Research Assistance Program (NRC-IRAP)

NRC-IRAP provides a range of technical and business oriented advisory services along with potential financial support to growth-oriented SMEs and has been a significant contributor in supporting the commercialization of sustainable technologies research. The program relies on an extensive network of professionals across the country working directly with clients supporting innovative research and the development and commercialization of new products. In 2004/05, NRC-IRAP's nearly \$130 million in total expenditures aided in building the innovative capacities of over 10,000 firms with direct financial support distributed across over 2,500 projects.





# 6

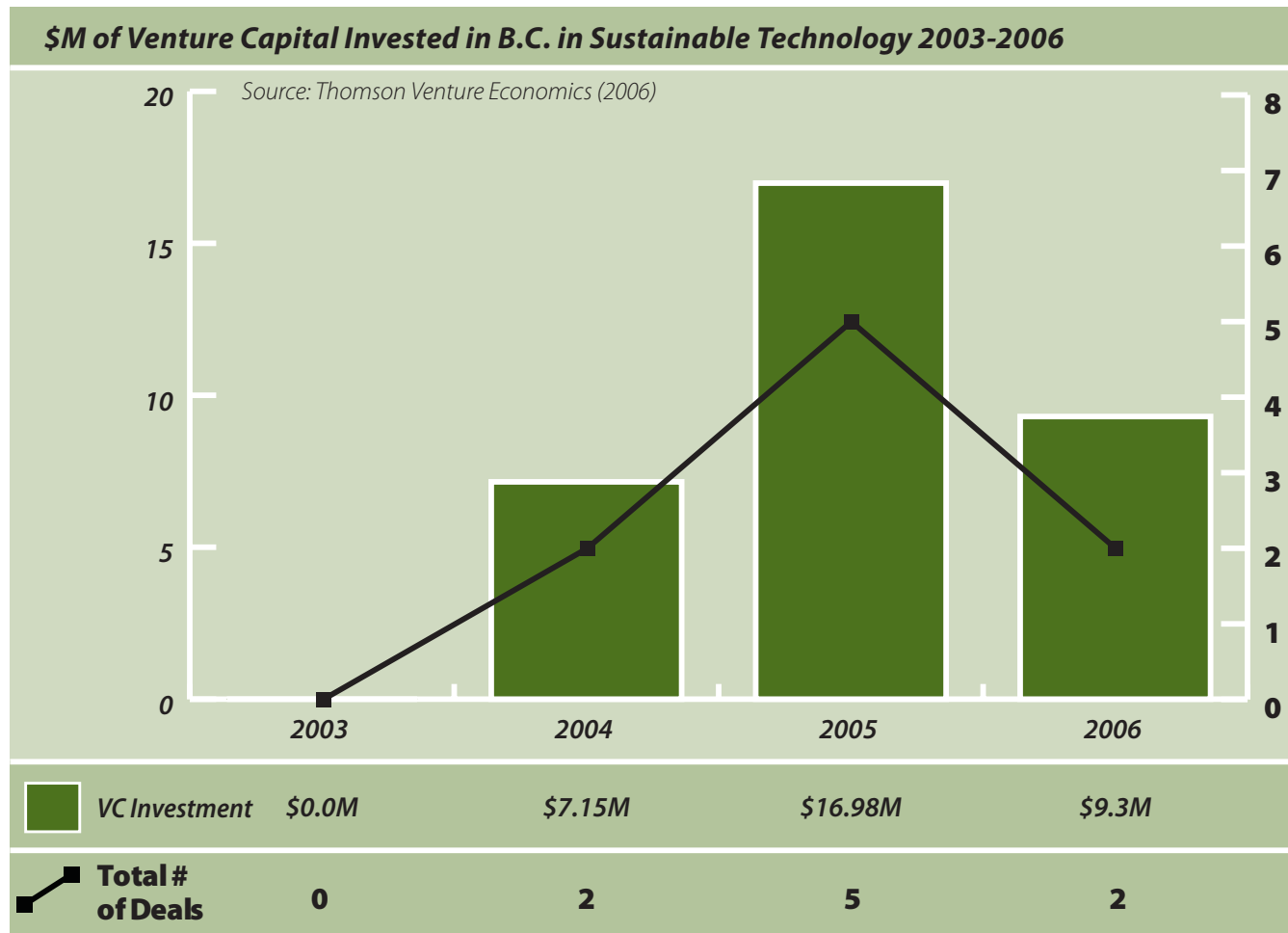
## Finance and Capitalization

The data is based on venture capital investment for B.C. based sustainable technology companies and all amounts reported are in Canadian dollars. The source of the data is the VCReporter database from Thomson Financial. Some transactions may have occurred that are not captured in the Thomson Financial database, for example, an acquisition of a B.C. company by a U.S. based firm will not be reflected in the VCReporter database.





## Financing Statistics for B.C. Sustainable Technologies Sector



## Fiscal Incentives

The following tables provide program information for fiscal incentives available to eligible companies carrying on business or residents located in B.C. All of the incentives listed are tax credits available from either the provincial or federal governments. Also noted are specific incentives available from the federal government to encourage investment in energy conservation and renewable energy projects.

## Research and Development Investment Tax Credits

Canada and British Columbia offer a generous program of research and development tax credits to support innovation. These credits can be used to substantially fund R&D and are very attractive to companies establishing themselves in the province.

The Scientific Research & Experimental Development (SR&ED) is the federal program designed to encourage businesses, including small and start-up companies, to do work that advances technology to develop new or improved products or processes.

