BCIT Sustainability Charrette: Details about Implementation of Recommendations

by

Jennie Moore, Director Sustainable Development and Environmental Stewardship, BCIT

for

Robyn Wark, Senior Account Manager, Sustainable Communities, BC Hydro

April 30, 2010

Table of Contents

1.0 Introduction

On October 19-21, 2009, BCIT hosted a Sustainability Charrette as part of the Gaining Ground conference held at the Vancouver Trade and Exhibition Centre at Canada Place. The purpose of the charrette was to engage BCIT Students, faculty and staff as well as leading experts in sustainable community development and energy management to address the question of how BCIT could reduce energy and materials consumption in the north-east portion of its Burnaby Campus by a Factor of Four from present day levels. This goal was chosen based on scientific assessment of global ecological carrying capacity and the level of energy and material resources that could be available to everyone if it were distributed equitably across the entire global population, i.e. a fair Earthshare. Based on the average level of energy and materials consumption of people within the Metro Vancouver region, in which BCIT's Burnaby Campus is located, the level of reduction from present consumption to a fair Earthshare would require a reduction by 75%, i.e. a Factor of Four. Longer term goals include using this initiative to catalyze a transformation of the entire campus to become a living laboratory of sustainability and to eventually work towards a Factor Ten reduction in energy and materials consumption.

BC Hydro has agreed to contribute funding in the amount of $5,000 towards this initiative through its Sustainable Communities Program. The BCIT Sustainability Charrette is the inaugural recipient of funding for this BC Hydro initiative and both institutions share a mutual interest in piloting the approach of integrating energy and greenhouse gas management considerations with a broader sustainability agenda that aims to: a) build a culture of sustainability both on campus and with surrounding neighbours, b) use design techniques to adaptively restructure existing buildings and infrastructure towards a lower energy footprint, and c) document and measure progress towards the goal of reducing energy and materials consumption. In particular, the question of whether and how energy and materials consumption can be reduced dramatically without compromising service levels is a key consideration.

BCIT hired Ecocity Builders, a not-for-profit organization based in San Francisco, to facilitate the Sustainability Charrette and to produce a vision and recommendations for how to proceed towards the goals of reducing energy and materials consumption in the northeast portion of the campus. This report builds on those recommendations and outlines a strategy for implementation based on: a) immediate actions to be completed within the next five years, b) Factor 4 recommendations to be pursued over the next five to ten years, and c) Factor 10 recommendations to be pursued in the longer term, e.g. twenty years and beyond.

2.0 Overview of Sustainability Charrette Recommendations

The Sustainability Charrette recommendations are grouped according to the following phases of implementation:

i) Immediate interventions (II) that can be implemented within five years
ii) Factor Four (FIV) interventions to be implemented within a five to ten year period
iii) Factor Ten (FX) interventions that extend to a twenty-year period (and beyond).

Although the Factor Ten interventions are long-range in nature, they also address the strategic positioning of the Sustainability Precinct which requires immediate articulation of a vision that can capture and hold the interest of senior leadership at the Institute for years to come. To this end, it is important to establish connections with the Campus Master Plan so that the long-range goals of both are mutually reinforcing. Although strategies to guide each implementation phase are articulated as part of the charrette recommendations, the overarching recommendation is to begin with the end in mind and develop a plan of implementation that aligns each phase towards achievement of the long-range, Factor Ten goal.

3.0 Recommendations for Immediate Intervention

Key strategies identified for this implementation phase focus on building internal capacity to both engage a diversity of stakeholders in the project and develop a baseline of energy and materials consumption by which to measure future progress. The immediate intervention recommendations focus on NE1 and Guichon Creek as the two primary foci for catalyst projects. This implies that the near-term opportunity is to create a "pedestrian island" ecocity fractal between these two features on campus.

II Strategy 1: Build multi-stakeholder support and participation

<u>Recommendations:</u>

II 1A Establish an inter-departmental steering committee comprising representation from administration, faculty, staff and students to steer this initiative

II 1B Collaborate with BCIT Marketing and Communications Department to promote sustainability education and outreach

II 1C Sponsor design competitions to engage students in inter-departmental collaboration to build pieces of the Sustainability Precinct

II Strategy 2: Build capacity to measure and verify the goals for energy and materials consumption reduction

Recommendations:

II 2A Establish a baseline for monitoring within the sustainability precinct

II 2B Engage industry partners such as BC Hydro to develop high performance monitoring systems on a targeted number of buildings

II 2C Explore development of an in-house process for commissioning/re-commissioning using software solutions. Engage IT Services as appropriate

II Strategy 3: Identify "Quick Win Projects" that can be implemented quickly and at little cost with high visibility

Recommendations:

II 3A Use "City Repair" techniques to change the look and feel of the environment in the Sustainability Precinct, e.g. draw or sign where pedestrian and bicycle paths will be designated, and use landscaping and street furniture to build a sense of place

II 3B Replace high-footprint food choices with low-footprint options, e.g. water fountains instead of bottled water

II Strategy 4: Prioritize "Catalyst Projects" that signify the intended transformation in the Sustainability Precinct

Recommendations:

II 4A Remodel NE1 toward becoming an ecocity fractal including increasing its offering of amenities such as housing

II 4B Continue day-lighting Guichon Creek and design for its eventual integration with the Sustainability Precinct as an ecocity fractal

3.1 How Recommendations for Immediate Intervention Could be Implemented

This section identifies how the recommendations for immediate intervention could be implemented. It includes general initiatives under the control of the School of Construction and the Environment, and where possible an effort has also been made to link these initiatives to the Campus Master Plan through identification of possible design guidelines, planning requirements, and infrastructure design considerations.

