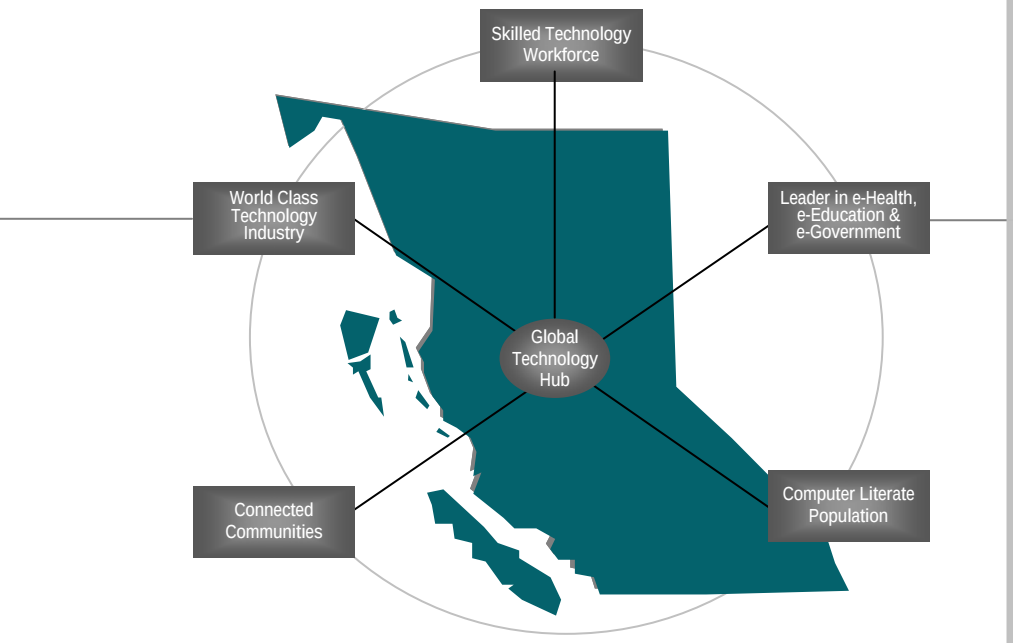
PREMIER'S TECHNOLOGY COUNCIL

11TH REPORT

JUNE, 2008



We believe that with strong cooperation between the provincial government and private enterprise, British Columbia will be one of the world's top ten technology centres

Every effort has been made to consider all information obtained and to be as accurate and consistent as possible in our use and analysis of all research materials. However, errors or omissions may have occurred. Please notify the Premier's Technology Council of any significant inaccuracies by e-mail at:

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Foreword

The Premier's Technology Council (PTC) was created in August 2001 to provide advice to the Premier on technology-related issues. The mission of the Council is to help make British Columbia one of the world's top ten technology centres.

The Honourable Gordon Campbell is Chair of the Council, a position shared with the Co-Chair, Greg Peet, formerly Chairman, President and CEO of ALI Technologies (acquired by McKesson Corp in 2002). The Council is fortunate to draw its membership from twenty-one other leaders of BC's technology industry and from senior levels of the academic sector.

This is the PTC's 11th report, the fourth of the government's mandate, and my third as President. In it we continue to focus on how government can encourage the growth of clean technology options. We also investigate the role of Industrial Design in strengthening technology industries.

The PTC also put a great deal of effort into learning more about the role of innovation in our regional economies. To prepare for this, the PTC conducted a tour that consulted with individuals from many different communities in British Columbia. I would like to acknowledge and thank all those who came to meet the PTC and shared with us the strengths and the needs of their local economies. The talent of people we met from around British Columbia and their commitment to their local communities was truly impressive.

I would like to express my personal appreciation to all the members of the Premier's Technology Council who volunteered their time and energy, and to the Premier and government officials for their continuing support.

Sincerely,

Cheryl Slusarchuk
President, Premier's Technology Council

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Executive Summary

In this, its 11th Report the Premier's Technology Council addresses three topics:

- *Clean Technology;*
- *Regional Innovation;* and
- *Industrial Design*.

CLEAN TECHNOLOGY

The growing global concern about the state of our environment presents a significant emerging economic opportunity for those who develop and use new technology to create cleaner alternatives for existing practices. In this 11th report the PTC examines two areas of opportunity, clean transportation and the use of waste as a resource.

Estimates are that 38% of BC's total carbon emissions come from transportation. This proportion is higher than in most jurisdictions because approximately 90% of our electricity generation is from clean hydro power. At the same time transportation accounts for just over a quarter of the total global demand for energy and this total demand is estimated to grow by 55% between 1995 and 2020. While it is important for BC to address its own transportation challenges, developing technologies to do so will also generate economic opportunities for the province. Such opportunities include improving vehicle efficiency and developing alternative fuel sources. These are areas where BC has existing strengths and where there is international interest and demand.

It is estimated that Metro Vancouver generates over 3 million tonnes of solid waste annually. The Capital Regional District generates more than 100 million litres of sewage per day. These municipal waste figures do not include agricultural waste and waste products from our industry base. Recovering materials and energy from these waste streams represents an economic opportunity. Not only could BC capture and use the energy, but there is a market for products and processes that BC can develop as a result.

The PTC determined that regulations are an obstacle that is common to the development of both of these opportunities. Current regulations do not recognise the impact of technological advances on alternatives both for transportation and the transformation of waste. The pace of technological change and the urgency of adopting better carbon solutions have made options available that governments are yet to prepare for.

BC has long been recognised as a leader in regulatory reform. It must capitalise on this expertise, through a focussed effort to address fundamental regulatory barriers the development of mechanisms that allow it to anticipate the opportunities offered by emerging technologies and develop policy and regulation that allows these to flourish. To achieve this, the Regulatory Reform Office should collaborate with the Climate Action Team and with the Pacific Institute for Climate Solutions.

Recommendation 11.1: That the provincial government address the regulatory challenges to the development of clean technology by:

- **directing the Regulatory Reform Office to collaborate with the Climate Action Secretariat and work across ministries to identify, prioritise and address regulatory barriers that affect the use and application of current and emerging technologies in addressing environmental issues, and**
- **directing the Pacific Institute for Climate Solutions, through its collaboration between UNBC, UVIC, SFU and UBC, to map current and emerging technologies and recommend to the Regulatory Reform Office how regulation and government policy planning should anticipate and accommodate the opportunities that they present.**

REGIONAL INNOVATION

The regions located outside of Greater Vancouver account for more than 50% of manufacturing shipments and produce a higher per capita income from exports than the Lower Mainland. To better understand the role innovation and technology could play in improving these regional economies, the PTC conducted a tour in the fall of 2007. These consultations identified a number of key measures government could consider so regions can take better advantage of innovation and technology.

The most common issue was the need for greater broadband connectivity. The provincial government has extended broadband throughout much of BC. Due to initiatives such as the Connecting Communities Agreement, and other efforts by Network BC, 92% of BC now has access to broadband. Although this makes BC one of the most connected jurisdictions in North America, there is still an opportunity for further connectivity.

Economic development, addressing the last mile, and First Nations connectivity are three key aspects of the existing broadband challenge. For some the quality or level of broadband connectivity limits economic opportunity while other jurisdictions lack access of any kind. Government should investigate ways to improve the quality of existing broadband to address these economic development challenges while continuing its efforts to reach the un-served. A large proportion of the remaining un-served population is

located on the outskirts of connected communities in subdivisions, housing clusters or facilities located on the edge of town. Local internet service providers (ISPs) will continue to be key to addressing these last mile challenges. The government procurement policy that has supported these ISPs to date needs to be maintained and supplemented with other policy initiatives.

The third key aspect is the role broadband can play for First Nations as they advance the social and economic interests of their communities. The provincial government has to continue making investments that assist First Nations in delivering broadband connectivity. It must not only assist with connectivity but also with capacity building to ensure expertise is built that can take advantage of what technology has to offer.

Recommendation 11.2: That government continue to address the broadband challenges for British Columbia by:

- **establishing a plan to address broadband related hindrances to economic development in BC;**
- **continuing to use its own telecommunications procurement as a lever for supporting regional delivery through local ISPs and make this solution part of a broader package that supports local ISPs in the delivery of these services; and**
- **continuing investment to assist First Nations in broadband delivery and related capacity building.**

The PTC learned that for regions to take better advantage of existing government programs there needs to be collaborative working structures at the regional level to address innovation and economic development. These cannot be driven by the provincial government but must instead be led by local business organisations that are best suited to identify and leverage a region's strengths, and can involve and unify communities.

Such organisations have been created in the past but they need a stable, secure economic development funding structure that will drive the regional collaboration that broader governments need in their grassroots economic development partners. The administrative criteria of such organisations should be very strict to ensure data based decision making.

Recommendation 11.3: That government create a stable funding structure for non-government economic development bodies that:

- **are regionally collaborative;**
- **are locally driven by business leaders;**
- **have significant industry input; and**
- **have strict data driven criteria for decision making.**

As well as coordination within a region, there is a need for greater coordination amongst BC's advanced education institutions, organisations and companies. This is particularly true for industries and businesses located away from the academic centres. Local industries will often have a research challenge or innovation idea and require the assistance of academic expertise to bring it to fruition. Industry is unclear about who to contact for expertise due to the lack of coordination within the system. There needs to be a method for industry to share research challenges with academia. BC needs regionally relevant, internationally competitive, leading-edge applied research produced by world-class academics in partnership with various stakeholders.

Recommendation 11.4: That the Ministry of Advanced Education support regional research development and deployment in the regions in collaboration with the BC Innovation Council and post-secondary institutions.

As industry sectors transform and the economy diversifies, post-secondary institutions need to effectively respond to local industry and community needs. This is particularly a challenge for BC's rural education institutions as they attempt to deliver education and training services to a small, geographically dispersed population.

To address this issue advanced education institutions require the flexibility for just in time training models. There could be a regional or grant fund to cover the cost of importing summer or other short term programs. A model that provided committed government funding for a limited time period with short negotiation and approval processes would greatly assist colleges as they meet industry needs and address BC's skills shortage.

Recommendation 11.5: The PTC recommends there be a budget allocation to fund program flexibility in order to establish short term and emerging technology training programs as required by industry.

One final regional issue identified by the PTC is access to capital, particularly in smaller communities. Under the government's current Small Business Venture Capital Act's (SBVCA) Community Venture Capital Program, $3 million in tax credits is allocated for regional distribution. There is potential to expand this program. The government could provide additional allocation to fundraise to the Venture Capital Corporations (VCCs) with the condition that the additional money is spent regionally.

Furthermore, one of the anomalies of the current $3 million allocation is that the vast majority of it is distributed in the larger regional centres. There is proportionally less distributed in the smaller regional communities where access to financial or legal advice and government agencies is more limited. Government should make greater efforts to

promote this program in smaller communities.

Recommendation 11.6: The PTC recommends that additional tax credits be allocated to the Small Business Venture Capital Act's (SBVCA) Community Venture Capital Program in the form of increased regional allocations and that the Investment Capital Branch implement policy to encourage greater distribution to smaller communities.

INDUSTRIAL DESIGN

Industrial Design (ID) is key to the innovation and commercialisation of technologies. It is one of the few means left for companies to gain a competitive advantage, particularly in mature markets.

Companies which use ID often experience increased sales, improved profit margins and higher stock performance. One American study, for example, found that for effective design companies the average earnings to net sales ratio 75% higher than the industry average over a seven year period. Companies derive these benefits because ID helps to differentiate and define premium products in an era when most competitors have the same offerings. ID can improve a product's utility, user experience and sustainability. It can also improve new product development and manufacturing processes.

Furthermore, there is a correlation between a jurisdiction's use of design and its global competitiveness. Many jurisdictions that have promoted ID are reaping the benefits including higher exports and employment. This is because ID not only helps develop the innovative technology sectors that drive future growth and competitiveness, but it can also revitalise industries that are stagnant or facing challenges.

BC's assets in this area include the Emily Carr University of Art and Design (ECUAD), a National Design Research Network based at SFU, BC Industrial Design Association (BCID), and a strong creative class. BC can build on these strengths. ID, for example, can play a critical role in the development of clean technologies and their associated products and services. It can also help transform our traditional resource based industries to ensure they remain competitive and an important contributor to BC's economy.

The PTC identified a number of potential actions for government but overall believes that government needs a plan that encourages greater use of ID.

Recommendation 11.7: That the provincial government develop a plan for the promotion and development of Industrial Design as a key component of BC's innovation economy and consider the first step of providing $4.5 million to fund an Industrial Design Chair for the Emily Carr University of Art and Design.

Clean Technology

Introduction

Climate change has become the key driver of a worldwide shift to environmental responsibility. Furthermore, most believe that clean technologies will play a critical role in addressing climate change. These two factors have created a market demand for clean products and services which represents a significant economic development opportunity for BC. By encouraging local development of technology to address our own challenges in BC, government can ensure BC companies are positioned to take advantage of this growing market.

To date, the most comprehensive analysis of the economic impact of climate change and the role of government in addressing it is contained in the Stern Review Report released in 2006. [1]

Table 1: Stern Review Report

STERN REPORT FRAMEWORK	EARLY BC ACTIONS
Strong long term targets for reducing GHGs and energy use	✓
Price on carbon	✓
Support for clean technology development	✓
Remove barriers to behavioural change	✓
Action to reduce deforestation	✓
Planning for adaptation	✓
International cooperation	✓
Amend regulations for all above	TBD

The BC provincial government is beginning to effectively address these areas. It has introduced a carbon tax, incentives for hybrid vehicles, a significant new transit plan, and

amended legislation around the BC Utilities Commission and fuel standards. These changes position BC as a global leader in environmental policy. It also allows BC to take advantage of both the worldwide imperative to be more accountable for the impact on the environment and its expertise to become a leader in the development of clean technologies.

The PTC 10th report released in September 2007 identified opportunities for BC in the generation of clean electricity and in the development of associated technologies. We commend government for taking action on many of those recommendations. In this report the PTC continues its examination of the application and development of clean technologies in BC. Two more sectors where BC has opportunities are in clean transportation and in making greater use of waste as a resource.

Clean Transportation

ANALYSIS AND OPPORTUNITY

Estimates are that 38% of BC's total carbon emissions come from transportation. This proportion is higher than in most jurisdictions because approximately 90% of our electricity generation is from clean hydro power. The breakdown of emissions from the transportation sector in BC is as follows:

- Passenger Vehicles 37%;
- Heavy Duty Vehicles 24%;
- Off-road 20%; and
- Marine, Rail and Air 19%.

Because the province has committed to a 33% reduction in total Greenhouse Gases (GHGs) by 2020, addressing the clean transportation challenge is mandatory. However, because generation of GHGs from transportation is an immense global challenge, the development of technology to address it constitutes an economic opportunity. Transportation accounts for just over a quarter of the total global demand for energy and this total demand is estimated to grow by 55% between 1995 and 2020.[2] BC can put itself at the forefront of finding sustainable transportation options that accommodate or reduce the demand.

TECHNOLOGIES

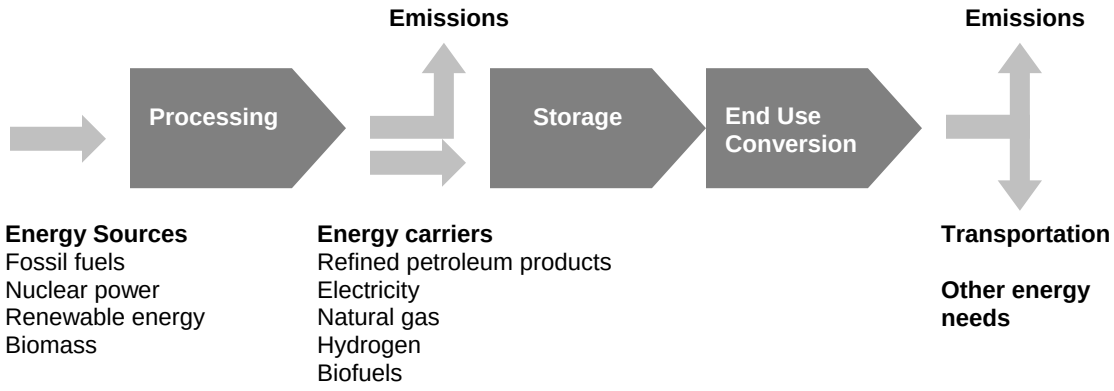
The three key components to a more sustainable transportation system are:

- improving vehicle efficiency;
- changing the energy sources;

- and reducing the amount of travel.