SR&ED provides companies with either refundable or nonrefundable tax credits for eligible expenditures incurred in Canada for research and development activities. Companies qualifying as a CCPC (Canadian Controlled Private Corporation) are eligible to receive a 35 per cent investment tax credit on up to \$2 million of qualified expenditures and 20 per cent of qualified expenditures not eligible for the 35 per cent rate. Non CCPC's are only eligible to receive tax credits of 20 per cent of qualified expenditures. All companies are able to carry forward federal investment tax credits for 20 years (from 2006).

<b>Canada – Federal</b>		<b>Scientific Research and Experimental Development (SR&amp;ED) Policy Details<sup>iii</sup></b>			
<b>Tax Credit</b>	<b>Qualifying Entities</b>	<b>Tax Credit Rate</b>	<b>Refund Rate</b>	<b>Further Details<sup>iv</sup></b>	<b>Who Qualifies?</b>
Scientific Research & Experimental Development Tax Credit Program (SR&ED)	Qualifying Canadian Controlled Private Corps. (CCPCs)	<b>35%</b> of annual expenditures up to threshold of \$2 million. <b>+20%</b> of qualified expenditures not eligible for the 35% rate.	<b>100%</b> of ITCs on current expenditure computed at the 35% rate. <b>+40%</b> of ITCs on capital expenditures computed at the 35% rate and of ITCs of a qualifying corporation at the 20% rate.	The SR&ED is a refundable tax credit, which means that even if an eligible firm is not profitable, it will still get a cash refund from engaging in R&D.  For non-CCPCs, even though no refund is available, the program allows firms to reduce taxes payable for a net positive cash flow.	Qualified research must fit advancement, uncertainty and content criteria.
	Non CCPC's	20%	N/A		
	Individuals	20%	40% of ITCs		

Under the B.C. provincial investment tax credit program, eligible corporations can take a 10 per cent tax credit against provincial income tax in addition to receiving federal SR&ED tax credits. Similar to the SR&ED program, CCPC's are eligible for refunds while non-CCPC's must apply the credit against taxes payable.