3.1.1 Administrative Considerations

Recommendations II 1A-C address administrative considerations.

II 1A Establish an inter-departmental steering committee

To implement recommendation 1A, which calls for the establishment of an inter-departmental steering committee that includes representation by students, the work of the original Environmental Stewardship and Sustainability Practices Committee could be re-directed to address the steering of the Sustainability Precinct. This committee contains within it the administration and staff representation called for in the recommendation and to it could be added faculty and student representation. Proposed participation on this revised committee could include:

Dean and Associate Deans of the School of Construction and the Environment

Research Directors from the School's research centres including:

- Centre for Architectural Ecology
- Centre for Infrastructure Management
- Centre for Building Sciences
- Centre for Energy Systems Applications

Director of Campus Planning

Director of Facilities Management

Researcher from GAIT (Smart Micro Grid Project)

Faculty from relevant programs including: Ecological Restoration, Architecture, Civil Engineering

Student representatives from the same programs as faculty and/or whole class projects

II 1B Collaborate with BCIT Marketing and Communications Department

This recommendation is already being implemented through the School of Construction and Environment in collaboration with BCIT's Marketing and Communications Department. The School has committed itself to become a leader in sustainability education and has developed several new programs as well as revised existing programs to address the emerging demand for qualified professionals that can contribute to the economic, social and environmental prosperity of British Columbia. Therefore, this recommendation can be considered complete.

II 1C Sponsor design competitions to engage students in inter-departmental collaboration

This recommendation aligns with BCIT's strategic plan and represents an opportunity for immediate action. Design competitions are only one way to foster inter-departmental collaboration. Other approaches include adopting a "problem-based" approach to pedagogy that includes bringing students together from different programs and assigning them a problem to solve. The learning that comes out of this exercise helps to meet the course/program learning objectives. Students could be assigned research and design questions related to transforming aspects of the northeast sector of campus towards energy and material consumption reduction goals.

3.1.2 Monitoring and Assessment

Recommendations 2A-C address issues of monitoring and assessment

II 2A Establish a baseline for monitoring within the sustainability precinct

The School of Construction and the Environment has collaborated with the GAIT Smart Micro Grid project to deploy electrical metering capacity at the following buildings within the sustainability precinct: NE1, NE2, NE3, NE4, NE6, NE8. This step will allow assessment of the electrical load for each building. Additional metering capacity within the building would assist in better understanding of how changes to the building and behaviour of occupants affect electrical energy demand. Gas meters and water meters for each of these buildings would further assist in the ability to track and monitor progress over time. Staff could work with the BCIT Foundation to search for a donation to support the purchase and installation of this equipment.

II 2B Engage industry partners such as BC Hydro to develop high performance monitoring systems on a targeted number of buildings

BC Hydro currently offers a number of programs to support Powersmart Partners, such as BCIT, in the effective monitoring of larger buildings. The BCIT Energy and Sustainability Manager and the BC Hydro Key Account Manager could assess which buildings within the Sustainability Precinct qualify for existing programs. Target buildings could reflect those identified through the SOCE-Gait collaboration, i.e. NE1, NE2, NE3, NE4, NE6 and NE8.

Terasen Gas could also be approached for participation in gas metering of these buildings.

BCIT, as part of its integrated energy and greenhouse gas management plan, could attempt to create an internal fund to support improved energy management on campus, including installation of gas meters.

The School could apply to its internal research endowment for the advancement of Green Value Strategies to support purchase and installation of water meters. Alternatively, this may be something that could be explored in collaboration with the Municipality of Burnaby. The Centre for Infrastructure Management could assist with this aspect of monitoring and assessment.

II 2C Explore development of an in-house process for commissioning/re-commissioning using software solutions. Engage IT Services as appropriate.

The BCIT Campus Planning Department has recently completed a re-commissioning study for NE1. The School of Construction and the Environment has also recently completed, with the assistance of Facilities Management, an Ecological Footprint Assessment of the Entire Burnaby Campus for the 2006-2007 academic year. Both initiatives represent a "stand alone" event the benefit of which could be maximized if the findings could be incorporated into an automated process capable of storing and retrieving energy and materials consumption data on a real-time basis, or at least at set intervals capable of feeding into an annual reporting capability.

In 2008, BCIT's Information Technology Services (ITS) Department was asked to assess a range of software solutions that could aid in this goal. It determined that the in-house capabilities of software programs such as Banner could be used to support such a function if coupled with new standard operating procedures to collect and track data that heretofore has not been tracked. The new requirements for greenhouse gas emissions reporting present an opportunity to incorporate the development and implementation of standard operating procedures related to tracking energy consumption as a first phase of such an approach.

In 2009, the School of Construction and the Environment purchased software from EnviroChem for its Environmental Engineering Program that could also be used to assist with automated tracking of energy and materials consumption data.