The technology solutions that are either available in the near term or are already available will not meet all of our needs. However, long term solutions can only be reached by taking the initial steps required to develop the shorter term solutions. Current gasoline hybrid cars for example are a step towards developing plug-in hybrids, which in turn are a step towards fuel cell hybrids. The final step is dependent upon the first being taken successfully. In BC both those first steps and our long-term solutions are primarily in areas of alternative power sources and increased well-to-wheel efficiency. These are critical components of the energy to transportation conversion chain as illustrated in Figure 1.[3]

Figure 1. Energy conversion chain for transportation



In this chain, the important clean transportation technologies for BC lie in the development of energy carriers, in storage and in end use conversion. These include: [4] [5] [6] [7] [8] [9] [10] [11]

A. **Alternative Fuels** – These comprise biogas from anaerobic digesters, hydrogen and biohydrogen, and liquid biofuels including both biodiesel and cellulosic ethanol. It also involves associated systems to ensure the bio products are pure enough for use.
B. **Batteries and Battery Systems** – There are a variety of battery systems including nickel metal hydride and lithium ion batteries. Lithium ion batteries have a high energy density and are recyclable at the end of their service life. Equally important are the associated power conversion and battery management and control systems.
C. **Hydrogen Storage Systems** – Current on-board hydrogen storage approaches include compressed hydrogen gas tanks, liquid hydrogen tanks and metal hydrides. Storing sufficient hydrogen on a vehicle to provide power for adequate distances at reasonable cost remains a challenge.
D. **Fuel Cell Systems** – Fuel cell systems are simple electrochemical conversion devices which directly convert the chemical energy stored in a fuel like hydrogen into electrical energy.
E. **Gas Driven Engines** – This involves the development of cleaner internal combustion

engines and the motors that actually use the alternative fuel sources.

F. **Zero Emission Vehicles (ZEV's) and Hybrids** – ZEV's are vehicles that have: no tailpipe emissions, evaporative emissions, onboard emission-control systems and no emissions from gasoline refining or sales. Hybrids, or Hybrid Electric Vehicles, HEVs, are vehicles that have two or more power sources, such as an electric motor and conventional gasoline. These technologies include battery operated Electric Vehicles, Fuel Cell Electric Vehicles and Plug-in Hybrid Electric Vehicles. The HEVs are the hybrid vehicles commercially available today. Some of the others are available commercially for certain specialty applications.

British Columbia companies and technologies play various roles in the different technology areas described above. Many have not only successfully demonstrated their technologies but also have them commercially available. The "Sector Profile for Advanced Energy" released by the Ministry of Economic Development clearly demonstrates some of our strengths. It highlights our research capabilities in each of these areas and lists some of our strongest companies. It states that there are approximately 89 companies currently active in the Advanced Energy Sector, generating revenues of approximately $750 million and employing about 3,000 people. [12]

Waste as an Energy Resource

ANALYSIS AND OPPORTUNITY

Modern society creates a great deal of waste. It is estimated that Metro Vancouver currently generates over 3 million tonnes of solid waste annually, and this has been increasing. The current generation rate is approximately 1.5 tonnes per person annually. As Metro Vancouver's population increases from 2 million to 3 million, waste generation is anticipated to increase from 3 million to 4.5 million tonnes per year.[13] Solid waste is just one part of the challenge. The Capital Regional District generates over 100 million litres of sewage per day, enough energy to heat approximately 30,000 homes.[14] [15] These municipal waste figures do not include agricultural waste or waste products from our industry base.

There are numerous ways for technology to address the waste challenges. They range from improved manufacturing and packaging methods, to reusable product design and better recycling systems. The opportunity identified by the PTC involves recovering materials and energy from our waste streams.

Too much of our waste is not being harnessed and there are a number of ways to capture and use the energy currently being lost. The potential energy that might be harvested from waste represents a material opportunity to contribute to our current energy utilization. One estimate

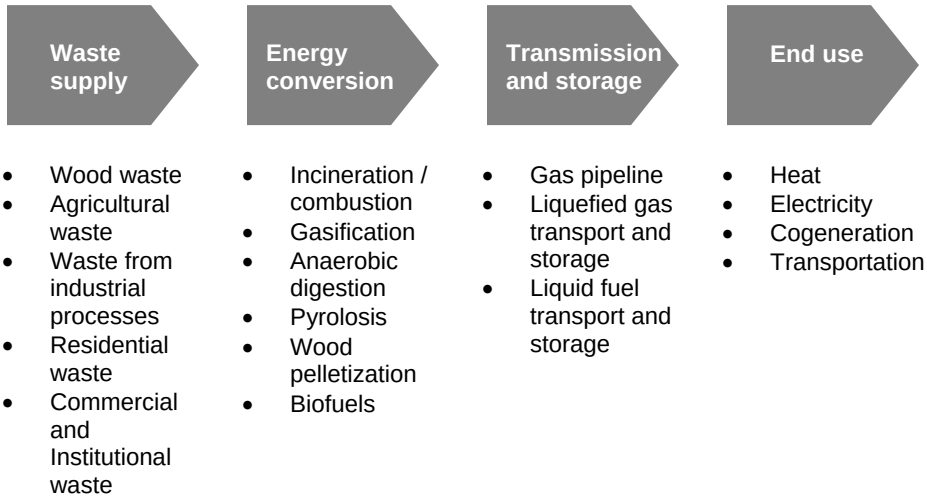
of the total Lower Mainland biogas energy potential from organic and sewage waste is over 4,500,000 gigajoules per year or 2% of the total energy delivered by Terasen Gas.[16] [17] This represents enough energy to heat 45,000 homes per year, or to run 2,250 buses per year and would constitute a direct reduction of 220,000 metric tons of CO2 equivalents. That would require ideal capture conditions, but is demonstrative of the opportunity nevertheless.

A second opportunity is in the growing demand for clean energy generation and transmission. BC can develop and sell the new products and processes to the global market while taking advantage of the province's own waste to energy opportunities. The market is immense, particularly in the US, where it is estimated that US landfills are responsible for a third of all methane emissions worldwide.[18]

TECHNOLOGIES

The processes of converting waste to energy are complex. There are a number of different decisions that need to be made based on the nature of the waste being converted and the potential end user. Figure 2 depicts different stages of waste to energy conversion, and lists the types of technologies that can be considered at each stage.

Figure 2. Waste to energy sources, energy carriers and conversion chain



The process delineated above is one in which the waste source is identified, a method is chosen to convert that to energy or to a usable form of energy storage, a decision is made on how to transmit that energy if necessary and finally, the best use for that energy product is determined. Each decision or stage involves technology. Examples include: [19] [20] [21] [22] [23]

A. **Combustion** – This most basic energy conversion process for biomass yields ash and

hot gases which can in turn be used to generate steam to drive a turbine.

B. **Gasification** – The conversion of biomass into ash and volatile gaseous compounds at high temperatures with the restricted use of oxygen. This creates a flammable gas ready to combust.
C. **Pyrolosis** – Biomass is heated in the absence of oxygen to vaporize a portion of the material, leaving a char behind. Bio-oil is produced by condensing part of the gases formed in the process.
D. **Anaerobic Digestion** – A biological digester mimics the processes occurring inside a landfill, but accelerates these reactions and produces a useful residue.
E. **Wood Pelletization** – The manufacturing of pellets starts with size reduction and the extraction of contaminants. The material is thereafter dried and hammer milled down to a specified fractional size and finally extruded in a pelletizer.
F. **Cellulosic Ethanol** – Some emerging technologies offer the chance to create ethanol from non-traditional feedstocks, such as agricultural residues or wood.
G. **Bio and Syngas Treatments** – Some of the gases produced from processes such as gasification need to be treated or upgraded before they are usable.
H. **Waste Hydrogen Capture and Use** – Hydrogen is a by-product gas from various industrial processes in BC. There are a number of technologies being developed to capture, purify, compress, store, transport and use waste hydrogen.

As mentioned earlier, the Sector Profile for Advanced Energy identifies BC companies and BC technologies that are looking to demonstrate or supply their products and processes. [24] There are BC companies involved in gasification, pyrolosis, and the generation of biofuels. There is also research on the role of genomics, both in the production of ethanol through biorefining, and in optimising feedstocks and enzyme systems for bioenergy. Equally important, there are user groups in BC who are looking for these kinds of clean opportunities. For example, municipalities, property and building developers, transportation fleet owners and greenhouse associations are all looking for alternative options for their energy supply needs.

Therein lays BC's advantage. BC is large enough to have both supply and demand but small enough that these potential partners can better work together. More importantly there are those on both sides of the equation who are prepared to experiment. There are stakeholders within government, industry and academia who are exploring innovative ways to work together. Clearing barriers of cost and regulation will assist the growth of this industry.

Common Challenges

To better understand the opportunities arising from these new technologies, the PTC held two roundtables in February of 2008. One addressed alternative technologies to be used in transportation and the second looked at waste as a resource. Participating in the roundtables

were both those who are users or buyers of the new technology, and those who are innovators or creators. It became clear during the roundtables that no one "miracle" technology will resolve all of transportation and waste challenges. It will instead require a menu of options that users can select from given the specific circumstances.

The PTC's role was to identify common challenges to the development of technologies across these two sectors. During the roundtables proponents discussed the wide variety of issues that surround either adopting these new measures or bringing them to market. Many relate to the barriers that are common to all new technology ventures, green or otherwise. These can include access to capital, the skills shortage, the costs of prototyping and demonstration, creating consumer demand for new products and bridging that final commercialisation gap to create an affordable product. However, two key barriers were identified that are more specific to the introduction of clean technologies.

A. **Cost** – Cost issues for green technologies are particularly challenging for they compete with less expensive traditional options. The differential is magnified because the cost of the emissions or waste is not usually reflected in the cost of the less green choice. That is why the provincial government is to be commended for its introduction of the revenue neutral Carbon Tax. Introduced in the provincial budget shortly after the PTC roundtables, it ensures that excessive carbon usage comes with a cost. It will help make environmentally sustainable options more economically viable.

B. **Regulation** – Current regulations do not recognise the impact of technological advances on alternative options, both for transportation and the transformation of waste. The pace of technological evolution and the urgency of adopting solutions that will slow climate change have made options available that governments are not prepared to manage. This challenge is not unique to British Columbia so addressing it can give BC a competitive advantage in the development, adoption and marketing of clean technology options.

Below are examples of the kind of regulatory barriers that need to be addressed in both the transportation and waste as an energy resource sectors.

I. Transportation:

A. Trucks can be made more efficient. Auxiliary Power Units can reduce idling, aerodynamic modifications and modifications to the tires can increase fuel efficiency. In each case current highway regulations limit the use of these carbon efficient technologies either through weight, or other restrictions;
B. Use of electric vehicles is limited due to a lack of infrastructure and code standards to

allow for home and commercial recharging;

C. Vehicles using hydrogen as a fuel are not allowed to use underground parking unless approval and compliance is obtained from BCSA;
D. Provincial Sales Tax (PST) exemption does not apply to medium duty hybrid vehicles or to mixed-use items such as boilers that are used to generate renewable energy;
E. Hydrogen is not recognised as a fuel in the provincial tax concession on the motor fuel tax, even though hydrogen as a fuel is exempt from GST at the federal level; and
F. The BC Ministry of Transportation is proposing changes to regulations which will limit Zero Emission Vehicles to certain roads (such as gated communities) unless individual municipalities pass by-laws permitting them on other speed limited roads.

II. Waste as an Energy Resource:

A. For the City of Vancouver to move waste heat from the Burnaby incinerator to the East Fraser development it would cross a municipal boundary and become subject to the BC Utilities Commission;
B. Metro Vancouver can build systems to recover energy for use within its own water and wastewater utilities, but is restricted from using such energy recovery projects to generate revenue;
C. There are no regulations to allow for the collection, handling and treatment of non-agricultural wastes in an on-farm biogas plant. Importation of off-farm waste likely requires amendments to regional Solid and Liquid Waste Management Plans which are under the jurisdiction of Regional Districts, in this case Metro Vancouver and FVRD; and
D. An agricultural operation interested in on-farm bioenergy production that would or could also accept feedstock from other farms or other biomass waste sources would not be allowed to proceed based on current regulations that consider this an "industrial" operation outside of normal agricultural operations.

In June 2007, prior to its 10th report, the PTC held five roundtables on other clean technology sectors, including independent power production, renewable energy, bio-energy, transportation, and energy in the built environment. These roundtables also identified regulatory barriers as a key inhibitor to their growth. This handful of examples illustrates how regulations have not kept up with technology and now represent an unnecessary impediment to the implementation of better, more environmentally friendly processes.

In the short term, government must identify and address these existing barriers to the application and development of environmental technology solutions. Fortunately, BC has a strong tradition and is a recognised leader in regulatory reform. Since 2001, BC has reduced its regulatory requirements by over 40%. Through the Regulatory Reform Office, the Government has pursued initiatives to streamline and simplify the regulatory system while

preserving regulations that protect public health, safety, and the environment. Reducing the number of regulations is just the beginning. The Regulatory Reform Office is working with ministries across government to improve the way government regulates and supports a culture of innovation.

The Regulatory Reform Office is making a difference but it is clear from the PTC roundtables that a more focussed effort needs to be made. The government must continue to address the fundamental issues around regulatory barriers. Government also needs to go forward with mechanisms that allow it to anticipate the opportunities offered by technology and develop policy and regulation that allows these opportunities to flourish. Other jurisdictions also have regulations that can not keep up with developments in emerging industries. Being able to understand, test and implement technology solutions more rapidly than other jurisdictions will keep BC at the forefront of the ever growing market for climate change solutions.

The Climate Action Secretariat is an ideal body to work with the Regulatory Reform Office to identify and prioritise existing challenges. Furthermore, in order to anticipate technologies and the challenges they may face, both organisations can work with the Pacific Institute for Climate Solutions (PICS). Having recently received funding from the provincial government the PICS has stated that: "Working with government and industry, institute research teams will frame questions, develop policy options and technological solutions, assess the implications, and communicate the issues and opportunities to government, industry and the general public."[25] Government should ensure that anticipating the regulatory changes needed to adopt and encourage emerging technologies that reduce the impact of climate change be a key directive given to the PICS.

Recommendation

Recommendation 11.1: That the provincial government address the regulatory challenges to the development of clean technology by:

- **directing the Regulatory Reform Office to collaborate with the Climate Action Secretariat and work across ministries to identify, prioritise and address regulatory barriers that affect the use and application of current and emerging technologies in addressing environmental issues, and**
- **directing the Pacific Institute for Climate Solutions, through its collaboration between UNBC, UVIC, SFU and UBC, to map current and emerging technologies and recommend to the Regulatory Reform Office how regulation and government policy planning should anticipate and accommodate the opportunities that they present.**

Regional Innovation

Regional Innovation & Commercialisation

"Innovation is a process through which economic or social value is extracted from knowledge—through the creation, diffusion and transformation of ideas—to produce new or significantly improved products, services or processes."[26] - Conference Board of Canada

A jurisdiction's ability to innovate and commercialise is fundamental to its competitiveness and standard of living. Highly innovative jurisdictions produce better quality goods and services, and higher income jobs. The entire economy, including the traditional resource-based industries, must be innovative to stay competitive in the marketplace.[27] There is an emerging social and political consensus that in order to maintain a high quality of life, BC needs to enhance its basic and applied research capabilities and create new types of knowledge-based industries.

BC's regions play an integral role in the overall prosperity of the province. The regions located outside of Greater Vancouver account for more than 50% of manufacturing shipments and produce a higher per capita income from exports than the Lower Mainland. Findings suggest that the innovation support system in Canada has focused its efforts and programs on larger population centres; but shifting the focus to foster innovation in the less populous regions can generate economic growth for BC and Canada.[28] There is increased awareness that innovative capabilities are sustained through local and regional communities of firms and supporting networks of institutions.[29] Ference Weicker, a local consulting company hired to analyse BC's regions, has identified this potential. Ference Weicker states there are "tremendous opportunities to expand economic activity in a wide range of existing and emerging economic clusters. The extent to which we are able to realise these opportunities will, in large part, be determined by our ability to improve productivity, add value and differentiate our products and services through innovation."[30]

Objective of PTC Regional Tour

The PTC regional tour was undertaken by the Regional Innovation Taskforce to examine how innovation and technology can contribute to the growth and development of the regional economies. The taskforce focused on issues that adversely affect the regions, and held discussions on actions or initiatives to encourage regional leadership and collaboration. The findings provided the taskforce with important insight regarding issues affecting BC's regions and served as a starting point to develop recommendations for this report.