<b>Province of British Columbia</b>		<b>British Columbia R&amp;D Tax Credit Policy Details<sup>viii</sup></b>			
<b>Tax Credit</b>	<b>Qualifying Entities</b>	<b>Tax Credit Rate</b>	<b>Refund Rate</b>	<b>Further Details</b>	<b>Who Qualifies?</b>
British Columbia Provincial R&D Tax Credit	Qualifying Canadian Controlled Private Corps. (CCPCs)	10% Credit Against Provincial Income Tax	Refundable	Qualifying CCPCs are refundable on the first \$2 million of expenditures eligible for SR&ED credit.	Qualified research must fit advancement, uncertainty, and content criteria.
	Other Corporations		Non-refundable	Other Corporations may carry the tax credit forward 10 years and back 3 years.	

## International Financial Activity (IFA) Act<sup>vi</sup>

B.C.'s *International Financial Activity (IFA) Act* came into effect on September 1, 2004, and provides eligible corporations and specialists with a refund on B.C. income tax paid on income that is related to the corporation's international financial activities conducted in B.C. The *IFA Act* was established to support certain business activities by essentially exempting income from these activities from provincial income tax or providing a significant reduction in the effective provincial tax rate.

These activities, all of which must be carried on with a non-resident person, includes: making loans, financing foreign affiliates, factoring trade accounts receivables, distribution of film and television rights, leasing property, captive insurance activities and foreign exchange activities. A corporation may receive an annual refund of 100 per cent of the provincial income tax paid on income earned from these activities. An IFA specialist is eligible to receive a refund of up to 75 per cent of income taxes paid.

Effective January 1, 2006, the IFA has been expanded to include the refund of income tax paid on income derived from certain types of life sciences patents<sup>vii</sup>. Corporations may receive an annual tax refund up to the lesser of \$8 million and 75 per cent of its corporate income tax paid on income that is derived from international commercialization of life sciences patents.

To be eligible for the refund, patents must have a primary classification number in accordance with the International Patent Classification and not have expired. Broad classifications for the types of patents that qualify for refunds include the following: new plant or processes for obtaining them, preservation of bodies of humans or animal, biochemistry, microbiology, investigation or analyzing food, and investigation or analyzing biological material. This program is summarized in the following table.

<b>Province of British Columbia</b>		<b>International Financial Activity (IFA) Policy Details<sup>viii</sup></b>			
<b>Tax Credit</b>	<b>Qualifying Entities</b>	<b>Refund Rate</b>	<b>Further Details</b>	<b>Who Qualifies?</b>	
British Columbia <i>International Financial Activity Act</i>	Incorporated Canadian companies with permanent establishments in B.C.	100% of provincial income tax paid on non-life science patent activity.  Lesser of \$8 million and 75% of provincial income tax paid on life sciences patent activity.	Registered corporations may claim a tax refund on patent activity or other eligible activities (but not both).	Must maintain membership in International Financial Centre British Columbia Society.	

## Small Business Venture Capital Act (SBVCA)

The B.C. Ministry of Economic Development offers tax credits to resident investors to help small businesses carrying on prescribed activities gain access to early stage or ‘seed’ capital through venture capital programs operated under the *Small Business Venture Capital Act (SBVCA)*. Prescribed activities include manufacturing and processing of goods in British Columbia, research and development of proprietary technologies, development and operation of a destination tourist resort and the development of interactive digital media products.

The annual cap for equity capital investment under this program is \$83 million of which \$10 million of program capital is reserved for investment in small businesses operating outside of the Lower Mainland and \$17 million is reserved for investment in small businesses substantially engaged in the ‘new media’ sector.

Under the SBVCA, program investment is made either through a holding corporation known as a Venture Capital Corporation (VCC) or directly to an Eligible Business Corporation (EBC). The EBC Tax Credit encourages direct investment by investors in eligible small businesses throughout the province. Professional management of the VCC fund selects and manages a diverse portfolio of investments on behalf of the pool of investors. Details of the SBVCA program are outlined in the following table.