The BCIT Energy and Sustainability Manager could work with faculty and students in Environmental Engineering, as well as staff from Ancillary Services (including purchasing and supply management), and staff from the ITS Department to initiate a cooperative effort to implement this recommendation and to combine the existing technologies purchased by the Institute with standard operating procedures aimed at establishing a baseline monitoring and reporting function for the entire Institute of which the Sustainability Precinct could serve as a pilot.

3.1.3 Quick Win Projects with High Visibility

Recommendations II3A-B address Quick Win Projects with a high visibility factor.

II 3A Use "City Repair" techniques to change the look and feel of the environment

This recommendation includes graphically depicting the future of the Sustainability Precinct through techniques such as graphics and colour cues to indicate priority pedestrian and cycling areas and/or flow-ways and riparian set-back areas of Guichon creek. The intent is to psychologically prepare people for changes that support the objectives of the Sustainability Precinct as articulated in the Greening Campuses aspirational goals and their cumulative goal of achieving a Factor Four and/or Factor Ten reduction in energy and materials consumption levels without compromising services.

Students from Interior Design, Fish Wildlife and Recreation and/or Ecological Restoration and Environmental Engineering could collaborate to map and then draw the flow of Guichon Creek across the northeast portion of campus where it is currently underground and in a culvert. Students from Ecological Restoration and Environmental Engineering could also work with the Rivers Institute at BCIT to prepare a long-range plan for the day-lighting and rehabilitation of Guichon Creek.

Students from Interior Design, Fish Wildlife and Recreation and/or Ecological Restoration and Environmental Engineering could collaborate to map and then draw pedestrian and bicycle right-of-ways on campus and/or identify areas for ecological restoration and public meeting/seating places interspersed with a greening campus strategy sponsored by Campus Planning.

Students from Interior Design, Steel Fabrication and/or Joinery could work collaborate to design and build bicycle shelters and street furniture such as benches and tables to populate appropriate meeting/seating places and or bridges and viewing areas associated with a day-lit Guichon Creek.

II 3B Replace high-footprint food choices with low-footprint options, e.g. water fountains instead of bottled water.

BCIT Food Services could work with Compass to identify and promote nutritious food choices with a low ecological footprint, similar to UBC's use of signage to identify food choices that have a low ecological footprint.

BCIT Food Services could work with facilities to identify opportunities for the re-introduction of water faucets in the Sustainability Precinct. NE1 could serve as a pilot building for this approach.

3.1.4 Prioritizing Catalyst Projects

Recommendations II4A-B address catalyst projects

II 4A Remodel NE1 toward becoming an ecocity fractal including increasing its offering of amenities such as housing.

This recommendation seems to be a difficult stretch as an action for immediate implementation, but could be considered as a Factor Four initiative. Based on a review of intermediate recommendations, the following appears appropriate as a consolidated plan of action for addressing the remodelling of NE1 toward becoming an ecocity over the next five year period:

i) form an integrated task group comprising: administrative staff, faculty and students to help plan and guide short-term and longer term initiatives for the adaptive restructuring of NE1
ii) improve baseline data collection capacity for the building, e.g. meters, and commissioning assessment to understand the current status of the building's systems.
iii) explore options to reduce energy loads within the building including exploring potential for efficiency gains coupled with integration of renewable energy technologies such as solar hot water heating. Think outside the traditional building energy box to find additional energy saving opportunities, e.g. re-thinking the food services functions and how food is stored and cooled as well as reducing overall loads (e.g. water fountains instead of pop-vending machines).
iv) Sponsor design competitions and problem-based learning initiatives that get more students and departments involved in cross-collaboration (e.g. re-program use of space to shed load, re-design for passive solar heating and natural ventilation)
v) Explore exterior road-way and landscaping changes adjacent to the building to increase natural vegetation and pedestrian/cycling priority over cars. Again use design competitions or problem-based learning to foster inter-departmental collaboration (e.g. design build of sheltered bicycle facilities)
vi) Aim to transition food services to healthier and lower footprint choices, e.g. emphasizing non-processed and locally grown food
vii) Explore opportunities to move toward more renewable and integrated energy systems, including waste-heat exchange through district systems
viii) Explore options to phase-out mechanical systems and replace them with passive systems for heating/cooling and ventilation (e.g. work with students as per above)
ix) Explore options to consolidate uses within NE1 as a 24/7 hub on the North side of campus

Moving from Factor 4 to Factor Ten could include the following:

x) Explore options to introduce housing and other services within the building or immediately adjacent to it (this may include expanding the scale and density of the building)

xi) Explore options to adapt the skin of the building to increase penetration of natural daylight, passive solar thermal gain and natural ventilation, access to views and fresh air

II 4B Continue day-lighting Guichon Creek and design for its eventual integration with the Sustainability Precinct as an ecocity fractal.