Findings from the PTC Regional Tour – Summary of Government Related Issues

A. **Connectivity** – Regions recognised that the broadband infrastructure built through the Connecting Communities Agreement with Telus represents a successful first step. They also made clear that this is viewed as only a first step and that broadband access is an ongoing issue.
B. **Government Funding** – Regions would like a more equitable distribution of government funds for research, perhaps more closely tied to regional industry.
C. **Research and Technology Programming** – Regions would like more regional support for technology initiatives including programs like Mentorlinx and Idealinx.
D. **Academia and Industry Linkages** – Regions believe academia should better interact with and support industry. This includes research in support of local industry and instruction or training that is better tied to industry needs. Students need to be trained on the most advanced technological equipment to ensure they are prepared for the workplace. Costs for such equipment are high and this is an example where collaboration between industry and education institutions could prove beneficial.
E. **Talent** – The skills shortage is more critical in the regions than in the lower mainland and government programming around immigration and Highly Qualified Personnel (HQP) needs to recognise and address this.
F. **Access to Capital** – Access to capital is a regionally magnified challenge and government programming around tax incentives needs to recognise this.
G. **Government and Industry Linkages** – Regions look to government for support or assistance in other ways including:

    - Marketing – assistance internationally;
    - Permitting – reduce red tape on regional development; and
    - Consulting – assist businesses in bridging the digital divide.

H. **Regional Economic Development** – Government needs to better understand and champion regions and in particular regional clusters or strengths.

I. **Regionally Specific Issues** – There were a number of issues raised that were specific to a particular region or a challenge with limited regional impact.

Key Needs – Overall Themes from the Regional Tour

Throughout its tour the Premier's Technology Council heard from many individuals and organisations. Most of the issues discussed revolve around specific challenges that fall into four key themes and can be addressed in the following ways.

1. **Broadband Connectivity** – There is a need to take the next step in extending broadband connectivity and its benefits to all regions and remote areas of BC.
2. **Regional Economic Development** – There is a need for local structures that can better identify and leverage a specific region's key differentiators or obvious strengths.
3. **Industry and Academia Linkages** – There is a need to tie regionally based research and development to centrally located academic expertise and then connect them more effectively to economic opportunities.
4. **Growing Innovative Businesses** – There is a need to address the innovation challenges already identified by the PTC but magnified by the regional challenges of geography and population, such as skills shortages, tax credits and access to capital.

Addressing the Needs

CONNECTIVITY

Throughout the PTC's regional tour, the issue that was raised most often was the continuing need for broadband connectivity. Citizens now view connectivity as essential infrastructure because they need broadband to access basic government services, such as e-health and e-learning, and the private sector depends on it as an essential business tool.

The provincial government has been working to solve this issue in BC. Network BC is a dedicated project office within the Ministry of Labor and Citizens' Services, working with BC communities, the private sector and all levels of government, including First Nations, to facilitate and encourage broadband connections to all BC communities. The BCNET 2010 Project, launched in 2005 with capital funding of $3.15 million from the BC Ministry of Advanced Education is building high-performance networks for BC's research and higher education community while the Provincial Learning Network (PLNet) is a program that gives all BC public schools, colleges and other institutions full access to the Internet.

The PTC has also been focussed on this issue for a number of years. Network BC was formed following a recommendation from the PTC in 2003. Its mandate was to deliver or expand broadband to 366 priority communities, 119 of which had no connection whatsoever. The first step, the Connecting Communities Agreement with Telus, had the key goal of establishing a connection in these 119 communities and this phase of the project has largely been completed (all but two of the 119 have a broadband connection) and according to Network BC's latest data, 360 of 366 communities have a broadband connection to the community.

Due to these various efforts some 92% of the province now has access to a broadband connection, making BC one of the most connected jurisdictions in North America. Having said that, the job is not finished. The remaining 8% represents approximately 300,000 people. This is a fair proportion of the rural population and so broadband remains an issue of concern for those who came to consult with the PTC.

The provincial government is to be commended for the resources it has dedicated to this challenge. But they are not the only government that needs to be involved. In 2000, the federal government set a policy goal of ensuring that broadband networks and services would be available to businesses and residents in every Canadian community. Industry Canada has done some work including the launch of the BRAND pilot program in 2002 (now over) and the National Satellite Initiative in 2003. It should however become more involved to ensure that Canada remains a global leader in the deployment of broadband networks. The BC government should continue its dialogue with the federal government to establish a targeted program that advances broadband connectivity while addressing local and regional infrastructure needs.

Some specific broadband challenges were raised on tour that government should continue to address. The first is the lack of industrial quality broadband which limits local economic development opportunities. In one region the technology based economic development opportunities were constrained because the available broadband was too slow and lacked redundancy. Data heavy businesses in those areas were often required to ship hard-drives via ground transportation when collaborating with clients on large projects. Furthermore, those that required secure and constant access were unable to locate in that community in spite of other favourable factors because of the lack of redundancy. These kinds of challenges were prevalent to one degree or another in most of the regions the PTC visited.

A second specific challenge is the last mile. Anecdotal evidence the PTC gathered on its tour indicates that a large portion of the un-served population is located on the outskirts of connected communities in subdivisions, housing clusters or facilities located on the edge of a town. We heard stories of industrial parks, for example, that were less than a kilometre from a connection point but still could not gain access. This anecdotal evidence is supported by figures from the 2001 Census.

These are all last mile issues and to date the key to addressing them has been the local Internet Service Providers (ISPs). The Connecting Communities Agreement used government procurement to lever a Point of Presence (PoP) in each of the identified communities from the incumbent telecommunications supplier (Telus). The local ISP then accessed the PoP at a discounted rate and delivered the service to the home. Government has also played a role. Network BC has helped bridge some of this last mile cost, through leveraging government spending, grants and other assistance to communities.

The local ISPs will continue to be key players in addressing the remaining last mile challenges. Their local knowledge, local networks, experience and expertise make them ideal partners for expanding delivery to the next layer of unconnected BC citizens. They also tend to be based in local communities so they have the greatest interest in solving the challenge.

The model that allows the local ISPs to provide service to these smaller communities hinges on providing them with low cost access to the PoP. Thus it is important that these remain part of procurement policy as government negotiates its next Master Services Agreement for telecommunications services. If the ISPs lose access to the discounted PoPs, the success in bridging the digital divide could be reversed.

Bridging the last gaps will take more than maintaining this PoP access. Government should consider developing a package that provides a variety of avenues to encourage and assist local ISPs in delivering last mile services. Options it could consider include:

- tax incentives for small Internet Service Providers offering connections or for households that order an Internet connection in rural and remote areas;
- internal government coordination to reduce the administrative burden and costs incurred by small ISPs who are working to bridge the digital divide (i.e. tower sites on Crown Land); and
- a centralised technical support structure that can sustain particularly remote ISPs and not-for-profit community ISPs.

Another connectivity challenge brought to the attention of the PTC is the continuing need for broadband solutions for First Nations communities. In every community we visited, First Nations representatives expressed how critical broadband was to their future.

Assisting First Nations to deliver connectivity to their communities is a government priority, and carries particular significance given the recent shift in relations between the federal and provincial governments, and First Nations. The New Relationship with Aboriginal People, the Transformative Change Accord and Bill C-34 are all developments that occurred after the PTC's original broadband recommendations.

In November 2005 First Ministers and National Aboriginal Leaders agreed to take action to

improve the quality of life for Canada's Aboriginal peoples in five important areas: First Nation-Crown relationships, health, education, housing and economic opportunities. In accordance with that commitment, BC, Canada and the province's First Nations Leadership Council signed the Transformative Change Accord, which commits parties to closing the socioeconomic gaps over a ten year period. The Accord includes numerous commitments, such as providing broadband connectivity to First Nations communities and the creation of a fully integrated clinical telehealth network. Bill C-34 gives First Nations control of the curriculum development and delivery for their education programs.

The BC government has granted First Nations more autonomy to govern and improve the lives of their people in BC. The 2006 Throne Speech spoke of closing the gaps that have disadvantaged Aboriginal children and families in the past. Although many social indicators have been improving there is still a wide divide between First Nations and the rest of the population for statistics such as unemployment and high school graduation rates. The Campus 2020 Report, prepared for the Ministry of Advanced Education in April 2007, has set a goal to ensure the rates of Aboriginal post-secondary participation and attainment are equal to the rates for the general population by 2020.[31] Connectivity can empower First Nations communities and provide them with opportunities and the ability to continue thriving. The First Nations Summit Chiefs, upon creating the First Nations Technology Council in 2002, declared the internet a crucial element of life, as vital as clean water or community land.

In order to meet commitments made to First Nations over the past several years, the provincial government has to make significant investments that assist First Nations in delivering broadband connectivity for all of their communities. It must not only assist in connectivity but also in capacity building to ensure the expertise is built that can take advantage of what the technology has to offer. As with broadband issues facing the broader population BC must also encourage the federal government to support First Nations broadband initiatives.

Recommendation 11.2: That government continue to address the broadband challenges for British Columbia by:

- **establishing a plan to address broadband related hindrances to economic development in BC;**
- **continuing to use its own telecommunications procurement as a lever for supporting regional delivery through local ISPs and make this solution part of a broader package that supports local ISPs in the delivery of these services; and**
- **continuing investment to assist First Nations in broadband delivery and related capacity building.**

INNOVATION IN THE KNOWLEDGE ECONOMY - THE NEED FOR COOPERATION

During the regional tour many participants stated that government needs to increase the economic development services and programs it offers to the regions. To understand this concern it is important to examine the provincial and federal innovation initiatives already underway in British Columbia. The BC Innovation Council (BCIC) in particular has to be recognised for recent, regionally relevant initiatives. They are looking to create virtual boards to assist companies and they are establishing business plan competitions to graduate more regional companies. BCIC is also working with the Regional Science and Technology Network (RSTN) to ensure that the network has an efficient, cohesive approach, and has granted them additional funding to administer mentoring programs. The provincial government has also undertaken a number of outreach initiatives so regions can take better advantage of the strong, but underutilised, Provincial Nominee Program (PNP) to bring skilled workers to BC communities from other countries.

There are a number of other laudable programs, (see Appendix C for a full listing) yet it became clear to the PTC that more needs to be done at the local level to ensure the benefits of these efforts are felt in the regions. Numerous studies indicate that for the efforts of the broader governments to be effective, there must be a regional, grassroots partner to drive economic development. This raises the key challenge identified by the PTC on this tour. Within each region, there is a notable difference in the levels of collaboration for economic development. The PTC believes improving the locally driven and controlled economic development networks will assist in a number of technology specific areas. These include opportunities for: improved collaboration between research institutions and industry; collaboration between post-secondary institutions and alliances with research institutes and non-governmental groups.

There have been a number of studies on this issue.[32] The Global Connect report was prepared for the Ministry of Advanced Education and BCIC and submitted in May 2007. It found that successful, sustainable initiatives also require grassroots momentum that is driven by local leadership and a variety of other players in the innovation system. It recognised that although there have been major developments to foster collaboration across institutional and organisational boundaries in BC, "there remains a high degree of fragmentation and there appears to be an absence of a community that is highly engaged in an integrative process of supporting commercialisation."[33] Too often the "silo-ing" of interests prohibits the creation of similar collaborative cultures evidenced by the achievements of the most successful jurisdictions, those being the Connect Sweden network, the Council for Entrepreneurial Development in Northern Carolina and Connect in San Diego.[34] The report identified three features of successful regions: "a culture that supports collaboration among key elements of the innovation community; networks that provide platforms for that collaboration, led by a

pre-eminent integrative organisation; and imaginative and well-aligned leadership that allows for the culture and platforms to take root."[35]

The Banff Consensus, a report published in 2006 following an Innovation Summit by the Centre for Innovation Studies, further supports this. It outlined key principles for integrating Western Canada into the global innovation system. The Consensus noted that both top-down and bottom-up initiatives are needed to cultivate innovation, but that innovation cannot be stimulated without vision and leadership. It also discusses the ability of governments to add value through cooperation. Pooling industry-academia research capabilities, bringing knowledge and skills together, leveraging R&D resources and raising the profile of regional initiatives can harness significant potential.[36]

As an example, Japan implemented initiatives designed to overcome the isolation of small firms in outlying regions. The Industrial Cluster Project of the Ministry of Economy, Trade and Industry (METI) and the Knowledge Cluster Initiative of the Ministry of Education, Culture, Sports and Science and Technology (MEXT) aimed to build inter-firm networks and encourage universities and governments to play a more active role in local economic development. The nine regional bureaus of METI established networks of local SMEs, universities and public research institutions. METI visits individual companies and research laboratories, introducing businesses to local research facilities and finding matches for research and business opportunities. MEXT focuses on commercialising university research by encouraging institutions to work with firms in local areas. It provides seed funding for joint activities, as well as the operating costs of associations, and improves the flow of research from and between universities. By 2005 METI had 19 industrial cluster projects with about 6,100 participating companies and around 250 universities; it also initiated 40,000 new businesses.[37]

Lessons Learned from Japan – BC Implications

A report produced by the Asia Pacific Foundation of Canada entitled, Japanese Approaches to Technology Clusters: Implications for British Columbia, examines what can be learned from the Japanese experience of cluster development.

A. National and Provincial Backing for Local Clusters

In depth cluster studies need to be carried out based on the competitive strengths of each of BC's regions and universities. BC's regions currently lack (strong enough) coordinating organisations to support economic growth and technology and they lack the capacity to plan and promote clusters. The commentary states, "bottom up initiatives will only be successful if allied with strong capacity-building in the regions provided by central governments."

B. The Importance of Local Leadership

'Civic entrepreneurs' are vital to catalyzing collaboration and the development of new industries in local regions. They are adept at assisting with strategic visioning, galvanizing socially organised activities and representing the collective interests of their region.

C. Stronger Support for University-Industry Links

The old division in knowledge production between pure and applied research has given way to new forms of partnerships and collaboration. Efforts to improve these relations are taking place as evidenced by on campus incubator facilities and Technology Licensing Offices in Japan.

D. A Place to Call Home

The importance of informal linkages and contacts has become widely accepted in the innovation literature. Cross-pollination of ideas and projects provides synergies and encourages serendipitous innovation. The Kyoto Research Park is a good example of the importance of place. The commentary suggests that BC should establish these "hubs" and space should be set aside for research institutes, industrial associations and government agencies at the same location. Establishing these locales should then take place across the province.[38]

Clearly, British Columbia needs collaborative working structures at the regional level to address innovation and economic development. For these structures to be effective however they cannot be driven by the provincial government. The effort must be driven by local organisations that can identify and leverage the region's strengths and are also best suited to meaningfully involve and unify the communities and industries in the region. The body should include community champions, representatives from industry, different levels of government and academia, and RSTNs. It is critical that they act under one umbrella group and agree on key areas of focus for the region.

The PTC notes that such efforts and initiatives have been undertaken before, most recently through the Regional Economic Alliance program, which was piloted in 2005. That program was preceded by the Okanagan Partnership which began with some federal funding. These organisations have faced challenges however as the limitations of pilot funding have prevented creating a sustainable model. They are often forced to fund themselves through administration fees on a project by project basis and this limits their ability to focus on the best economic development strategy for a given region.

The need then is for a stable, secure economic development funding structure that will drive the regional collaboration that broader governments need in their grassroots economic development partners.

Recommendation 11.3: That government create a stable funding structure for non-government economic development bodies that:

- **are regionally collaborative;**
- **are locally driven by business leaders;**
- **have significant industry input; and**
- **have strict data driven criteria for decision making.**

REGIONAL INDUSTRY RESEARCH COLLABORATION

As well as coordination within a region, there is a need for greater coordination amongst BC's many advanced education institutions, organisations and companies to enhance innovation and commercialisation. There are a number of provincial programs and organisations that are looking to address this. The Accelerate BC program developed by MITACS is an excellent example. It places graduate students in an actual workplace to assist on research issues. Another is the Applied Genomics Innovation Program from Genome BC. It looks for genomics applications in existing industries and current projects include applications for fishing, mining, bioenergy, and agriculture. There are also instructive models from other jurisdictions, such as the UK.