Province of British Columbia		Small Business Venture Capital Act Policy Details		
Tax Credit	Qualifying Entities	Tax Credit Rate	Further Details	Who Qualifies?
Small Business Venture Capital Act (SBVCA)	Resident investors who provide investment capital into a VCC or EBC.	30% refundable tax credit <sup>x</sup> for individuals to a maximum of \$60,000 annually (not refundable for corporations with no maximum limit).  Tax credit is applied first against provincial and federal taxes payable, if any.	Investors may provide up to \$83 million per year in equity capital for investments in small business.  For tax certificates greater than \$60,000, the excess can be carried forward up to four years.	Residents and corporations with B.C. taxes payable.

The Venture Capital Corporation (VCC) Tax Credit encourages investment in small businesses operating outside of the Greater Vancouver and Capital Regional Districts.

## Employee Investment Act

The Labour-Sponsored *Employee Investment Act* provides investors with the opportunity to receive a provincial tax credit of 15 per cent and a federal tax credit of 15 per cent on their investment in the fund. The funds seek long-term equity investment opportunities in companies seeking 'expansion' capital.

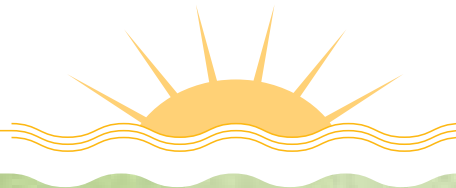
Labour-Sponsored Funds are registered under the *Employee Investment Act* and are owned by shareholders who rely on professional management to select investments. Two Labour-Sponsored Funds that are registered in the province include Altura Growth Fund (EVCC) Inc. and the Working Opportunity Fund (EVCC) Ltd.

## Social Service Tax Act

The B.C. Social Service Tax is a provincial sales tax of 7 per cent levied on the purchase price of tangible personal property. Eligible manufacturers purchasing production equipment and machinery can apply for an exemption of the sales tax<sup>x</sup>.

Province of British Columbia		B.C. Sales Tax Exemption for Equipment and Machinery Policy Details <sup>xi</sup>		
Tax Credit	Qualifying Entities	Tax Credit Rate	Further Details	Who Qualifies?
<i>Social Service Tax Act</i>	Manufacturers	Exempt from 7% PST	Production machinery and equipment purchased or leased by manufacturers are exempt from tax.	Must meet definition of manufacturer and equipment must be used primarily and directly in manufacture of qualifying tangible personal property.





# 7

## Value Chain / Ecosystem





The following diagram illustrates the value chain/ecosystem of the Sustainable Technologies sector in B.C. Organizations that support or provide services to the sector are placed into the top and middle of the diagram according to their function as follows:

- Industry support organizations
- Industry infrastructure
- Research facilities
- Specialized finance organizations, and
- Education and human resource support organizations

Sustainable Technology companies are then slotted into four activity categories that describe each company's placement along the value chain:

- Design and suppliers
- Manufacturing and production
- Processes and services, and
- Integrators

The sector is unique in that it includes a wide range of consulting activities ranging from environmental consulting to "green" building design.

## Strategic Consulting

- AMEC Earth & Environmental
- Conestoga-Rovers & Assoc.
- CNRG International Ltd.
- Envirochem Services Inc.
- G3 Consulting Ltd.
- Gandalf Consulting Ltd.
- Golder Associates Ltd.
- Hatfield Consultants Ltd.
- Jacques Whitford
- Jones Environmental Sciences
- Keystone Environmental Ltd.
- Levelton & Associates Ltd.
- Morrow Environmental Consultants
- New East Consulting Services
- NovaTec Consultants Inc.
- Pottinger Gaherty Environmental Consultants Ltd.
- Rescan Environmental Services
- Triton Environmental Consultants
- TTA Technology Training Assoc. Ltd.

## Testing and Analysis

- ALS Environmental (Canada)
- Econotech Services Ltd.
- I.G. Micromed Environmental Inc.
- Norwest Labs
- Pacific Rim Laboratories Inc.