This recommendation aligns with the Campus Master Plan that already calls for the day-lighting of the entire length of Guichon Creek on the Burnaby Campus. The following actions could be pursued immediately towards this goal:

i) Form an integrated task group comprising: administrative staff, faculty and students to help plan and guide short-term and longer term initiatives for the day-lighting of Guichon Creek.
ii) Improve baseline data collection capacity for the creek including its existing flow through underground culverts and its probable natural flow based on topography.
iii) Assess whether and how the original path of the creek can be restored including attention to flow volumes, riparian restoration, and impact on existing buildings and transportation right-of-ways.
iv) Map the desired pathway for a day-lighted Guichon Creek and ensure that design guidelines and the Campus Master Plan account for and protect it as a blue-way in all future land use and building decisions.
v) Draw the mapped pathway for a day-lighted Guichon Creek on the ground, and over buildings, using blue paint (e.g. work with Interior Design, Fish Wildlife and Recreation, Ecological Restoration, and Environmental Engineering).
vi) Work with the Rivers Institute at BCIT to manage the implementation of day-lighting Guichon Creek including fund raising and coordination of student projects.

4.0 Recommendations for Factor Four Intervention

Key strategies identified for this implementation phase focus on the whole northeast portion of the campus including land-use changes that introduce higher density, mixed uses including student housing, and conversion of some parking lots to: green space, urban agriculture to support on-site food demand, and housing (or some mix thereof). Emphasis is also given to reducing automobile dependence by introducing a comprehensive transportation management strategy to increase pedestrian, cycling and transit mode shares to and on campus. This approach includes: re-design of service vehicle access to campus buildings to avoid impeding foot and bicycle pathways; increased transit access aided by campus design that supports increased transit capacity and enables transit riders to access buildings quickly and comfortably; improved bicycle access that addresses both the need for storage of bicycles as well as shower and change facilities distributed across the campus. Priority is also given to transformation of

the energy infrastructure to introduce combined heat-and-power, use of wood waste generated on site, and expansion of geo-exchange capacity. Exploration of the potential for other renewable energy technologies, most notably passive solar for lighting and heating (space and water), is also important. This implies that the medium term opportunity for achieving Factor Four recommendations is to begin creating an "urban village" ecocity fractal in the northeast portion of the campus that could include a wood-waste to energy project in NE2 and NE4 (i.e., Joinery and Carpentry) as well as introduction of housing through, for example, a Laneway housing demonstration project.

FIV Strategy 1: Reconfigure Land Use and Transit for More Walking and Less Parking

Recommendations:

FIV 1A Provide a variety of housing options both on and adjacent to campus

FIV 1B Work with transit authorities to increase frequency and redesign stops and shelters to accommodate maximum capacity

FIV 1C Improve cycling pathways and related infrastructure both on campus and connecting to City of Burnaby bicycle paths

FIV 1D Reconsider parking lots for other, more sustainable uses, including green space, urban agriculture and housing

FIV Strategy 2: Change behaviour to reduce waste

Recommendations:

FIV 2A Phase-in water fountains and healthy snack food choices and phase out bottled water and processed food choices from vending machines

FIV 2B Revise purchasing guidelines to incorporate sustainability best practices, including in food services

FIV 2C Rethink the commuter campus identity and support non-automobile dependent transportation options for students and employees

FIV 2D Expand composting capacity on campus by converting some parking lots into gardens

FIV 2E Increase the supply of Ecocity and Sustainability literature in the Library including exhibits, posters, displays and models

FIV Strategy 3: Adopt a Bold, Long Range Vision

Recommendations:

FIV 3A Establish a launching pad for large scale transformation

FIV 3B Address cultural transformation of campus life in addition to campus physical re-design

FIV 3C Employ an integrated approach to planning that includes creative and bold design with variety and attention to comfort

FIV 3D Transition away from being a commuter campus towards becoming an urban village

FIV Strategy 4: Value and appreciate nature and natural features

Recommendations:

FIV 4A Restore and maintain Guichon Creek to support its full ecosystem functioning potential

FIV 4B Celebrate Guichon Creek as an important green design feature on campus

FIV 4C Increase the amount of and strategically locate green space on campus to maximize ecosystem services while simultaneously improving liveability

FIV 4D Protect view corridors and use roof-top spaces as gathering places that provide access to views and nature

FIV 4E Explore the potential for natural amenities on campus to yield additional energy services, e.g. geo-exchange, biomass and solar access

4.1 How Recommendations for Factor Four Interventions Could be Implemented

This section identifies how the recommendations for Factor 4 intervention could be implemented. Because these initiatives encompass the entire northeast portion of the campus, multiple stakeholders will need to be engaged including BCIT administrative services, neighbouring land owners and utility service providers such as TransLink. In most cases these initiatives require inclusion in the Campus Master Plan through changes to design guidelines, planning requirements, and infrastructure design considerations.

4.1.1 Land Use Change on Campus and in Adjacent Lands

Recommendations FIV 1A-D address land use changes on campus and in adjacent lands

FIV 1A Provide a variety of housing options both on and adjacent to campus

This recommendation represents a major change to the Campus Master Plan to include additional student housing in the northeastern portion of the campus, particularly along its eastern edge. It also requires consultation with the City of Burnaby to determine whether and how densification in this portion of the campus fits with the neighbourhood area plan and Official Community Plan objectives. Increasing density could proceed as part of an integrated approach to not only increase the provision of residential housing at this location but to also increase the range of amenity services provided to support a new residential population. Bearing in mind that the underlying goal of increasing housing supply on campus is to reduce automobile dependency and single-occupant vehicle commuting to campus, any increase in residential development should be designed in a pedestrian/transit oriented fashion that also supports mixed use development with sufficient amenities available near to where people live.