UK Initiatives to Promote Innovation

The UK Department for Innovation, Universities and Skills (DIUS) is offering a range of initiatives intended to help small businesses link up with universities and colleges to develop new products and services. Key features include:

- At least 1,000 innovation vouchers every year by 2011 to support small and medium sized businesses to work with a university, further education college or research organisation of their choice. This is expected to generate an investment of at least £3 million to initiate collaborations between SMEs and the knowledge base.
- Doubling the number of knowledge transfer partnerships between businesses, universities and colleges.
- Piloting a new specialisation and innovation fund that boosts the capacity of further education colleges to unlock workforce talent and support businesses.
- Expanding the network of national skills academies.
- DIUS and the Confederation of British Industry (CBI) will facilitate the interchange of innovation expertise between the public and private sector, including the secondment of private sector experts into the public sector for the purpose of mentoring in pro-innovation procurement.[39]

What BC currently lacks is an overarching, collaborative program to tie its different initiatives together. As well as coordination within a region, there is a need for greater coordination amongst BC's many advanced education institutions, organisations and companies. This is particularly true for industries and businesses located away from the academic centres. Local industries will often have a research challenge or innovation idea and require the assistance of academic expertise to bring it to fruition. Industry is unclear about who to contact for expertise due to the lack of coordination within the system. There needs to be a way that industry can share research challenges with academic researchers. BC needs regionally relevant, internationally competitive, leading-edge applied research produced by world-class academics in partnership with various stakeholders.

Recommendation 11.4: That the Ministry of Advanced Education support regional research development and deployment in the regions in collaboration with the BC Innovation Council and post-secondary institutions.

BC'S ADVANCED EDUCATION INSTITUTIONS - RESPONSIVENESS AND FLEXIBILITY

As industry sectors transform and the economy diversifies, post-secondary institutions need to effectively respond to local industry and community needs. At the regional level in particular, their mandate seems to be changing as they are required to balance local issues and provincial training priorities. BC's rural education institutions face added challenges when attempting to deliver education and training services to a smaller, geographically dispersed population.

As an example, a company may need 50 workers trained to be mining engineering technicians over two years. The program would be full for that period but not sustainable in the long term, making it more expensive to initiate. Furthermore, technology-related programs are expensive to start and run for a short period so it is not economically viable for the business to pay for the entire course. Placing the cost solely on the student is an equally impractical solution.

To address this issue advanced education institutions require flexibility for just in time training models. Technology can play a role in addressing this challenge as it now offers greater opportunities to diversify offerings by partnering with other institutions. The Ministry of Small Business and Revenue has recently installed 38 video conferencing facilities as have many of the colleges. These facilities can help deliver 'one off' programs to address short term needs as well as diversify offerings.

Colleges should be incented to host established programs from other organisations and the additional costs incurred should not be paid by the existing budget. There could be a grant fund, or a "regional fund," to cover the costs of importing summer programs or programs with a one or two year window of viability. A new model that provided committed government funding for a limited time period, with a short negotiation and approval process, could meet some industry needs and help to address BC's skills shortage.

Recommendation 11.5: The PTC recommends there be a budget allocation to fund program flexibility in order to establish short term and emerging technology training programs as required by industry.

CAPITAL

The Ministry of Economic Development's Investment Capital Branch administers tax credit incentives under the Small Business Venture Capital Act (SBVCA) and the Employee Investment Act (EIA). Both programs support the BC government's commitment to triple the supply of venture capital to companies in communities throughout the province. Ensuring there is adequate seed capital for emerging small businesses is a strategic priority and over

$270 million has been invested in eligible capital investments under the SBVCA since 2003.[40]

The PTC wishes to congratulate government for this highly successful initiative that is promoting economic development and fostering a culture of innovation in the province.

The Equity Capital Program was created to encourage equity investment in eligible small businesses in British Columbia. To recognise the risk element involved in making equity investments, the province provides a 30% refundable tax credit to investors who invest in eligible small businesses under the program. The SBVCA Community Venture Capital Program is an add-on to the Equity Capital Program and was established to encourage equity investment in regional businesses outside of the GVRD and CRD.[41]

The Community Venture Capital Program allocates $3 million in tax credits for regional distribution. This $3 million is always fully subscribed, which indicates there is potential to expand such a program. The government could provide additional allocation to fundraise to the Venture Capital Corporations (VCCs) provided that additional money is spent regionally. Should the regional component not be met, government could claw back the difference through the pacing requirements. Furthermore, one of the anomalies of the $3 million regional allocation is that the vast majority of it is distributed in the larger regional centres. There is proportionally less distributed in the smaller regional communities where access to financial or legal advice and government agencies is more limited.

One potential solution is to expand the regional allocation but in the form of a third tier, for regions of even smaller population than where the majority of the current regional allocation is distributed. The challenge to the administration of such a program however would be how to differentiate between such communities and the legal implications of such a differentiation. In other words, how and where would one draw the line? From an operational policy perspective however, government could make greater efforts to promote the program in the smaller communities.

Recommendation 11.6: The PTC recommends that additional tax credits be allocated to the Small Business Venture Capital Act's (SBVCA) Community Venture Capital Program in the form of increased regional allocations and that the Investment Capital Branch implement policy to encourage greater distribution to smaller communities.

Industrial Design

Introduction

In its 10th report the Premier's Technology Council recommended steps that would give British Columbia a competitive edge by improving innovation and commercialisation. One key component identified at that time but not expanded upon is the role of Industrial Design (ID). A number of studies indicate that companies benefit from using industrial design.[42] [43] [44] [45] These benefits include:

- differentiation in the market place;
- increased product utility, visual quality, and user experience;
- improved development and manufacturing processes;
- greater sustainability; and
- improved business performance.

Due to this wide range of benefits, design is one of the few means left for companies to gain a competitive advantage, particularly in mature markets.

"At Sony, we assume all products of our competitors will have basically the same technology, price, performance and features. Design is the only thing that differentiates one product from another in the market place!"[46] - Nono Ohga, former Chairman and CEO, Sony

DEFINITION OF DESIGN

According to the Industrial Designers Society of America (IDSA), "Industrial Design is the professional service of creating and developing concepts and specifications that optimise the function, value and appearance of products and systems for the mutual benefit of both user and manufacturer."[47] Industrial design, which sometimes overlaps with other design disciplines, is about marrying precision and accuracy with the look, feel and utility of a product. This can be demonstrated through a recent example of successful ID, the Apple iPod. This product not only employed cutting edge technology to create an efficient device for storing and playing mp3s, it did so in an attractive and easy to use form. But ID is not just about making a pretty product; it is about ensuring the product is user friendly and operates effectively as well. Steve Jobs of Apple said it best, "Design is not just what it looks like and feels like. Design is how it works."[48]

Benefits of Industrial Design

BUSINESS CASE FOR INDUSTRIAL DESIGN

Design can be a source of competitive advantage in the marketplace because it differentiates and defines premium products in an era when most competitors have the same technology.[49] Through improving usability, ergonomics, aesthetics, sustainability and overall quality, ID creates more competitive products and services, improves customer experience and strengthens the brand.

The benefits of design are not limited to creating an improved product. ID also improves product development and manufacturing processes, speeding time to market and ensuring new products integrate with the rest of the product portfolio. It serves as a resource for creating new business opportunities, and improving a company's ability to cope with change. ID contributes to increased sales, improved margins, and higher stock performance. In short, the use of ID is just good business.

As a result, many companies have made design an integral part of their core strategy. These include Apple, Philips, Google, DeWalt, Nokia, P&G, Xerox, Sony and others. The impact of a strong design program is demonstrated by success stories from these companies. For example, the iPod was redesigned for larger capacity and smaller size. It was launched in spring 2004 and increased Apple's brand value by 24% from 2003 to 2004.[50] Apple is not the sole example of this kind of success. The UK Design Council tracks a Design Index of 61 design-led businesses traded on the London Stock Exchange. This index has outperformed key stock market indices (FTSE 100 and FTSE All-Share) by about 200% in the past decade.[51] [52]

Increased brand value is not the only benefit. Investment in design will contribute to a company's revenue and profit. One annual study among UK companies revealed that every £100 spent on design by design alert companies ([1]) increased revenue by £225.[53] [54] Companies that increased their investment in design were also more likely to experience revenue growth, by as much as threefold if the company used design to lead and guide the product or service development process. These figures indicated that design alert companies saw an average increase of £602,000 in their yearly revenue.[55]

The impact of design is not limited to this jurisdiction, nor is it limited to consumer products. In the Finnish metal sector, for example, there is a positive correlation between the design investment in companies and their sales growth. [56]

[1] The 'design alert businesses' are specific 250 companies out of the 1,500 businesses thoroughly interviewed in the UK Design Council National Survey of Firms. In these companies design had made a direct impact on a number of measures, such as competitiveness, market share, revenue and employment.

Similar design impacts have been noted in North America. A seven year study among almost 200 manufacturing companies submitting filings to the US Securities and Exchange Commission (SEC) demonstrates that companies with more effective industrial design (ranking done by design managers globally) outperform their counterparts systematically. For "effective design" companies; the EBITDA (Earnings before interest, taxes, depreciation, and amortisation) to Net Sales was on average 75% higher than the industry average over the seven years. Companies with less effective ID had a 55% lower ratio than the industry average. Investment in design can also be measured with the Net Income to Total Assets (ROA) ratio. The study demonstrated a significant association with ROA and effective industrial design. Not surprisingly, the companies with a more effective design program outperformed their competitors in stock market returns during every year of the study.[57]

There is little doubt that design is a wise investment regardless of business sector or jurisdiction.

BENEFITS OF PROMOTING DESIGN IN A JURISDICTION

It is just as important to promote ID at a jurisdictional level. ID is a critical component of competitive products and business processes. This is particularly true in the development of the innovation and technology sectors that drive growth for the economy. Furthermore, increased use of ID increases exports and employment. Consequently, it is no surprise that countries with higher use of design rank higher in the Global Competitiveness Report by the World Economic Forum.[58] [59] Many other jurisdictions are now investing heavily in the development and promotion of ID with a view to building the next generation of global technology companies. This investment is also driven by the fear of losing companies and tax revenues if design and R&D become outsourced in addition to manufacturing. The words "Designed in the USA, assembled in China" which are on the back of every iPod may not be true for long.[60]

Economically successful countries with national design polices or programs include the United Kingdom, Denmark, Finland, Sweden, Norway, Germany, New Zealand, Australia, South Korea, Japan, Taiwan, China and India. These are all countries with strong technology related industries and growing economies. Even more importantly from the BC perspective, they are all jurisdictions with which we trade and compete. The rate of adoption amongst other jurisdictions is increasing and BC should move soon to prevent low usage of ID from becoming a competitive disadvantage.

Industrial Design Potential for British Columbia

Traditionally BC's economy has been driven by the resource based industries with little use of ID. Even the technology sector here does not have many companies with proprietary technology or product development. The net result is that ID investment in BC has been quite small. The PTC believes that this is ripe for change due to a number of strengths and, more importantly, the need to address some pressing challenges.

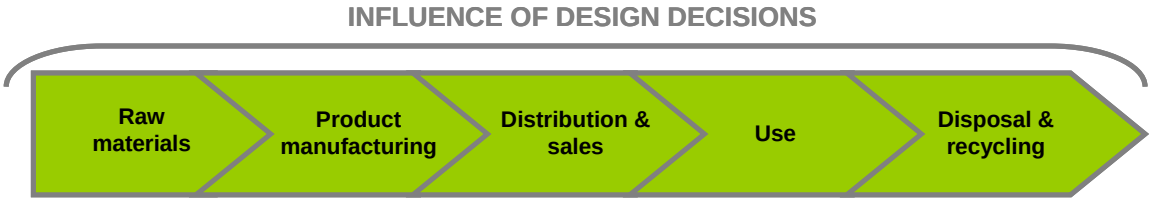
One asset in this area has been the Emily Carr Institute of Art and Design (ECIAD). Its programs offer both a BA and an MA in industrial design and produce about 30 ID graduates per year. Government is to be commended for recognising the importance of this institution through its recent designation of Emily Carr as a University, to be called the Emily Carr University of Art and Design (ECUAD). BC also hosts a Design Research Canada network at SFU, which links design researchers to industry. The BC Industrial Design Association (BCID) can also be considered a strength. Although small, their commitment to the further development of the industry and their knowledge of local opportunities will be important to future success.

Another strength identified in the PTC 10th report is the important role BC's creative class plays in fostering innovation and commercialisation. ID professionals are an integral part of the creative class that helps to attract talent and contributes to the strength of the entire economy.

BC's potential in this area is demonstrated in some of the early success stories among BC companies using ID and working with the BC design service sector. These companies are mainly in outdoor equipment, transportation, lighting, clean technology, advanced manufacturing, and high technology sectors. ID has also played a role in developing user interfaces for the new media sector. STEMCELL Technologies working with Form3 Design consultancy reduced the manufacturing costs of their equipment by 40% through design.[61] Xantrex exceeded its sales forecast for the product category by 30% in two years.[62] Angstrom, with help from Tangram Design, has used industrial design not only in the development of successful demonstration products but also as a strategic business tool.[63] Greenlight Innovation cooperated with UNIQUE:ID and reduced assembly time and material costs of their equipment by 25% to 30%.[64]

There are two particular opportunities for industrial design to play a role in BC's industries. The first of these is in the development of clean technologies and their associated products. Design decisions made in product development affect the entire value chain and the environmental footprint the product creates during its life cycle. It is estimated that 70% to 90% of any given product's footprint can be addressed at the design stage.[65]

Figure 3. Design decisions affect all parts of the value chain[66]



This does not just apply to consumer products but to all products from wood pellets and hydrogen fuelling stations to medical devices. The industrial design discipline uses several guiding principles to ensure Design for Environment (DfE) and minimal footprint. These include Cradle to Cradle, Life Cycle Assessment (LCA), and Carbon Life Cycle Analysis. One of the most recognised curriculums for teaching these principles is the Okala Design Guide co-developed by one of the ID faculty members at ECUAD. The guide is endorsed by IDSA and the material is used by over 60 design schools in the North America.[67]

This is particularly important to BC where we believe in a more environmentally conscious lifestyle and are trying to capture market share on clean technology products. The consumers of products and technologies that serve a 'green' purpose expect these products to be designed and developed using sustainable design standards.

The second opportunity is in the transformation of our traditional resource based industries. Mining and forestry remain critical components of BC's economy. This is true for the regional economies but also in the urban centres where, although their impact is less visible, they remain the most important economic driver. Furthermore, contrary to the traditional view of the lumberjack with an axe or a miner with a pick, technology and hence design play critical roles in these traditional industries. These associated technologies are among the most important opportunities for British Columbia.

These industries are facing challenging times however, and design will play an important role in addressing current and emerging issues. This is particularly true for BC's wood products sector as the forest is transformed by the impact of the pine beetle. The forest and wood products industries must develop new products and practices, and look to the future. Key competitors in the wood markets in Scandinavia, New Zealand and the USA have all recognised the need to apply design to the wood industries and are investing in programs.[68] In BC FPInnovations, Canada's Wood Products Research Institute, is working to increase the awareness and use of design in the forest sector.

Potential Actions for Government

It is evident that many of the assets required for a robust ID culture already exist in BC, albeit in either nascent or unconnected form. The matter at hand is how best to leverage them. The PTC believes that although industry itself must take responsibility for ensuring that BC increases its usage of industrial design there is still a role for government. In other jurisdictions governments are investing heavily in design and the kinds of initiatives they have undertaken provide options for the BC government to consider.

Some have built national design centers to promote training, support research and showcase design. Others actively support the use of design in product development through tax credits or other forms of support like design venture funds. There are programs to support Small and Medium Sized Enterprises (SMEs) in design, and programs that increase design and multidisciplinary education. There are governments that go through public procurement for design services, and others that invest in public awareness to highlight the benefits of design or strengthen national identity. [69] [70] [71] [72] [73]

Among this raft of options for the promotion of design in BC the PTC identified some potential avenues for government to consider. They fall into three key themes.

Theme I – Establish the leadership needed to create ID success

1. **Strategy** – Government could consult with successful programs elsewhere to create a leadership strategy to provide immediate impetus for the use of ID in BC.
2. **Design Chair for ECUAD** – Government could fund a Chair of Industrial Design at the Emily Carr University of Art and Design. This Chair may or may not be focused on specific design opportunities but must be a collaborator between industry and research sectors and have the ability to raise public awareness. As a current funding benchmark, the endowment for a Chair from the Leading Edge Endowment Fund (LEEF) is $4.5 million.
3. **Promotional Campaign**– Government could work with the design community, BCID and ECUAD to raise awareness of how ID can improve almost any business. Such a program may include events, competitions or BC Design Awards.
4. **Global Design Awards** – BC industrial design firms and companies that use Industrial Design in the development of projects should be encouraged to compete globally for ID awards. Encouragement could include celebrating the win and assisting companies in preparing their submission. The most prestigious global design awards include: the International Design Excellence Awards (IDEA), Red Dot Design Award, iF Award, I.D. Annual Design Review, and Good Design Award.