## Industry Infrastructure

- Translink
- BC Hydro
- Telus

## Research Facilities

- BCIT Centre for the Advancement of Green Roof Technology
- UBC Centre for Advanced Wood Processing
- UBC Institute for Resources, Environment & Sustainability
- UBC Centre for Environmental Research in Minerals, Metals and Materials
- Forest Engineering and Research Institute of Canada (FERIC)
- Forintek Canada
- Pacific Forestry Centre
- Pulp and Paper Research Institute of Canada (Paprican)
- Royal Roads University
- University of Northern British Columbia

## Design/Suppliers

### **Sustainable Resource Management:**

- NORAM Engineering Constructors Ltd.

### **Water and Wastewater Technology:**

- Esko Industries Ltd. Environmental Division

### **Green Buildings:**

- Bing Thom Architects
- Bunting Coady Architects
- Busby + Associates Architects Ltd.
- Cobalt Engineering
- HunterLaird Engineering Ltd.
- HY-GEO Consulting
- LEDCOR Construction
- Prism Engineering
- Sacré-Davey Engineering
- Stantec Engineering Co. Ltd.
- Theodore Sterling Associates
- VEL Engineering Ltd.

## Manufacturing and Production

### **Sustainable Resource Management:**

- E.S.I, Environmental Sensors Inc.
- FTS Forest Technology Systems Ltd.
- RST Instruments
- Westbay Instruments Inc.

### **Water and Wastewater Technology:**

- Muddy River Environmental Ltd.

### **Green Buildings:**

- IBC Technologies Inc.

## *Specialized Information Systems*

- GemTeck Environmental Software Ltd.
- Genus RMT
- RADARSAT International
- Viewscape3D Graphics Ltd.

## *Lobbying and Industry Support*

- Association of Professional Engineers and Geoscientists
- Association of BC Forest Professionals
- BC Onsite Sewage Association

- BC Environmental Industries Association
- BC Association of Agrologists
- BC Water and Waste Association
- Canada Green Building Council (Cascadia Chapter)
- Canada Land Reclamation Association (BC Chapter)
- Centre for Sustainable Communities Canada
- Council of Forest Industries

- Environmental Managers Association of BC
- Society for Ecological Restoration BC
- EcoSmart Foundation
- BC Sustainable Energy Association
- Vancouver Geotechnical Society
- Vancouver LEED User Group

## *Specialized Finance*

- Banyan Capital Partners
- BC Advantage Funds
- BC Discovery Fund
- Discovery Capital
- GrowthWorks
- Pangaea Ventures Ltd
- Smart Seed Equity Inc
- Vancouver Angel Technology Network

## *Education and HR Support*

- Canadian Technology Human Resource Board
- Environmental Careers Organization of Canada (ECO)

## *Processes and Services*

### ***Sustainable Resource Management:***

- Joule Microsystems Canada Inc

### ***Water and Wastewater Technology:***

- Aquavic Water Solutions Inc
- BioteQ Environmental Technologies Inc
- Earth Tech Canada
- ECOfluid Systems Inc
- Ecological Technologies Inc
- Paradigm Environmental Technologies Inc
- Spectral Innovations Ltd
- Tri-Arrow Industrial Recovery Inc.

### ***Hazardous/Solid Waste Remediation:***

- Burrard Clean Operations
- Electronics Recycling (Canada) Co. Ltd.
- International Bio-Recovery Corp.
- Sonic Environmental Solutions Inc.
- Toxco Inc.
- Transform Compost Systems Ltd.