FIV 1B Work with transit authorities to increase frequency and redesign stops and shelters to accommodate maximum capacity

The BCIT Burnaby campus enjoys regular and frequent bus service from Metrotown via bus no. 130 at 8 minute intervals all day from 7:30 a.m. to 5:30 p.m. Nevertheless, demand for service often exceeds supply, e.g. at the Metrotown Station in the morning it is common for students to wait for more than one bus to pass them by before they can ride. Bus shelters at stops adjacent to the BCIT campus on Willingdon at Goard Way are insufficient to protect all passengers from the winter rains while they wait for bus service. There is also regular and frequent bus service from Brentwood Town Centre to the North of Campus. However, there are no bus shelters along Canada Way, at the campus' northern boundary and the bus stop is located adjacent to a depression in the road where icy water pools and is splashed onto would be passengers by passing vehicles while they await their bus or attempt to walk along the road to get to the campus. An opportunity exists to form a transportation management authority (TMA) by collaborating with other businesses in the area to form a coalition interested in both improved transit frequency and access to a variety of services through TransLink's TravelSmart and Employer Pass programs. BCIT could also work with the BCIT Student Association to seek an agreement with TransLink to opt-in to the U-Pass program. Finally, BCIT could also work with TransLink to plan for increased transit capacity through redesign of bus stops and shelters, perhaps even creating a bus loop on campus or providing for improved sheltered access from the bus stops to the campus buildings. BCIT's Burnaby campus is noted for its sheltered walkways including one that covers pedestrians accessing the main campus entrance from Willingdon at Goard Way. However, access from the north end of campus remains unsheltered.

FIV 1C Improve cycling pathways and related infrastructure both on campus and connecting to City of Burnaby bicycle paths.

BCIT's Campus Planning Department can coordinate with the City of Burnaby to create contiguous cycling pathways and related infrastructure on campus that connect with the City's bicycle paths. An action team comprising BCIT employees and students who cycle to campus as part of their commute could also work with Campus Planning and the City of Burnaby to help identify on-campus cycling pathways, as well as participate in both identifying and developing appropriate cycling infrastructure and services on campus.

FIV 1D Reconsider parking lots for other, more sustainable uses, including green space, urban agriculture and housing

BCIT's ecological footprint assessment reveals that BCIT's employees and students are automobile dependent with 75% of commute trips made by single occupant vehicles. Nevertheless, according to a recent transportation study, BCIT currently has a 30% over-supply of parking on campus which remains under-utilized most of the year. This represents a significant opportunity-cost for misallocated use of land. BCIT also heavily subsidizes parking on campus charging under-market value for daily and monthly rates, e.g. $4.00 per day for student parking and $10.83 per month for employee parking. By comparison, SFU charges students approximately $9.00 per day to park at its Burnaby campus and UBC charges employees approximately $60.00 per month to park at its Point Grey Campus in Vancouver. BCIT's Campus Planning Department and Safety and Security Department could work together to develop a comprehensive trip reduction program that addresses: a phase-out of parking subsidies or a more even distribution of subsidies for employee travel that includes incentives for pedestrian, cycling, transit, and carpool commuters. The latter option could be supported through a partial or full phase-out of the parking subsidy that is currently offered to single-occupant vehicle drivers. Market rate for parking at BCIT's Burnaby campus should reflect what other employers and the market is willing to pay and should also consider fair treatment for all employees. Offering a subsidy to those employees who choose to drive alone to campus not only represents inequitable treatment in consideration of those employees who choose transportation alternatives (and do not receive a subsidy benefit), it also fails to make best use of BCIT's resources. BCIT's Campus Planning Department could explore opportunities to change the designated use of the existing 30% of under-utilized parking space on campus by working with the School of Construction and the Environment's environmental programs in Environmental Engineering, Ecological Restoration, and Fish Wildlife and Recreation to convert these lands into green spaces. BCIT's Campus Planning Department could also work with the BCIT Farmer and Artisans Market Committee and BCIT Food Services to identify opportunities to convert these lands into urban agriculture areas. BCIT's Campus Planning Department could

also identify options to convert these lands to housing. BCIT's Campus Planning Department could also work with the Safety and Security Department, which has transportation and parking authority on campus, to develop an integrated strategy aimed at using trip reduction programs as a means to further reduce demand for parking on campus so that additional lands can be freed for conversion to green space, agriculture and housing. Which lands should be converted to what uses should be addressed through a whole systems approach that retains the Factor Ten goals and is reflected within the Campus Master Plan.