Theme II – Create the infrastructure for practitioners and users to succeed

1. **Targeted Training/Education** – Develop expertise and awareness around design by including ID, especially DfE, in engineering and business program curricula, and introducing a multidisciplinary graduate program for Engineering, Marketing and ID.
2. **Prototyping Lab** – Create a prototyping lab that applies ID to developing products, particularly for small companies, and provide a facility for them to test and demonstrate the efficacy of such ID. Because of ECUAD's small facilities such a lab could be located at Great Northern Way, allowing ECUAD to lead a collaborative venture with industry and other institutions.
3. **World Class ID Skill Sets** – Identify the world class companies in ID, investigate if there are any practitioners who are Canadian ex-patriots or individuals in the US who can otherwise be encouraged to move to British Columbia.

Theme III – Make it easier to learn, evaluate and adopt ID as a strategy

1. **Credits** – The regulations surrounding SR&ED are not clear with regards to how they could be applied to ID activities. This could be amended to specifically state that ID costs are eligible for SR&ED.
2. **BC Innovation Council & National Research Council** - Industry Research Assistance Program (NRC-IRAP) – The BC Innovation Council could collaborate with a federal funding program such as NRC-IRAP to determine the feasibility of a funding program to accelerate ID in the near term.
3. **ECUAD Internship Program** – ECUAD could develop an internship program in the style of MITACS where representatives of the design programs go into businesses to identify the opportunities to apply ID and supply students to work in the company.
4. **Design Centre / Council** – The provincial government could partner with key industry players and educational institutes to develop a small design centre, specifically focussed on the key opportunities for ID application in BC.

These opportunities can best be understood and identified in the context of a greater plan. Experience in other jurisdictions shows that such a plan should be reasonably long term and include a number of components. It often resides in ministries responsible for a jurisdiction's innovation strategy, economic development and trade, or culture. Further work needs to be done to determine where the best opportunities lie for BC.

Recommendation 11.7: That the provincial government develop a plan for the promotion and development of Industrial Design as a key component of BC's innovation economy and consider the first step of providing $4.5 million to fund an Industrial Design Chair for the Emily Carr University of Art and Design.

Appendix A. List of Clean Technology Roundtable Participants

Lawrence Alexander, Special Advisor
Climate Action Secretariat, Office of the Premier

Janet Benjamin, Consultant

Michelle Blake, Director, Engineering and Project Services, Translink

Shannon Boase, President and CEO
Earthcycle

Jack Bryden, Environmental Management Officer, Ministry of Environment

Rod Bryden, CEO
Plasco Energy Group

Jonathan Burke, VP, Corporate Development
Westport Innovations

Chris Clements-Currier, Automotive Manager, Terminal Maintenance, BC Ferries

Gary Cowell, CEO
Richmond Auto Mall

Gordon Doyle, Business Development Manager, Terasen Gas

Ron Drolet, Sr. VP, Customer Service and Corporate Secretary, BC Transit

Robert Evans, Clean Energy Research Centre
UBC
Claes Fredriksson, Business Development Specialist, Terasen Gas

Richard Gaudet, Director and Project Management, Xantrex

Mary-Margaret Gaye, Executive Director
BC Greenhouse Growers Association

Lorne Gettel, President and CEO
Advanced Lithium Power

Fred Ghatala, Assistant Director of Policy and Regulatory Affairs, Canadian Bioenergy Corporation

Andrew Hall, Director of Sales and Marketing
QuestAir

Ron Iacobelli, Chief Technology Officer
Azure Dynamics

David Lange, Founder
Extensible Computational Chemistry Environment

Janice Larson, Director
Ministry of Energy Mines and Petroleum Resources

Paul Libby, Managing Director
Cedar Road LFG

Ross MacLachlan, President
Lignol Innovations
Richard Marchant, COO
Powertech Labs

Bob Menard, Regional Fleet Manager
Purolator

Bette Miller, President
Extensible Computational Chemistry Environment

Anne Murray, VP
Community and Environmental Affairs
Vancouver International Airport

Fred Nenninger, Regional Manager
Regional Utility Planning, Metro Vancouver

Ian Robertson, Executive Director, Corporate Communication and Public Affairs
Great Canadian Railtour Company

Gustav Rogstrand, Waste Management Specialist, BC Ministry of Agriculture and Lands

John Sheridan, CEO
Ballard

Gordon Skene, President
Micro Sludge

Melanie Stewart, Executive Director, Planning and Policy Research, Climate Action Secretariat

Anwar Sukkarie, CEO and President
Web Tech Wireless

Hamid Tamehi, Senior Engineer and Project Manager, Sacre-Davey

Paris Thomas, Director of Communications and Policy, BC Dairy Farmers Association

Ulf Tryggvesson, Senior Process Specialist
Poyry

Anthony Van Grol, Director of Engineering
Teleflex Power Systems

Craig Webster, Director of Energy Systems Engineering, Powertech Labs

Graham Whitmarsh, Head
Climate Action Secretariat

Appendix B. PTC Regional Tour Dates, Locations & Participants

Tour Dates & Locations

Terrace (NSIS) – October 2, 2007
Cranbrook (KRIC) – October 4, 2007
Castlegar (KAST) – October 5, 2007
Kamloops (ISIC) – October 10, 2007
Kelowna (OSIC) – October 11, 2007
Fort St. John (Sci-tech North) – October 24, 2007
Prince George (IRC) – October 25, 2007
Nanaimo (MISTIC) – November 1, 2007
Victoria (VIATeC) – November 9, 2007

Tour Participants

Autumn Abrams, Systems Administrator
Timberline Natural Resource Group

Sean Abrams, Owner
Abrams Consulting

Andy Ackerman, Vice Chair
Fort St. John District Chamber of Commerce

Lori Ackerman, Executive Director
Sci-Tech North

Bob Allen, President
ABC Communication

Elizabeth Anderson, Manager
Omenica Beetle Action Committee

Sasha Angus, EDO
Greater Victoria Development Agency

W.R. (Duke) Armleder, Technical Manager
Tembec

Kathy Arney, Acting Director of Development, UBC Okanagan

Jill Bain, Business Support
National Research Council –Industrial Research Assistance Program

Betty Barton, Business Mentor
National Research Council –Industrial Research Assistance Program

Greg Belland, New Business Development Manager, Teck Cominco

John Belshaw, Associate VP Education
North Island College

Glen Bennett, Chief Councillor
Kitselas First Nation

Rob Bennett, Board Chair
Vancouver Island Advanced Technology Centre

Jill Boland, Executive Director
Tech Village

Brian Booth, Manager
Chemainus First Nation

Mike Boudreau, President and CEO
Technology Brewing Corporation

Tracy Boyd,
Community Futures Grand Forks

Rick Braam, Regional Project Manager
Ministry of Economic Development

Jim Brackett, President
Syndel Laboratories

Wolfgang Brunnbauer, Owner and President, JLS Forum

Paul Burgener, Advisor
National Research Council –Industrial Research Assistance Program

Steve Burns, President and CEO
Burns Innovation Group

Austin Byrne, Executive Director
Kitimat Terrace Development Society

Peter Cameron-Inglis, Owner
ASL Limited

Chris Campbell, Consultant
Renewable Energy Group

Greg Caws, President and CEO
Enquisite Software

Richard Chesson, VP Strategy
Carmanah Technologies

Geoff Clarke, ITA
National Research Council

Randy Cooke,
Elk Valley Coal

Steve Cotton, President
Micro Precision Parts Manufacturing

Alan Coyle, Director Public Affairs
Okanagan College

Steve Cross, President
Aquametrix Research

Nikki Csek, Owner
Dot Com Media

Viva Cundliffe, CEO
Strategic Visionary Alternatives

Jordon Dagg, Business Manager
Schneider Electric

Harry Daniels, Negotiator
Gitanyow First Nation

Alan Danks, IT Specialist
Nelson and District Credit Union

Tammy Danshin, Administrator
North Peace Education

Fraser Deacon, Coordinator
16/97 Economic Alliance

Hans DeBruyn, Owner
Okanagan Technology Consulting

Greg Deck, Mayor
Cranbrook

Mary DeVos,
Columbia Mountain Open Network

Kevin Dobbin, Development Coordinator
Alcan

Colin Dobell, President
Inuktun Services

David Drakeford, Dean
Malaspina University- College

Mike DuToit, Entrepreneur
Kootenay Rookies Innovation Council

Rob Dykman, Owner and General Manager, Tower Radio

Jordan Eliason, Communications Advisor
JSL Forum

Pauline Eugene, Administrative Assistant, Traditional Knowledge and Language Sector, Ktunaxa First Nation

Garth Frizzell, President
Terra Cognita Software Systems

Wilf Froese,
Media Webb Solutions

Brian Fry, President
Rackforce Hosting

Mary-Lyn Fyfe, Director, Telehealth
Island Health Authority

Angus Graeme, Dean
Selkirk College

Mark Grambart, CEO
Contech Electronics

Jason Gray, Consultant
Meyers Norris Penny

Charlie Graydon, Owner and President
Graydon Security

Geoff Greenwall, Business Advisor,
Okanagan Nation Alliance

Corie Griffiths, Officer
Economic Development Commission

Dan Gunn, Executive Director
Vancouver Island Advanced Technology Centre

Bruce Hardy, National Research Council
Industrial Research Assistance Program

Roger Harris, Executive Director
Kitimat Port Development Society

Ian Hartley, Associate Dean
University of Northern BC

Wally Harwood, Director
Sci-Tech North

Peter Haubrich, Director
Okanagan Resource and Innovation Centre

Al Hildebrandt, President
QHR Technologies

Heather Hornoi, Economic Development Officer, City of Kimberley

Peter Jeffery, President
FormaShape

Daryl Ketter, Integrated Digital

Arvo Koppel, System Administrator
Peace Regional Internet Society

Jennifer Krotz, Community Liaison
Columbia Basin Trust

Judy Kucharuk, Administrator
South Peace Education

Lynda Lafleur,
Columbia Basin Trust

Alex Lautensach, Assistant Professor
University of Northern BC

Weldon Leblanc, CEO
Chamber of Commerce, Kelowna

Roger Leclerc, Manager
Kitimat Valley Institute Corporation

Tim Leggett, CEO
Traction Technologies

Nelson Leon, Chief
Adams Lake Indian Band

Paul Libby, Managing Director
Cedar Road LFG

Kim Loub, Operations Manager
Gate to Plate Food Services

Don Maki, Dean of Traditional Knowledge and Language Sector, Ktunaxa Nation

Katie Mauthner, Business Consultant
Shinoqua Solutions

Fred MacDonald, Dean, Trades, and Applied Tech, Malaspina University-College

Rob Macrea, Integrated Environment Planner Selkirk College

Primo Majoko, Technical Services Manager, Teck Cominco

Dave Mannix, Economic Development Officer, Snuneymuxw First Nation

Dan Manuel, IT Manger
Upper Nicola Band

Steve Martin, Kootenay Savings Credit Union

Denise McCabe, Lawyer and Trademark Agent, Fulton & Company

Dan McCarthy, General Manager
Columbia Mountain Open Network

Doug McLachlan, Dean
College of the Rockies

Troy McMillan, Senior Analyst
PC Doctor

Cathy Mercer, Director
Selkirk College

Pat Miller, Manager
Sun Peaks Utilities Company

Mike Morrison, Production and QC Manager, MCI Solutions

Ray Nyuli, Weyerhaeuser

Dave O'Leary, Dean of Trades and Technology, Northwest Community College

Kate O'Neill, Project Manager
Eagle Vision

Chris Ortner, President
Cirque Resource Associated Ltd

Will Peirce, CEO
City of Cranbrook

George Penfold, Chair
Regional Innovation Council

Kathy Peters, Nurse Manager
Health Care

Marilyn Petersen, Manager
College of the Rockies Invermere

Tom Phillips, Information Technology Manager, Ktunaxa Nation

John Pictin, Web Master
Selkirk College

Sophie Pierre, Chief
Ktunaxa First Nation

Matt Pommer, Chair
Kootenay Association for Science & Technology board

Keith Powell, Publisher
Kootenay Business Magazine

Don Reimer, President
D.R. Systems

Marlies Roeder, Researcher
D-Pace

Carrol Rosner, Owner
Cybernet

Stuart Ross, Manager
Pacific Insight

Cindy Rost, Program Director
North East Native Advancing Society

Jeffery Rueger, Team Leader
Northern Health

Nick Sardy, Owner
The Computer Access Centre

Carrie Schaefer, Community Development Manager, College of the Rockies

Tyler Schwartz, Generation Specialist Engineer, BC Hydro

Kathie Scouten, Economic Development National Research Council –Industrial Research Assistance Program

Gordon Sebastian, Chief Executive Director, Gitxsan

Mel Sheng, Resource Restoration Pacific Biological Research

Dave Shworan, CEO
Bravenet Web Services

Don Simpson, Partner
BDO Dunwoody

Cat Sivertsen, Marketing and Communications, Wolftek Industries

Gord Smith, Mayor
Rossland

Pat Snowie, Administration and Operations, Pelican Software

Roy Spooner, Executive Director
Innovation Resource Centre

Don Stables, Marketing and Sales Manager
MCI Solutions

Rich Stern, Director
Detailed Design Drafting Services

Norma Stumborg, Economic Development Officer, City of Cranbrook

Grant Sutherland, Owner and President
Vallhalla Consulting

Mike Tan, Founder and CEO
TeamPages Online

Jason Taylor, Chair
Multi Media Program, Selkirk College

Katherine Tenessee, Ktunaxa Nation Council

Ian Thomas, Manager
Community Futures Trail

Nevin Thompson, Collaboration Manager
BC Innovation Council

Matt Thompson, Owner
Driven Media

Mike Thompson, President
Impact Visual

Don Tillapaugh, Director
Center for Shellfish Research

Gary Tomlinson, Owner
Agri-green Bio-Diesel

Andrew Tylosky, Owner and CEO
Motion Media

Jean Valgardson, President
Northern Lights College

Doug Van Sickle, KAST Board
School District #8

Nancy Van Wagoner, VP
Thompson Rivers University

Richard Wake, IT Manager,
Columbia Basin Trust

Doug Wakely, CEO
EDS Advanced Solutions

Rick Walker, Past President
Dynamic Exploration Ltd.

Laura Walsh, BC Cancer Society

Scott Walter, Owner and President
Scotech Systems

Sherree Walters, Executive Director
Community Futures

Jason Wassing,
Sweetwater Web Media

Andrew Watson, President
Voda Computer Systems

Harry Weiler, CEO
Axys Technologies

John Weisbeck, Founder
Okanagan Technology Symposium

Lisa Wildman, Research Coordinator
Sci-Tech North

Glenn Williams, Chief Executive Director
Gitanyow First Nation

Cathe Wishart, VP
Collage of New Caledonia

Joe Wong, Manager
Woodmere Nursery

Mark Zienowicz, Business Partner
Voda Computer Systems

Akos Zsufa, Senior Network Specialist
IT North

Don Zurowski, General Manager
Community Futures

Appendix C. Regional Innovation Supplement

There is recognition within the Government of Canada and the provincial governments that innovation drives economic growth and social development. To reflect this importance, governments have created strategies to provide support for activities and initiatives that promote an innovative and knowledge driven economy in Canada.[74]

There are a number of stakeholders in BC's innovation system. Federal and provincial government ministries, cities, towns, regional districts and companies can all be members of and/or fund multiple councils, societies, associations, alliances and networks to carry out economic development initiatives in the province. This supplement lists only some examples of the many organisations involved in BC's innovation economy.

A random sample of some of the organisations in BC include: the Terrace Economic Development Authority on the North Coast, the North Peace Economic Development Commission in the North East, the Columbia Shuswap Regional District in the Thompson-Okanagan, and the Greater Victoria Development Agency on Vancouver Island. They all aim to build a strong, sustainable regional economy that can attract new investments, help businesses grow, encourage innovation, and serve the needs of communities in the region.