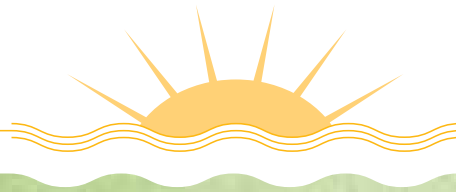
## *Integrators*

### ***Sustainable Resource Management:***

- A. Lanfranco & Associates
- ### ***Water and Wastewater Technology:***
- AQUASOL EnviroTech Ltd.
  - AZCO Industries Ltd.
  - International Water-Guard Industries Inc.
  - Quantum Remediation Inc.
  - SEACOR Environmental Inc.
  - Shigeo Ban and Associates
  - Ultraguard Water Systems Corp.

### ***Hazardous/Solid Waste Remediation:***

- Belkorp Industries Inc
- Newalta Corporation
- Piteau Associates Engineering Ltd
- Positive Results Environmental Management Ltd
- Richway Environmental Technologies Ltd.
- Safety-Kleen



# 8

## Industry Contacts



**Pulp and Paper Research Institute of Canada**

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Vancouver, BC, V6S 2L9  
(604) 222-3201

**Pacific Forestry Centre**

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Victoria, BC, V8Z 1M5  
(250) 363-0600

**Forintek Canada**

2665 East Mall  
Vancouver, BC V6T 1W5  
(604) 224-3221

**Forest Engineering and Research Institute of Canada**

2601 East Mall  
Vancouver, BC, V6T 1Z4  
(604) 228-1555

**Natural Resources and Environmental Studies Institute**

UNBC  
3333 University Way  
Prince George, BC, V2N 4Z9  
(250) 960-5555

**Clean Energy Research Centre**

2360 East Mall  
Vancouver, BC, V6T 1Z3  
(604) 827-4342

**Energy and Materials Research Group**

School of Resource and Environmental Management  
Simon Fraser University  
Burnaby, BC, V5A 1S6  
(604) 291-4659

## Endnotes

- i *Green Globes, [www.greenglobes.com/design/homeca.asp](http://www.greenglobes.com/design/homeca.asp)*
- ii *Companies included among the twenty largest companies are those that rank the highest by 2005 revenues according to *Business in Vancouver Magazine, Hightech British Columbia 2006* and by 2004 revenue according to *Business in Vancouver's Book of Lists 2005*. Annual revenues were confirmed by reviewing the most recent annual report for each company where available. In cases where the annual revenue figures differed between these sources, we used revenues from the company's annual report. The *Business in Vancouver* publications were also used as sources for information on employment numbers. Finally, *Factiva* was used to supplement revenue and employment data where that data was unavailable elsewhere. Where revenues are reported in \$US, they have been converted to \$CAN based on the monthly average \$CAN/\$US exchange rate of the last month of the company's fiscal year. Where revenues are not from a company's annual report, the annual 2005 exchange rate is used to convert the revenues to \$CAN.*
- iii *PricewaterhouseCoopers, *Tax Facts and Figures for Individuals and Corporations, 2006**
- iv *Susan Ward. Don't Miss Out on the SR&ED Tax Credit Program. From "Your Guide to Small Business Canada" available at <http://sbinfoCanada.about.com/od/taxinfo/a/SREDtaxcredit.htm>*
- v *PricewaterhouseCoopers, *Tax Facts and Figures for Individuals and Corporations, 2006**
- vi *Ministry of Small Business and Revenue, *Bulletin IFA 001, International Financial Activity Overview, Revised February 2006**
- vii *Ministry of Small Business and Revenue, *Bulletin IFA 002, Life Science Patents, Revised April 2006**
- viii *PricewaterhouseCoopers *Tax Facts and Figures for Individuals and Corporations, 2006**
- ix *To the extent credit is made available by the Ministry of Economic Development.*
- x *Ministry of Small Business and Revenue, *Bulletin SST 054, Manufacturers, Revised February 2003**
- xi *PricewaterhouseCoopers, *Tax Facts and Figures for Individuals and Corporations, 2006**



*Research for this profile was conducted by PwC*



BRITISH  
COLUMBIA

Canada's Pacific Gateway