4.1.2 Behaviour Change

Recommendations IV2A-E address behaviour change

FIV 2A Phase-in water fountains and healthy snack food choices and phase out bottled water and processed food choices from vending machines

BCIT Facilities Management Department can re-introduce water fountains and personal canteen filling stations within the buildings comprising the sustainability precinct and along pedestrian and bicycling pathways. Strategic location of these facilities at BCIT cafeterias is also recommended and could be complemented by a "Tap Water" campaign to remind employees and students that they have low-footprint drinking options. BCIT Food Services could work with the Metro Vancouver Tap Water Pledge program to implement such a campaign on campus, including participation at student orientation and student services week, EcoFair and through on-line and poster communications efforts. BCIT Food Services could also promote healthy snack food choices and work with the BCIT Farmer and Artisans Market Committee to identify and source appropriate products. A similar awareness campaign to the Tap Water Pledge could also be offered on campus in order to raise awareness about healthy food choices that also help reduce our ecological footprint. BCIT is currently under contractual obligation to Compass that includes agreements to carry Pepsi Co. Products, including bottled water products under the Pepsi Co. brand. These products are also sold on campus through vending machines which is part of the contractual agreement. Nevertheless, BCIT Food Services and Supply Services could engage Compass in discussions about BCIT's aspirations to explore near-term options to provide food and drink products with an overall lower ecological footprint. Both BCIT and Compass Group were named as two of Canada's top 50 Greenest Employers in 2010. The combined efforts of these two organizations working in collaboration to engage sub-contractors to supply greener products could have reasonable sway in increasing green product choices in the future, including engaging Pepsi Co. in discussions about greener product options and delivery options on campus.

FIV 2B Revise purchasing guidelines to incorporate sustainability best practices, including in food services

BCIT Purchasing and Supply Services could develop an Ethical/Sustainable Purchasing Policy to incorporate best practices in all Institutional purchasing. This policy could come forward under the new Sustainability Policy that has been drafted and endorsed by the BCIT Leadership Team and will be going forward to 30 day consultation with the BCIT community. Precedent for this initiative has already been set through Purchasing's work with the Information Technology Services Department to establish "Green IT" requirements in all of its purchasing contracts, and similarly in the revision of BCIT's request for proposals for waste management contracted services. BCIT Food Services, Purchasing and Supply Services could work together to explore how the next round of contracts pertaining to food services could incorporate BCIT's sustainability aspirations, including reducing our ecological footprint from food packaging and bottled beverages.

FIV 2C Rethink the commuter campus identity and support non-automobile dependent transportation options for students and employees

This recommendation complements recommendations IV1A-D and requires engagement of the BCIT community through a collaborative effort among: Campus Planning, Safety and Security, and the BCIT Student Association. These organizations could form an inter-departmental steering committee to formulate a coordinated approach to: rethinking the identity of BCIT's Burnaby Campus as a live-work site including strategies to increase provision of housing and services on campus, to offer an integrated suite of incentives and support for an employee trip reduction program, and to amend the Campus Master Plan including designation for pedestrian and cycling paths that connect with the City of Burnaby's cycling infrastructure and designation of more student and employee housing and mixed use development.

FIV 2D Expand composting capacity on campus by converting some parking lots into gardens

BCIT has a successful composting program but lack of available space for composting bins limits the program's capacity for future expansion. In order to maximize the amount of organic wastes that is composted on campus some of the under-utilized parking space on campus could be converted to green space, including gardens that contain composting bins. BCIT Facilities Management could work with the Safety and Security Department as well as with the Campus Planning Department to identify suitable expansion areas for the composting program.

FIV 2E Increase the supply of Ecocity and Sustainability literature in the Library including exhibits, posters, displays and models

In order to raise awareness about sustainability among the members of the BCIT community, the Director Sustainable Development and Environmental Stewardship could work with the Director Library Services to explore opportunities for: increasing the BCIT Library holdings in the areas of Ecocity and Sustainability literature and using the Library as a space to exhibit student projects related to these themes.

4.1.3 Vision

Recommendations FIV3A-D address vision

FIV 3A Establish a launching pad for large scale transformation

In order to achieve the Factor Ten goal, Factor Four interventions must align with it. The Director of Sustainable Development and the Director of Campus Planning can revise the draft Greening Campuses Strategic Plan to incorporate Factor Ten as the new overarching and longer-term goal. This means that the current goal for achieving Factor Four reductions in energy and materials consumption would be contextualized as an interim goal. The Director of Campus Planning, Director of Facilities Management, and the Director of Sustainable Development and Environmental Stewardship could work together to identify how the Factor Ten goal affects the long-range plans for their respective portfolios and develop a strategy for aligning Factor Four recommendations with Factor Ten outcomes. The Director Sustainable Development and Environmental Stewardship can work with the VP Education, International and Research to develop a strategy to engage applied research faculty in projects that derive a benefit towards achieving the Factor Ten goal. This work could be initiated in the sustainability precinct with the aim of expanding scope to the entire campus over time – in alignment with the goals of the Environmental Stewardship and Sustainability Practices Committee to transform the BCIT Burnaby Campus into a living laboratory of sustainability.

FIV 3B Address cultural transformation of campus life in addition to campus physical re-design

Simply re-designing the built environment will be insufficient to achieve the level of energy and materials reduction needed to achieve the longer term Factor Ten goal. Therefore, it is important to start now to change the culture of campus life to instil an ethic of care, meaning a willingness to participate in environmental stewardship and social responsibility. The BCIT Energy and Sustainability Manager and the Sustainability Marketing and Communications Strategist have developed a communications strategy and community engagement campaign to inspire change in behaviour of BCIT employees toward sustainability. This includes ongoing development of the BCIT Green Team, a voluntary initiative by BCIT employees to advance

sustainability on campus, and numerous campaigns to: reduce waste, go paperless, and turn of the lights. To further advance these efforts, the Director of Sustainable Development and Environmental Stewardship could work with the Director of Marketing and Communications, the VP Human Resources, and VP Student Services, and the Director of the BCIT Student Association to develop a strategy to engage BCIT employees and students in efforts to transform the campus into a living laboratory of sustainability, including an explicit goal to enable and encourage "one planet living." Such an initiative could also create an important link to the work of Facilities Management, Campus Planning and the School of Construction and the Environment that aim to reduce our ecological footprint.