Provincial and Regional Agencies and Initiatives

ROLE OF GOVERNMENT IN BC'S ECONOMIC DEVELOPMENT

Many government ministries, including the Ministries of Advanced Education, Community Services, Small Business and Revenue, Aboriginal Relations and Reconciliation and Economic Development, are working to promote economic development in BC's regions. Initiatives include the Regional Science and Technology Network, the Small Business Roundtable and the Community Opportunities Task Force. The Economic Competitiveness Division and the Regional Economic Development Branch of the Ministry of Economic Development have been specifically tasked to further

economic growth and enhance business competitiveness in every sector and region.[75]

Past economic initiatives include the Regional Economic Alliances, a pilot initiative undertaken in 2005 that sought to establish regional economic alliances with local governments and the private sector in the South Peace, East Kootenay, and Vancouver Island-Coast regions. The aim of the alliances was to assist communities to take a greater role in enhancing their economic well-being, and engage private sector in the development of the regional economies.[76]

The Ministry of Economic Development also established significant outreach initiatives in BC's regions. In November 2003 the Ministry launched the On-the-Ground Regional Economic Services program by placing economic development staff in Nanaimo, Cranbrook, Prince George, Kamloops, and Smithers. To support these staff, professional business development consultants were engaged to carry out specific projects on behalf of the ministry.

Similar regional staff continue to serve as contacts for investors, local governments, and MLAs, to assist in the identification of business opportunities, and project development and to identify barriers to investment. They also find creative solutions to provincial policy or regulatory problems, and work closely with other provincial and federal agencies at a local and regional level. As of 2008 there are seven regional project managers located throughout the province, along with an array of various other government staff.[77]

The ministry has also undertaken an outreach project to support the Provincial Nominee Program, a program designed to offer accelerated immigration for qualified skilled workers. They have worked with community groups, organisations such as EDABC and regional small businesses; as well they have held 20 workshops in 2007 to foster awareness about the benefits of the program.

The BC Ministry of Aboriginal Relations and Reconciliation works in partnership with Aboriginal people and includes efforts to support and increase Aboriginal management and control over programs and services. There are a number of services supported by government and provided by various aboriginal organisations. They include Business Advisory Centres, Aboriginal Business and Skills Training and the Native Economic Development Advisory Board.[78] There are also BC First Nations Development Corporations and Community Economic Development Officers located throughout the province.[79]

ECONOMIC DEVELOPMENT LED BY REGIONAL ORGANISATIONS

There are some economic development initiatives being led by regional collaborative organisations. For instance, the East Kootenay Manufacturing and Technology Industry Development Plan is intended to provide a long-term roadmap for growing manufacturing and technology industries in the region. It aims to strengthen links between industry members' supplying network and support services, help attract new businesses by building a sustainable industrial base, and identify new opportunities that will stimulate business growth and retention. Financial support has been provided by the BC Innovation Council (BCIC), the regional economic alliance, Western Economic Diversification and the Ministry of Economic Development.[80]

The approach developed by the partner agencies is being used by other rural communities and regions to bolster their manufacturing and technology sectors. A similar project has been started in the West Kootenays by the Kootenay Association for Science and Technology, Selkirk College's Regional Innovation Chair in Rural Development, and the Ministry of Economic Development. The 16/97 Economic Alliance based in the North East has also set similar economic development priorities and its members include the Aboriginal Business Development Centre, Community Futures, the Economic Development Association of British Columbia and the Ministry of Economic Development.

There are also a number of trusts that have been created with support from the Ministry of Economic Development. Established in 2004 and 2006, the boards of the Northern Development Initiative Trust, the North Island - Coast Development Initiative Trust and the Southern Interior Development Initiative Trust make strategic investments in regional economic priorities such as: forestry, transportation, tourism, mining, energy, projects related to the 2010 Olympic and Paralympic Winter Games, aquaculture, small business and other opportunities for economic diversification. The boards of these three trusts will use the funds to leverage partnerships and other investments with the private sector and other government partners. These trusts give communities the funding, control and ability to identify and pursue new opportunities for stimulating sustainable economic growth and job creation in the regions.[81] Other examples of similar initiatives include the B.C. Alcan Northern Development Fund and the Columbia Basin Trust.

Below are some specific organisations in BC that have a direct role in economic development.

1. **The BC Innovation Council's** (BCIC) mission is to promote economic development and enhance the quality of life in BC through innovative applications for science and technology. BCIC administers funding programs for applied research and development, market assessment, scholarships and

fellowships. BCIC has several projects underway intended to increase support for the regions and they also support the Regional Science and Technology Network.[83]

2. **The Regional Science and Technology Network** (RSTN) was incorporated as a non-profit society in 2001 and helps build the technology sector outside the Lower Mainland by working with over 30% of technology companies in B.C. The network augments the nine regional councils' mandates through shared projects and activities, and it helps members build innovative regional technology and knowledge-based businesses.[84]

3. **The BC Knowledge Development Fund** (BCKDF) provides funding for research infrastructure at Higher Education Institutions and is matched by federal funding through the Canada Foundation for Innovation.

4. **Regional Innovation Chairs** were created in 2003 by the provincial government when they made a commitment to establish nine chairs in order to foster new social and economic development opportunities at BC's colleges, university colleges and institutes. The program is cost-shared between public, through the Leading Edge Endowment Fund, and private sectors, enabling government to leverage its investment.[85]

5. **The Vancouver and Okanagan Angel Forums** provide services to small companies that need access to financing.

6. **Invest British Columbia (formerly Leading Edge BC)** is a partnership of provincial, federal and local economic development organisations working together to expand business investment in BC. It provides advice on how to establish a business in BC.

7. **The Economic Development Association of British Columbia** (EDABC) is a provincial association of economic development practitioners and is dedicated to providing services that support the activities, profile and development of its members and their economic development goals. EDABC has over 160 members in all regions of BC.

Federal Agencies and Initiatives

1. **The Community Futures Network** was established in 1986 by the federal government in response to the severe economic and labour market changes

faced by rural Canadian communities. Comprised of 34 locally and strategically positioned organisations, the network has a significant impact on the socio-economic development and diversification of the rural communities it serves. It is sponsored by organisations such as WEDC and EDABC.[86]

2. **The Canada Foundation for Innovation** (CFI) is an independent corporation created by the Government of Canada to fund research infrastructure. The CFI's mandate is to strengthen the capacity of Canadian universities, colleges, research hospitals, and non-profit research institutions to carry out world-class research and technology development that benefits Canadians. Since its creation in 1997, the CFI has committed $3.8 billion in support of 5,714 projects at 128 research institutions in 64 municipalities across Canada. In March 2008 three of BC's top universities were granted just under $3 million dollars for investment in state-of-the-art labs and equipment from the Leaders Opportunity Fund and the Infrastructure Operating Fund.[87]

3. **Indian and Northern Affairs Canada** (INAC) plays a role in BC's regions through its commitment to support First Nations in achieving sustainable social and economic development in their communities. INAC BC is working with First Nations to achieve results in strengthening individual and family well-being, supporting sustainable community and land and resource development, increasing First Nations participation in the economy and supporting First Nations governance. Most INAC programs and services are delivered in partnership with First Nations, who directly administer over 95.5% of funds.[88]

4. **The Natural Sciences and Engineering Research Council of Canada** (NSERC) is a national instrument for making strategic investments in Canada's capability in science and technology. NSERC supports both basic university research through discovery grants and project research through partnerships among universities, governments and the private sector. NSERC is opening five regional offices across the country to facilitate access to its programs. The Community College Innovation Program is one of many managed by NSERC, in collaboration with the CIHR and SSHRC, and was created to increase the capacity of colleges to support innovation at the community and/or regional level. It is intended to stimulate new partnerships by enabling colleges to take risks and be nimble in developing new ways of working with local businesses and industries to foster innovation and economic growth.[89]

5. **The National Research Council- Industrial Research Assistance Program** (NRC-IRAP) provides a range of both technical and business oriented advisory

services along with potential financial support to growth-oriented Canadian SMEs. Working directly with clients in one hundred communities across the country, the program supports innovative research, development and commercialisation of new products and services.[90]

6. **The Network Centres of Excellence Program** (NCE) mobilizes research excellence to foster powerful partnerships between university, government and industry in areas of strategic importance for Canada: Information and Communication Technologies; Engineering and Manufacturing; Environment and Natural Resources; and the Health and Life Sciences. In February 2008 eleven new networks were created, which are expected to have a major impact in aligning university research with the needs of their user sector, and in producing important knowledge and technology transfer results. BC was granted four of the eleven Centres of Excellence for Commercialisation and Research (CECRs). These centres will share $163 million to pursue major discoveries and bring them to the marketplace over the next five years. The NCE is comprised of 24 pan-Canadian research networks involving 830 companies, 266 public sector departments and agencies, 51 hospitals, 194 Canadian and foreign universities and more than 365 other organisations from Canada and abroad. In an average year, the 19 NCEs across Canada leverage additional cash and in-kind contributions of almost $71 million from partners, create 8 spin-off companies, file over 100 patents and obtain close to 50 licences.[91]

   Networks of Centres of Excellence (NCEs) in BC

   1. MITACS
   2. PrioNet Canada
   3. Canadian Genetic Diseases Network
   4. Canadian Design Research Network

   Centres of Excellence Commercialisation and Research (CECRs) in BC

   5. Centre for Drug Research and Development
   6. Advanced Applied Physics Solutions, Inc.
   7. The Prostate Centre's Translational Research Initiative for Accelerated Discovery and Development
   8. Centre for the Prevention of Epidemic Organ Failure

7. **The Federal Partners in Technology Transfer** (FPTT) initiative allows individuals in Canada's science-based departments and agencies to work together to establish common approaches, practices and policies to effectively transfer research and technologies from government laboratories to the private

sector. The 16 federal departments and agencies that are FPTT Partners span the full spectrum of federal science and technology activities, from human health and natural resources to communications and space. FPTT is bringing together government, universities and industry to improve the system of innovation in Canada. Examples of federal labs in BC include the Canadian Centre for Climate Modeling and Analysis in Victoria and the Pacific Agri-Food Research Centre in Agassiz.[92]

8. **The Canada Research Chair** (CRC) program was created in 2000 and is establishing 2000 research professorships in universities across the country by 2008. The program invests $300 million a year to attract and retain some of the world's most accomplished and promising minds.[93]

9. **Western Economic Diversification Canada** (WED) works to strengthen western innovation, entrepreneurship and community economic development and build a stronger West in a stronger Canada. There are several programs such as: The Community Economic Diversification Initiative, an important component of the federal Mountain Pine Beetle Program. It is a two year federal contribution program aimed at helping to diversify the economic foundation of forest-dependent communities and contribute to their long-term stability. Western Economic Partnership Agreements (WEPAs) are multi-year funding commitments to strengthen economic activity and improve the quality of life in western communities.[94]

10. **The Scientific Research & Development Program** (SR&ED) is a federal tax incentive program to encourage Canadian businesses of all sizes and in all sectors to conduct research and development (R&D) in Canada that will lead to new, improved, or technologically advanced products or processes. The SR&ED program is the largest single source of federal government support for industrial research and development. Claimants can apply for SR&ED investment tax credits for expenditures such as wages, materials, machinery, equipment, some overhead, and SR&ED contracts.[95]

Appendix D. Summary of Recommendations

This is a list of recommendations made by the PTC in this and all preceding reports. They are numbered in the order in which they appear in the original report.

10th Report

Learning and Technology

10.1 That a government task force, which includes the Virtual School Society, BC Campus, and the Ministries of Education and Advanced Education, develop a long-term vision for technology and education by the end of March 2008.

10.2 That the Ministry develop Key Performance Indicators to measure the success of programs that encompass learning technology and use those KPI to ensure quality.

10.3 That the Ministry of Education continue to use LearnNowBC as a central repository for electronic learning programming in order to ensure interoperability, quality, and effective use of resources.

10.4 That the Ministry of Education work with the Boards of Education to create a realistic plan for expanding the one-to-one computer programs around the province and to determine the costs.

10.5 That the Ministry of Education develop an independent certification program that rewards teachers for expanding their professional qualifications to include technology-supported learning.

10.6 That the Government use the implementation challenges facing BCeSIS as a proxy for determining infrastructure barriers, and move to address them.

10.7 That government develop a single window for learning for government-supported e-learning services.

10.8 That the Ministry of Education work with a school district to pilot a 'school of the future' that combines the elements of a modern learning environment.

Clean Technology

10.9 That government continue to pursue its goal of self-sufficiency by 2016.

10.10 That BC set a target to become an annual net exporter of clean energy by 2020.

10.11 That government direct BCUC to consider the broader goals of government in its monitoring role, in particular the objectives of the Energy Plan. Examples of specific measures that need to be considered are:

- **Investment in infrastructure**, including smart grid technologies,

to allow access to more supplies and enable system efficiencies;
- **Stimulation of conservation initiatives** through such measures as public awareness/education and pricing structures including time based pricing; and
- **New tariff structures** that encourage the development of a range of renewable energy supplies.

10.12 That government direct BC Hydro to advance its investigation of Site C and provide large-scale clean energy generation to meet growing demand for energy and capacity and to provide dependable power.

10.13 That government direct BCUC to consider government policies for conservation and renewable energy when reviewing the long-term strategic plans of the utilities to invest in a 'smart grid' digital power infrastructure.

10.14 That government and appropriate utilities embark on public awareness campaigns that explain the importance and value of conservation and renewable energy initiatives.

10.15 That BC Hydro invest in an infrastructure that allows BC to become a leading jurisdiction in the application of DSM technologies and that BC Hydro implement rate and regulatory structures that take full advantage of these DSM technologies.

10.16 That government continue to advance the Green Cities Project and the Green Building Code, through the mandating of green targets and promoting the use of green technologies.

10.17 That as part of a demonstration project, 100 government vehicles be PHEVs, either through conversion of existing fleet or purchase of new vehicles.

10.18 That the government continue to work with industry and the federal government to develop the guidelines and regulations to achieve British Columbia's biodiesel targets.

10.19 That government support a 'Hydrogen Highway Rally' to California for 2009.

10.20 That BC investigate other incentives to promote the use of green vehicles.

10.21 That government support the development of appropriate feed-in tariffs that decline over time to assist the commercialisation of emerging, renewable energy sources and their associated technologies.

10.22 That BC Hydro and BCTC identify areas rich in renewable energy potential in the near term for transmission system investment.

10.23 That the cost of building transmission lines including the transmission interconnect to new power sources be factored into the price of electricity.

10.24 That BC Hydro assess the current energy storage capacity and the needs for the future, determine the best options to meet those future needs (in particular the Site C dam), and initiate the development of those capacity options.

10.25 That government adequately resource the approval mechanisms for developing renewable energy projects, including an expediter dedicated to clean energy.

10.26 That government finalise and support the bio-energy strategy to enable BC to reach its renewable energy targets and its bio-energy leadership potential as soon as possible.

10.27 That government continue to support demonstration projects that make BC a clean technology showcase.

10.28 BC should leverage federal programs to create research chairs and develop centres of excellence around existing strengths in clean technology.

10.29 BC should have a coordinated approach to applications for federal funding for clean technology.

10.30 That BCTC and BC Hydro's abilities to contribute to the deployment of pre-commercial technologies be recognised and these organisations be provided with an effective R&D budget.

10.31 That government support the transformation of Powertech Labs into a Centre of Excellence for Smart Grid Technology.

Innovation and Commercialisation

10.32 That government restructure to create a Ministry of Research and Talent, and a Ministry of Learning.

10.33 That the government's long term strategic plan for Research and Innovation include interim goals to increase gross investment in R&D toward the world class benchmark of 4.5 percent of GDP, increase private investment in R&D to 65 percent of that total, and move toward these targets with aggressive but realistic time frames.

10.34 That the provincial government extend the British Columbia SR&ED tax credit program beyond its current expiration date (September 1, 2014) and make it an ongoing program with periodic reviews.

10.35 That government set a long-term goal for a British Columbia university to achieve a top 20 world university ranking.

10.36 That the provincial government develop a faculty recruitment plan in concert with the BCIC.

10.37 The government should develop a graduate student strategy to attract, tech and retain the best possible students.

10.38 That the government and the universities should restructure and simplify the UILO process.

10.39 That government appoint a group of independent advisors led by BCIC to work with the UILOs to develop new policies and procedures.

10.40 The Ministry of Research and Talent should focus on strategies to attract and retain the top talent in the world.

10.41 That the provincial government develop and implement an employee equity participation incentive to attract technology companies, senior management, key employees and head offices to British Columbia. The incentive should eliminate the provincial tax payable on the exercise or disposition of stock from the employee's company.

10.42 That BCIC lead the innovation associations in other key provinces to advocate to the federal government for the elimination of federal tax payable on the exercise or disposition of stock from the employee's company.

10.43 That government continue to develop programs that address housing issues. Government could begin investigating University housing models, implement them within our own University system and expand programs based upon their success.

10.44 That the provincial government work with the federal government to change the deadline for deemed disposition of assets from five years to seven years.