FIV 3C Employ an integrated approach to planning that includes creative and bold design with variety and attention to comfort

Buildings are an extension of the urban infrastructure system and how buildings are designed and used affects demand for energy and materials over the building's lifecycle. Furthermore, all urban infrastructure systems ultimately depend on natural ecosystem services. Therefore, an integrated approach to planning that aims to reduce the load requirements of buildings and infrastructure while simultaneously maximizing the capacity of ecosystem services to function as "green infrastructure" is an important step towards achieving the Factor Four goal. In the same way that green buildings benefit from an integrated design process, the campus could also benefit from an integrated planning process that brings professionals from various backgrounds such as architecture, biology, and engineering together to address multiple objectives and concerns. The Director of Campus Planning could advance design guidelines for new buildings on campus that require passive design features to offset or eliminate use of mechanical heating and ventilation systems, lighting systems, and hot water heating. Design guidelines could also stipulate that the quality of energy service provided match the level of use demanded. For example, computing technology is a high-grade demand for energy that requires electricity, a high-grade form of energy at a secured, constant supply. The consumption of electricity in computing technologies generates heat, a low-grade form of energy. Space heating is a low-grade demand for energy that can be met through a variety of means including taking advantage of the waste heat from computers. Such a guideline would, therefore, maximize the "cascading" use of energy from high-grade to low and prevent the mismatch of high-grade forms of energy for low grade uses, i.e., it would prevent use of electrical base-board heating in new buildings and encourage its phase-out from existing buildings as they are retrofitted and/or adaptively restructured. Design guidelines to protect solar access between and among buildings, e.g., to avoid one building excessively shading another, would also be required to protect opportunities for future buildings and existing buildings that are slated for adaptive restructuring to also benefit from passive design solutions. The Director of Campus Planning could also consider the clustering of buildings, and articulation

of uses within buildings, to take advantage of opportunities for waste-heat exchange (e.g. housing tends to be a heat sink and offices tend to generate waste heat; when articulated together an opportunity for waste-heat exchange emerges). The Director of Campus Planning could work with faculty and students in the School of Construction and the Environment's Environmental Engineering, Ecological Restoration, and Sustainable Resource Management programs as well as the Centre for Infrastructure Management, Centre for Architectural Ecology, and the Rivers Institute at BCIT to develop a green infrastructure strategy, including an integrated storm water management plan, to maximize on-site permeability and retention and treatment of storm water entering Guichon Creek. For example, the use of swales adjacent to the newly daylighted portions of Guichon Creek at the north end of campus could serve as green space in drier months and double as storm overflow retention areas during wetter months of the year. Incorporation of green roofs and living walls can also assist in both increasing permeability and green space on campus as well as improve the thermal performance of buildings. Creative use of design that incorporates a diversity of approaches such as the ones articulated above can simultaneously increase the aesthetic appeal of the campus while reducing its operating load and embodied energy, i.e. its ecological footprint.

FIV 3D Transition away from being a commuter campus towards becoming an urban village

This recommendation builds on those contained in FIV1A-D and FIV2C. The urban village concept encompasses a 2-3 block, i.e. walkable, area that includes a variety of amenities and mixed land uses that enable place-based living, working and recreating in close proximity. In order to achieve Factor Four, the urban village must also address on-site provision of energy and resource needs, including food and water, to partially offset demand for their importation and related impacts from their processing, packaging and transportation. This recommendation represents a major change to the Campus Master Plan. The inter-departmental steering committee, as called for in recommendation II1A, could be tasked with guiding the coordination of the entire Sustainability Precinct initiative towards this objective in cooperation with Campus Planning and Facilities Management. The Director of Campus planning could bring forward for consideration by the BCIT Community, Board of Governors and City of Burnaby a plan to transform the Campus into an urban village, following ecocity principles. Consultations with BC Hydro and TransLink would also be necessary. An inter-agency working group could be established comprising the aforementioned institutions to explore how to move forward with its implementation.

4.1.4 Valuing Nature

Recommendations FI4VA-E address the valuing of nature

FIV 4A Restore and maintain Guichon Creek to support its full ecosystem functioning potential

This recommendation aligns with the Campus Master Plan that calls for the daylighting and ecological restoration of Guichon Creek. Faculty and students from the School of Construction and the Environment: Fish Wildlife and Recreation, Ecological Restoration, and Environmental Engineering Programs can work with research faculty at the Rivers Institute of BCIT and Campus Planning to introduce riparian set-back areas adjacent to the creek and work to rehabilitate these lands to a naturalized state conducive to the healthy ecosystem function of the creek.

FIV 4B Celebrate Guichon Creek as an important green design feature on campus

Campus Planning can allow for an expanded green space and park area adjacent to the creek in order to call attention to and celebrate its presence on campus. The Rivers Institute of BC could build a small public reception and information kiosk with adjacent office and research capacity for the Rivers Institute within the northeast area of campus, i.e. near the creek, to enable community access to the creek and its surrounding re-habilitated green spaces and to facilitate learning about ecological restoration and stewardship of rivers.