10.45 That the provincial government streamline immigration to BC by:

- using the PNP program to grant immediate permanent residency for graduates of BC universities' Master's and PhD programs, with no requirement of existing job offer;
- amending the PNP program to allow the designation of approved employers in the technology sector with such designation allowing for automatic qualification for the program (The system should be subject to audit);
- working with the federal government to pilot a BCTFW program that allows designation of approved employers in technology areas so that their prospective employees can obtain immediate temporary work visas (The system should be subject to audit);
- negotiating with the federal government the provision of immediate work permits to the foreign spouses of returning Canadian citizens; and
- allowing children of temporary foreign workers to qualify as domestic rather than international students at our universities.

10.46 That the new Ministry develop a recruitment plan for expatriate Canadians which could potentially be executed through the BCIC.

10.47 That BCIC lead innovation associations in the other key provinces to press for implementation of the changes to the tax treaty.

10.48 That government work with the Discovery Foundation to form a set of proof-of-concept funds with a few select partners.

10.49 That the provincial government raise the annual investment cap and double the size of the Equity Capital Program to provide the opportunity for more angels to get involved with more money.

10.50 That BCIC facilitate the UILO review.

10.51 That BCIC implement a province-wide Entrepreneur-in-Residence program.

10.52 That BCIC develop a virtual board t support and advise start-up companies in BC.

10.53 That BCIC partner with the proposed new Ministry to develop a repatriation program.

10.54 That BCIC encourage development of technology sales and product management training programs in universities.

10.55 That BCIC encourage development of multidisciplinary programs in universities.

10.56 That BCIC help develop and deliver training programs in world class recruiting and virtual company management.

10.57 That BCIC assist in the expansion of existing mentor programs and in the development and delivery of further mentoring programs.

9th Report

Citizen Centred Services

In order to implement the technological integration required to achieve the five great goals the PTC believes that:

9.1 Ministries should be directed to share data collaboratively with programs outside their own Ministry and actively seek such opportunities in order to deliver seamless coordinated services to the citizens.

9.2 The role of the Chief Information Officer (CIO) should be enhanced with the authority to set standards, architecture and policy for IT purchases and development across government, and to monitor compliance with those standards. Precedent for this model is in the Office of the Comptroller General. Furthermore, for this CIO to assist the government in achieving its goals it should:

a. be adequately resourced to complete the integration of government systems.

b. be given responsibility for managing privacy considerations on a government wide basis. A Chief Privacy Officer (CPO) should be established in the CIO offices to set guidelines and procedures that protect privacy without unnecessarily hindering data sharing.

9.3 Government should focus on some important key projects to generate early success and grow confidence both with the citizens of BC and within the public service.

e-Learning - Assessment

9.4 That the provincial government consider dedicating the time and resources needed to expand the limited e-examination system with a long term goal of e-examinations as the norm.

9.5 That the provincial government consider developing a 'teach the teachers' program on e-examinations.

WINLAB

9.6 That the government support and invest in the WINLAB project.

8th Report

DIGITAL DIVIDE

8.1 That the government commit further funds to addressing "last mile" issues inherent to the Digital Divide. The funds would add value by preparing communities for the arrival of broadband and by equipping them to benefit from its introduction.

First Nations

8.2 That the Joint Task Force be constituted as soon as possible and tasked to develop and resource an action plan to bring broadband to First Nations communities in BC.

8.3 That the Premier and government Ministers continue to support the Transformative Change Accord, urge their federal counterparts to support the connection of broadband to First Nations communities in British Columbia, and enter into a partnership with British Columbia and First Nations in this province to accomplish this task.

IDENTITY MANAGEMENT AND SECURITY

8.4 That government define an architecture and an implementation/delivery strategy for service integration and information sharing that spans the public service; that recognises the diversity and mandates of the organisations that participate in delivering public service; and that recognises the complexities of the service integration and information sharing.

8.5 That government ensure a budget and process exist to accommodate the major investments in corporate government infrastructure needed to provide identity management, privacy and security capabilities.

8.6 That government expand its notion of identity management to include the broader public sector (i.e., important registries such as client registries, master patient indexes, health care provider registries, student registries, and social service provider registries). The strategy identified in 8.4 also needs to address how the registries will be cooperatively managed (for example, which one will be the authoritative source).

8.7 That government ensure public sector investment in better information security technologies is done in a way that provides open connectivity for all users that arrive at any public facility or location. This is especially important as organisations look to extend their current wired networks with wireless capabilities.

8.8 That government approach federally sponsored initiatives in an organised fashion. For example, the Ministry of Health and the health authorities are working cooperatively to secure funding from Canada Health Infoway. This will ensure that BC does not build infrastructure to support health solutions in stand-alone silos that increase costs and complexities in integrating these sources into the government's electronic service delivery environment.

8.9 That government pursue these issues and recommendations through stakeholders across the broader public and private sector by utilising a model similar to the NetWork BC project, with the aim of optimising the amount of investment required and increasing the quality of the result for the entire public sector.

PRIVACY

8.10 That government revisit the responsibility structure for privacy management and ensure the authority is appropriately delegated and that there are sufficient resources available for the development, implementation and monitoring of policies and procedures.

8.11 That government clearly communicate to the public how it manages privacy and educate public service employees on privacy management in an electronic environment.

8.12 That government ensure all ministries deliver on their legislative requirement to conduct privacy impact assessments. These privacy impact assessments must be conducted at the onset of new e-government initiatives and be reviewed periodically to ensure that the privacy considerations have been addressed in the design and continue to be addressed successfully in production.

8.13 That government periodically review privacy and program legislation to ensure that it anticipates technological advances and is not rendered obsolete by them.

8.14 That government ensure a secure electronic infrastructure to protect privacy.

TECHNOLOGY AND EDUCATION

8.15 That government ensure the investment in the BCeSIS system to finalise its installation and provide as rapid implementation as possible.

CAPITAL AND INVESTMENT

8.16 That the provincial government expand the SR&ED program to provide the provincial refundable tax credit to all companies in BC.

8.17 That the provincial government work with the federal government to remove any administrative and fiscal constraints that hinder foreign capital investment into BC's companies and venture capital pools.

8.18 That the provincial government work with the federal government to recognise tax-exempt corporations under the Canada/US Income Tax Convention to encourage foreign capital investment into BC, and Canada in general.

POWER TECHNOLOGY

8.19 That the government support and implement the initiatives outlined by the Alternative Energy and Power Technology Task Force.

NEW MEDIA

8.20 That government support and invest in the development of the Master of Digital Media program and the World Centre for Digital Media located at the Great Northern Way Campus.

7th Report

DIGITAL DIVIDE

7.1 That the provincial government work with the federal government to create a Joint Task Force with the expertise, authority and resources to provide broadband and related services to First Nations communities in British Columbia wherever reasonably possible. The Task Force must also have First Nations representation.

E-HEALTH

7.2 Define a provincial strategy and architecture for the Electronic Health Record and commit to its implementation. The PTC recommends that the provincial government:

- Give the highest priority to establishing architecture for the Electronic Health Record, giving consideration to the best industry practice using Internet technology. A defined EHR solution that aggregates existing information in the healthcare system will determine the appropriate standards and interface to ensure that the evolution of systems are properly directed.
- Ensure that the EHR strategy incorporates features to empower patients to better manage their own health and to interact with the health care system electronically.

7.3 Create a business model and data exchange standard to integrate the EHR with private practice physicians' internal Electronic Medical Records (EMR). To do this, the Council recommends:

- That a task force be established to determine a single business model and data exchange standard that will allow electronic information exchange with private practice physicians and their internal EMR while respecting patient privacy rights. Priority should be given to the electronic delivery of information to private practice physicians (for example, to improve chronic disease management), and the collection of private practice physician information should be deferred until a definitive plan is determined.
- That this strategy and business model incorporate a method to encourage private practice physicians to acquire broadband network connections for their offices, principally via demand for the "content" made available from the health authorities EHR.

7.4 Establish preferred standards for the regional implementation of clinical systems and give priority to optimising clinical workflow on an enterprise basis across regions, as distinct from workflow bounded at each facility. To do this the Council recommends:

- That the eHSC and its working committees establish a policy for the preferred architecture for the deployment of clinical systems, as a basis for making future investments and joint procurement purposes.
- That the health authorities give priority to adopting the preferred architecture and undertake projects to optimise workflow within the next three years.

7.5 Continue infrastructure investment. The PTC recommends that the provincial government:

- Complete broadband network services to acute care facilities, expand the network to all government-managed care facilities, and consider a network platform that connects service provider groups within the health authorities.
- Invest to execute on the strategy for a client registry with the ability to uniquely identify each client. This will provide a critical resource for the establishment of the Electronic Health Record. Furthermore, collaboration managed through the eHSC should establish operational methods to add new persons to the client registry and to manage identity records efficiently. The client registry should be considered as a resource for the potential integration of client identity for other social services.
- Continue to invest in the execution of its implementation plan for the provider registry, in consultation with the College of Physicians.
- Invest in the continuing development of a detailed architecture and operational plan built on the common "active directory" security access standard. This would be used to develop a comprehensive system access standard that will be inter-operable (single sign-on) across regional systems. It would also meet national security and privacy standards. Preference should be given to the harmonisation of regulations with the standards primarily adopted by major software systems.

7.6 Continue to develop telehealth initiatives. The PTC recommends that:

- The relevant agencies move expeditiously to expand fee codes to cover all billing categories, except where there is a specific medical reason where they should not apply.
- Under the guidance of the eHSC, there be continuing evaluation of opportunities to implement specific telehealth services that achieve positive clinical and economic outcomes.

7.7 Governance and management. The PTC recommends that the leadership of health authorities and Ministry of Health Services collectively:

- Place priority on collaboration to achieve significant progress in the development of the e-health system.
- Ensure that development of the e-health architecture is within the context of best industry practice, and also establish a process of independent evaluation of the effectiveness of all e-health technology deployed.
- Invest in resources to effectively lead the process of change management of a system required to successfully implement technology that will automate the delivery of healthcare in the province.

IT PROCUREMENT

7.8 That the provincial government continue its procurement reform initiative in cooperation with industry to ensure the most effective process possible. It should consider the issues and the suggested solutions identified at the procurement symposium and further examine those that did not receive due attention.

CAPITAL AND INVESTMENT

7.9 The PTC recommends that government continue its existing programs under the *SBVC Act* and work with federal government to secure federal funding for the program.

HUMAN RESOURCES

7.10 That the provincial government work with industry to develop an accurate inventory of the province's current and projected technology sector skills and then execute on strategies designed to close critical skills gaps that impair growth of designated technology clusters.

7.11 That the provincial government work with industry to develop immigration policy recommendations to the federal government targeted at attracting the senior management required to grow BC's technology sector.

7.12 That the provincial government work with industry and the federal government to define modifications to the *Income Tax Act* that would improve industry's ability to attract top senior talent to BC's technology sector.

POWER TECHNOLOGY

7.13 The PTC recommends that the government pursue the strategies outlined in the report (*A Vision for Growing a World-Class Power Technology Cluster in a Smart, Sustainable British Columbia*) to advance the power technology industry and secure BC's position as a world leader.

NEW MEDIA

7.14 That the government work with industry to extend the DAVE tax credit to include the new media sector.

7.15 That the government establish a world class, graduate-level program in digital entertainment technology.

6th Report

DIGITAL DIVIDE

6.1 The PTC recommends that government:

- Keep up the momentum to extend broadband to the remaining communities as quickly as possible.
- Work with communities to identify last mile solutions.

INDUSTRY DEVELOPMENT

6.2 The PTC recommends that government:

- Recognise and support the important role that regional technology councils play in fostering innovation and small business development within their region.
- Support the formation of a regional technology council in the Northwest.
- Provide incentives to encourage growth and development of technology companies in the regions.
- Market the technology innovations and opportunities for the province as a whole through Leading Edge British Columbia.

E-LEARNING

6.3 The PTC supports the PLNet initiative and recommends that its installation and capacity review continue to receive top priority to ensure it has the ability to meet ever-expanding needs.

6.4 The PTC recommends that government, through the Ministry of Education, in cooperation with industry and the school districts, support the goals and financing needs of BCEd Online, and that the Ministry continue to monitor and promote the expansion of its activities to all school districts in the province.

6.5 The PTC recommends that the Ministry of Education:

- Continue research in e-learning for K-12 to include funding for school districts to use IP video and other telecommunications technology delivery systems.
- Conduct education programs for teachers to provide them with the skills necessary to utilise e-learning technology.
- Promote the use of technology in school districts.
- Continue to work with other provinces to research, evaluate and test, and cost-share in the implementation of e-learning strategies in the provinces K-12 system.

6.6 The PTC recommends that the Ministry of Education investigate providing a capability to encourage and assist students to enter high-tech careers. The Australian Skills Hub distance learning program, located on the web at www.itskillshub.com.au, is a good example of a resource that has been very successful.

6.7 The PTC recommends that government, through the Ministry of Advanced Education, continue to encourage and support the BCcampus initiative as the leading organisation to promote e-learning concepts at the post-secondary education level.

6.8 The PTC recommends that government, through NetWork BC, in cooperation with other ministries, lead a process whereby a comprehensive and focused team (possibly federal/provincial) work with First Nations to address digital divide issues and government services such as e-learning and e-health.

6.9 The PTC recommends that the government work with BC universities, both the federal and provincial governments and large and small business to promote the establishment of an R&D facility to advance the e-learning industry in BC.

E-HEALTH

6.10 The PTC recommends that government support the adoption of a fee code structure that allows health care providers to bill for e-health procedures.

6.11 The PTC recommends that the government establish a governance structure dedicated to the development and implementation of the EHR. Its structure and accountabilities would involve the following:

- A pre-determined term (24-36 months, for example) be set, and clear, reasonable success criteria developed.
- A team leader who is a member of the ministry executive reporting to the deputy minister.

- Positioning so that it is acceptable to the entire community (the health ministries, health authorities and practitioners).
- A direct link between the success of the team and the success of the EHR implementation.
- A funding model utilising resources from other bodies such as Canada Health Infoway. The model must allow for central decision making on the common or province-wide EHR infrastructure but also provide continued funding for specific health authority equipment and software.
- An advisory group with members from the ministry, health authorities and practitioners to guide development activities.

CAPITAL AND INVESTMENT

6.12 The PTC recommends that government expand the tax credits under the *SBVC Act*. Further, government should change appropriate regulations so that the tax credits exist as a total allocation over multiple years and unused credits can be transferred between programs.

HUMAN RESOURCES

6.13 The PTC recommends that government, through Leading Edge British Columbia, undertake special marketing initiatives to assist in recruiting talent for high-tech companies throughout the province.

ALTERNATIVE ENERGY: FUEL CELL

6.14 The PTC recommends that government build on the record of success and work with the energy technology sector to complete the "Hydrogen Highway™" prior to the 2010 Olympics and to further develop the sector.

5th Report

CAPITAL AND INVESTMENT

5.1 That the provincial government extend the British Columbia SR&ED tax credit program beyond its current expiration date (September 1, 2004) and make it an ongoing program with periodic reviews.

5.2 That the provincial government initiate an advocacy program with the federal government to:

- Review and modify the rules within the SR&ED program that restrict tax credits to companies having investment from public companies and/or non-residents. This would ensure that firms that have obtained capital from legitimate sources are not being excluded from other important and appropriate financing sources.
- Review and modify restrictions in the program, mandated at a federal level, with respect to differences in the treatment of public (20% tax benefit carry forward) and private (35% tax credit carry forward) companies.

5.3 That the provincial government develop and implement an equity participation incentive to attract technology companies, senior management, key employees and head offices to British Columbia. The incentive must lower and/or eliminate the provincial tax payable on the exercise or

disposition of stock options. The incentive would be applicable to:

- All employees who are residents of BC at the end of the calendar year and file for a BC tax return,
- All forms of equity compensation such as stock options and restricted stock, and
- The gain in value between the fair market value on the date of grant and the price on disposition.

The incentive would provide a tax credit equal to 50% of the provincial tax payable if the option is held for greater than 1 year but less than 2 years and a tax credit equal to the provincial tax payable if the option is held for more than 2 years.

5.4 That the provincial government work with the federal government to explore the issue of double taxation by nations whose citizens are working in Canada and ensure that all parties honour both the intention and letter of the appropriate treaties, and that the federal government, when acting upon new tax treaties, pay particular attention to double taxation clauses.

5.5 That the provincial government work with the federal government to extend the loss carry-forward provision from the existing 7 year period to 20 years (the newly enacted US limit).

5.6 That a thorough review of all regulations and taxation involved with foreign pension and investment fund investment in venture capital and entrepreneurial growth business be undertaken by the province in cooperation with the federal government.

5.7 That the provincial government undertake a study to investigate the under-investment of pension funds and other investment portfolios in venture capital, determine the key drivers (particularly educational and training) that would enhance such investment, and work with the venture capital industry and appropriate industry associations to encourage and/or secure further investments by such portfolios in venture capital funds within the province.

5.8 That the provincial government remove the individual annual limit in the provincial *Income Tax Act* for angel investors in eligible small businesses under the *Small Business Venture Capital Act*.

5.9 That the provincial government develop programs to focus on attracting and/or building 2 to 3 new, venture capital funds per year, staffed with experienced venture capital players, in British Columbia. The new funds would be required to:

- Be associated with a top tier world class venture capital player that is establishing a new fund in BC,
- Be a new fund primarily directed at investment in BC which counts among the principals in the new fund individuals with extensive venture capital experience.

Any new funds must:

- Establish their funds locally: a BC office and general partners in BC,
- Target its investments in BC companies, and
- Raise private capital before accessing the BC programs.

5.10 That immediate steps be taken to identify an appropriate and targeted campaign for creating greater awareness of British Columbia as a high technology jurisdiction and to make clear the entrepreneurial opportunity that lies within it. The campaign should be designed to be undertaken with existing provincial high technology and biotech players so that it benefits both the companies and the region.

5.11 That the provincial government work with the venture capital industry, successful high technology and biotech businesses, and appropriate trade associations to host small group meetings in the key investment centres of New York, London, Boston, Frankfurt and San Francisco.

5.12 That the provincial government work with industry and the financial and academic communities to invite the management teams of the top 20 global venture capital and private equity funds to visit the province on fact-finding tours. This should be executed within the year, in an effort to build momentum in the venture community.

5.13 That the provincial government work with the universities and institutes to ensure that British Columbia is receiving its fair share of federal funding for innovation, as well as any available industry funding. In addition, the PTC recommends the province work with industry and the academic sector to ensure that BC-based companies, or those having significant satellite plants in the province, are actively investing in innovation in the province.

HUMAN CAPITAL FOR AN INNOVATION ECONOMY

5.14 That the provincial government work with industry to develop a means to raise awareness of the opportunities available in an information-based economy and assist citizens to enter technology-related careers.

5.15 That the Ministry of Education continue to develop its K-12 e-learning strategy through the BCEd Online initiative to ensure that consistent, province-wide standards and content are developed and maintained.

5.16 That the provincial government fully implement the BCcampus initiative.

5.17 That the provincial government revise the definition of a "high technology professional" to provide:

- Enhanced clarity for employees and employers to minimise disputes and costly resolution processes.
- Greater clarity as to what occupational activities are included as opposed to defining specific occupational titles that limit interpretation.
- Inclusion of all occupational activities related to the full product and service life cycle, including sales and marketing.
- Clear inclusion of other high technology sectors such as new media, alternative energy (fuel cells), and biotechnology. The definition should also leave room to include new technologies as they emerge.

4th Report

THE PTC PRIORITY RECOMMENDATIONS

4.1 Continue to work to implement all previous PTC recommendations with priority consideration of the following by government in the coming year:

a. Broadband

Provide broadband services to all British Columbia communities. Work with the federal government to accomplish this in the next three years.

b. Government Operations - Telehealth

Make telehealth a top priority and continue work to adopt and implement common health information technology infrastructure and standards, and establish an e-Health Task Force.

c. Industry Development

1) Venture Capital -
Work to pass the PTC's previously recommended amendments to the *Small Business Venture Capital Act* (*SBVC Act*).

2) Promoting British Columbia -
Develop a provincial marketing strategy and take every opportunity possible to promote the province. This includes:

a) Marketing and promotion missions led by the Premier

b) A marketing and promotion plan developed from government analyses of the five key emerging industry sectors in British Columbia – information technology, life sciences, new media, alternative energy and wireless. The plan would provide for a sustained marketing effort of the province's technology industry and business climate. Among other things, it would include:

i. Developing and executing a branding strategy and marketing plan for the British Columbia technology community.

ii. Creating an inward-bound information centre for prospective corporate recruits to the province.

ALTERNATIVE ENERGY

4.2 Combine the strengths of the provincial and federal governments, industry and academia to develop and implement an aggressive British Columbia Fuel Cell Strategy that parallels and builds on a similar National Fuel Cells Strategy. Activities in the provincial strategy should include:

a) Enhanced support for research and development carried out by the private sector and in public institutions (in collaboration with industry).

b) Support for market focused demonstration projects in both public and private sector applications. This should include real life situations that validate product reliability and output, "ruggedize" the product, provide quality assurance data, and help manufacturers make the necessary alterations to earn commercial success.

c) The British Columbia government becoming an early adopter of fuel cell products. Government departments and crown corporations being real customers raises the profile and supports the development of markets.

d) Accelerate the development of harmonised codes and standards. Government and industry collaboration is necessary to remove regulatory obstacles to the introduction of fuel cell products and systems.

e) Incentives that support and reward growth and investment such as:

1) Encourage the early adoption of fuel cell and related products and

systems by providing fiscally neutral tax based incentives, such as the income tax payback approaches used in Michigan.

2) Consider programs having an initial cost but longer term substantial savings to the treasury.

f) Development of infrastructure which includes building upon investments already made by BC Hydro and others.

g) Ensure the availability of a highly skilled, well-trained workforce. This involves conducting industry and government collaboration with secondary and post-secondary institutions to define and implement appropriate education and training at all levels in the post-secondary system.

REWARDING INNOVATORS IN THE PUBLIC SERVICE

4.3 Accelerate and reinforce desirable change in the public sector by adopting the Premier's Awards in all the proposed categories (leadership, service excellence, innovation and partnership), especially the innovation category.

3rd Report

IT PROCUREMENT

3.1 Examine the scope of its current procurement reform initiative to ensure it adequately addresses the unique nature of IT procurement and permits adoption of a benefits-driven procurement model based, above all, on the business objectives rather than the technology requirements of government.

3.2 Identify a senior government official to drive both a strategy and implementation process around IT procurement reform. This official will also be responsible for fostering development and adoption of new IT procurement tools and models; facilitating government-wide and industry education; and championing support throughout government.

3.3 Create a joint government and industry task group to address the wide range of issues associated with IT procurement reform, with particular attention to the prioritized list of issues and proposed solutions emanating from the Procurement Symposium as well as the larger list of tactical and strategic issues identified by the PTC during its consultative process.

3.4 Continue the momentum. Hold a follow-up IT procurement symposium within 120 days. The joint industry/government event should include a progress report from government outlining its response to the set of recommendations contained within this report, as well as future plans, deliverables, and timelines.

E-HEALTH

3.5. Establish an e-Health Task Force composed of both government representatives and health care professionals to address the recommendations arising from the e-Health Roundtable. In addition, the mandate of the e-Health Task Force would include:

- coordinating and leveraging current e-health initiatives, including clinical and educational telehealth projects;
- the implementation of an Electronic Health Record (EHR), in conjunction with other levels of government and across ministries. This standard EHR would be adopted by all Health Authorities, institutions and businesses providing health care services in the province;
- address the licensure, liability and billing issues and the resulting changes required to existing policy or legislation to enable health care givers to participate in telehealth; and
- conduct a community consultation
- process to identify specific telehealth applications that will address critical needs in each community.

VENTURE CAPITAL

3.6. To meet the acute need for seed and early stage venture capital within the province, the PTC strongly recommends that the proposed amendments to the *SBVC Act* be passed by the legislature prior to the beginning of 2003. Failure to do so will discourage and inhibit the facilitation of more early stage capital within British Columbia, and will put us further behind other jurisdictions.

2nd Report

UTILIZING SPAN/BC NETWORKS

2.1 Upgrade and extend SPAN/BC so it is capable of delivering advanced broadband network infrastructure to the communities of British Columbia.

2.5 Find ways to open up SPAN/BC to allow communities to take advantage of the government's broadband infrastructure in those communities where the private sector is unlikely to provide high speed Internet access to citizens and businesses.

PRIVATE SERVICE PROVIDERS' NETWORKS

2.4 Investigate all potential levers including – but not limited to – aggregating public demand, so that it can prompt service providers to extend and update their current telecommunications network infrastructure.

2.6 Reform procurement policy to allow for flexible, creative and competitive procurement models that will stimulate the private sector to upgrade and expand their broadband network infrastructure, as well as encourage the entry of local service providers, such as community-based networks, into the marketplace. To this end, two or three communities should be identified as pilot sites for further detailed planning, and implementation.

2.7 Conduct a Request for Information that solicits vendor and community stakeholder reaction to these recommendations, and taps into the innovative and creative potential for public-private partnerships that exists in the marketplace.

BROADBAND - DEMAND AGGREGATION

2.2 Aggregate total public sector demand (including core government, health authorities, schools, etc) where feasible to upgrade and expand SPAN/BC so that it will be capable of providing next-generation broadband infrastructure to the communities of British Columbia.

2.3 Investigate fully the economics as well as the potential benefits or obstacles inherent in aggregating public sector demand.

PUBLIC ACCESS AVAILABILITY

2.8 Make sure that there is public access to the Internet in every community in British Columbia.

2.11 Develop a complete map-based inventory of all public access sites by community to determine if the levels of public access and location of sites are appropriate for the size and demographics of the population.

2.14 Work with the First Nations of British Columbia and the federal government to bring information technology, including public Internet access, to remote First Nations communities in British Columbia.

2.15 Determine if the province's 58 sCAT locations and if existing PLNet facilities could be used by the public to access the Internet.

PUBLIC ACCESS SUSTAINABILITY

2.9 Work closely with the federal government to coordinate the allocation of scarce public dollars for public access.

2.10 Find ways to sustain existing public access sites in the province and meet the growing public demand by increasing, where necessary (based on demographics and usage patterns), the number of sites, the number of public access terminals, the available bandwidth, and the hours of operation.

2.13 Increase staffing levels at public access sites through programs like Youth@BC, through partnering with Industry Canada's CAP Youth program, or through use of the Labour Force Development Agreement with the federal government to train unemployed individuals to work at access sites

IMPROVE AWARENESS ON PUBLIC ACCESS

2.12 Improve awareness and visibility of public access.

PROVINCE-WIDE HEALTH IT STANDARD

2.16 Continue meetings between the executive of the new Health Authorities and the Ministry of Health Services and Ministry of Health Planning to discuss province-wide health information and information technology standards that will apply to all six Health Authorities as they move to restructure and consolidate.

2.17 Ensure each of the Health Authorities appoints a person to be responsible for information management and technology with the task of implementing the appropriate standards in collaboration with the Ministry of Health Services and the other health authorities.

2.26 Extend its standards beyond just ministries to its agencies and other government service providers.

Ensure that the designated chief information and technology officers of each authority work with the Ministry of Health Services and Ministry of Health Planning and other appropriate ministries to establish integrated technology standards province-wide. At a minimum these information and technology officers should:

2.18 Establish a consolidated provincial strategy for Health Information Management and Information Technology (IM/IT).

2.19 Adopt and implement common health information technology infrastructure and standards.

2.20 Evaluate and seize opportunities for moving towards shared services where practical and cost-effective.

2.22 Identify policy changes needed to support the electronic delivery and management of health services.

2.23 Recognise information technology development as a strategic investment.

E-HEALTH AND TELEHEALTH STRATEGY

Ensure that the designated chief information and technology officers of each authority work with the Ministry of Health Services and Ministry of Health Planning and other appropriate ministries to establish integrated technology standards province-wide. At a minimum these information and technology officers should:

2.21 Develop a provincial strategy to facilitate Telehealth and electronic health record initiatives in consultation with medical and continuing education units of the colleges and universities.

2.24 Facilitate the advancement of key e-health and Electronic Health Record initiatives.

2.25 Establish a British Columbia e-Health Think Tank composed of e-health visionaries, not senior IT staff, who will examine the applications side of e-health, since it will be compelling applications that drive down costs and improve the delivery of health services to the remote and rural regions of the province.

IT PROCUREMENT

2.39 The provincial government should expedite its efforts to rewrite its Policy and Legislative Framework around Procurement Reform so as to result in more streamlined, flexible, and cost-effective processes for both government and the British Columbia supplier community, ensuring fair and open procurement throughout the province. The government should also develop procurement policies and educational programs for both ministries and the supplier community which will provide British Columbia-based technology companies with the tools and skills required to compete more effectively for government contracts.

VENTURE CAPITAL - CHANGES TO *SBVC ACT*

Accelerating 'Early Stage' Technology Investment

The provincial government should proceed promptly with the following streamlining amendments to the *SBVC Act* to address the need for early stage capital investment in technology companies:

2.27 Expand the tax credit budget legislated under the *SBVC Act* from $50 million to $100 million annually.

2.28 Introduce an investment model under the *SBVC Act* that does not require the registration of a separate VCC to facilitate investment and tax credits under the programs in order to allow direct investment, cut red tape and reduce program registration costs.

2.29 Increase the total amount of capital one business may receive under the program (beyond the current $3 million) to better reflect the capital needs of many early stage technology companies.

2.30 Increase the employee threshold limit for a small business from 75 to at least 150.

2.31 Allow approval for common investment regimen, such as multi-tranche investments over multiple years based on attainment of established milestones.

Leveling the Playing Field for Tax Credit Investment in British Columbia

The provincial government should enable small businesses and venture capital managers participating under the *SBVC Act* to raise and invest venture capital, with the assistance of tax credits, under the same conditions that are presently offered to the one Labour Sponsored Venture Capital Corporation (LSVCC) operating in British Columbia and other LSVCCs operating throughout Canada.
To achieve parity with labour sponsored funds, the task group recommends the following amendments be made to the *SBVC Act*:

2.32 Allow program investors the option to invest directly from their self-directed retirement savings plans.

2.33 Make the tax credit incentives available for program investment within 60 days after the calendar year.

2.34 Increase program flexibility in program capital investment beyond simple common or preferred shares.

2.35 Provide VCC investors up to 24 months to complete investments.

2.36 Open up the tax credits provided to the sole LSVCC to competition by allowing other venture capital firms to enter the market to create a more dynamic venture capital community.

RESEARCH AND DEVELOPMENT

2.37 The provincial government should take steps to create an e-learning chair at one of BC's universities.

ATTRACTING TALENT TO BRITISH COLUMBIA (RECRUITMENT)

2.38 The provincial government should work with the federal government to change immigration rules so that spouses of employees moving to British Columbia can work here automatically.

BRITISH COLUMBIA PROVINCIAL BRANDING

2.40 Develop a provincial branding and marketing strategy that feature technology and innovation as key drivers supporting British Columbia's image as a place with a sustainable and vibrant economy, including resource and knowledge-based industries, and an unparalleled quality of life.

2.41 Develop a strong macro-image positioning British Columbia as a desirable technology destination for investors, employees and site selectors.

2.42 Develop and execute its provincial branding strategy in consultation with the technology community.

MARKETING BRITISH COLUMBIA

2.43 Target its technology industry marketing effort at key audiences that include decision makers in technology investment, site selection and highly skilled workers.

2.44 Focus its technology industry marketing strategy initially on four sectors known as areas of strength within the province: biotechnology, wireless, alternative energy and new media.

2.45 Focus its marketing strategy to attract highly skilled workers or those individuals that may be predisposed to move to Canada such as expatriate Canadian and British Columbia technology workers and members of communities that are already represented in British Columbia.

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PUBLIC AWARENESS ON THE BENEFITS OF E-GOVERNMENT

1.8 Educate British Columbians about the benefits of being fully connected, including access to relevant Internet-based applications and information, and increasing e-government services.

RESEARCH AND DEVELOPMENT

1.1 Double the number of computer science and electrical engineering graduates from British Columbia post-secondary institutions.

1.2 Establish 20 British Columbia Research Chairs in the fields of medical, social, environmental, and technological research.

ATTRACTING TALENT TO BRITISH COLUMBIA (RECRUITMENT)

Attract senior professionals to accelerate industry growth by:

1.3 Making changes to immigration policy.

1.4 Establishing an Info-Office to aid in the recruitment of out of province technology workers and relocation of technology companies to British Columbia.

1.5 Implementation of a competitive provincial stock option program for British Columbia workers.

1.6 Resolution of cross-boarder security issues with the US.

MARKETING BRITISH COLUMBIA

1.7 Establish a domestic and international campaign to promote British Columbia's quality of life, superior infrastructure, education system, technology community and business-friendly environment.

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