FIV 4C Increase the amount of and strategically locate green space on campus to maximize ecosystem services while simultaneously improving livability

This recommendation complements recommendation FIV3C, and FIVA-B. Campus Planning and Facilities Management could work with the BCIT: Centre for Architectural Ecology, Centre for Energy Systems Applications, and the Rivers Institute at BCIT to identify and strategically plan for the introduction of green space on campus that serves to maximize biocapacity and ecosystem functioning while simultaneously improving access by the BCIT community to green spaces on campus. Examples could include re-introduction of indigenous flora across the campus in combination with removal of extensive paved areas to improve permeability; introduction of community gardens, park benches, and tables that expand opportunities for the community to enjoy these newly greened spaces; creation of living walls and green roofs that simultaneously serve research and learning functions while they contribute to the beautification of the campus.

FIV 4D Protect view corridors and use roof-top spaces as gathering places that provide access to views and nature

BCIT enjoys views of the North Shore Mountains from the northeast side of campus. These views could be protected through introduction of design guidelines that protect view corridors. For example, this could be achieved through terracing of upper level floors in buildings to allow views through the buildings to the mountains while simultaneously providing patio/green roof spaces for people to enjoy those views.

FIV 4E Explore the potential for natural amenities on campus to yield additional energy services, e.g. geo-exchange, biomass and solar access

This recommendation complements recommendation FIV3C and draws attention to the synergies that a sustainability approach can bring to bear. The Director of Campus Planning could work with the Centre for Energy Systems Applications, Centre for Infrastructure Management, Centre for Architectural Ecology, and the Rivers Institute at BCIT to identify opportunities for natural amenities to provide energy services. Examples include strategic placement of deciduous trees near buildings that provide shade and cooling in the summer but allow penetration of sunlight in the winter months, e.g., London Plane trees adjacent to the east and west sides of SE1, the electrical trades building. The use of swales for storm-water overflow could also contain a horizontal geo-exchange field, the forested area at the south end of campus could be managed for harvesting of fuel wood for use in biomass burners on campus. (*Note this latter option could be explored for expansion beyond campus to sourcing in neighbouring municipal parks through an agreement with the City of Burnaby.)

5.0 Recommendations for Factor Ten Intervention

Key strategies identified for this implementation phase address the entire campus. Whereas the Factor Four recommendations move towards the creation of an urban village at the north end of campus, the Factor Ten recommendations transform the campus into an “ecovillage.” The distinction is that most energy and materials to supply the needs of campus operations and its residents are sourced locally on campus or within the bioregion from renewable sources that are managed sustainability to ensure their ongoing availability indefinitely. This includes maximizing green space potential on campus for provision of bio-energy and agriculture to meet fuel and food needs. Rainwater harvesting and onsite storm-water management for stream and aquifer recharge. Buildings would be clustered and made of low-embodied energy materials. Where high-embodied materials are used it is to match a high-quality need, e.g. structural integrity, and the design allows for the benefits of these materials to be amortized over many years through flexible use of space, modular deconstruction, and ease of maintenance.

FX Strategy 1: change land use and construction materials

Recommendations:

FX 1A House nearly all employees and students on or within walking distance to campus

FX 1B Build high-density, mixed use, clusters of buildings with flexible spaces and shared walls

FX 1C Convert parking to buildings or green spaces (there is no need for cars in an ecovillage)

FX 1D Remove or relocate some buildings to expand room for natural resource cultivation

FX 1E Use low embodied energy materials in buildings and/or amortize over long periods

FX Strategy 2: Source food, energy and materials regionally

Recommendations:

FX 2A Grow as much food as possible on campus and source the rest form within the region

FX 2B Source building materials on campus, in the region, or from recovered building supplies

FX 2C Phase out use of fossil fuels and replace with clean and renewable energy sources

FX Strategy 3: Change behaviours and habits

Recommendations:

FX 3A Replace throw-away and impulsivity with frugality and thrift

FX 3B Waste nothing

FX 3C Localize production and consumption of goods and services

FX Strategy 4: Develop a bold plan for leadership and serious investment

Recommendations:

FX 4A Develop a plan that can lead to achievement of Factor Ten outcomes

FX 4B Commit to long-term planning in order to achieve Factor Ten goals

FX 4C Create a compelling vision to sustain commitment that accompanies a detailed plan

FX 4D Invest for the long-term in order to amortize benefits over many years

5.1 How Recommendations for Factor Ten Interventions Could be Implemented

This section identifies how the recommendations for Factor 10 intervention could be implemented. Because these initiatives encompass the entire campus, multiple agencies will need to be engaged including BCIT , City of Burnaby, Metro Vancovuer, TransLink and BC Hydro, among others such as neighbouring land owners and utility service providers such as Terasen Gas. In most cases these initiatives require major changes to the Campus Master Plan and may also require or benefit from changes in Burnaby's neighbourhood area plans and/or Official Community Plan. Changes to design guidelines, planning requirements, and infrastructure design considerations will also be needed.

5.1.1 Changes to Land Use and Construction Materials

Recommendations FX 1A-E address changes to land use and construction materials

FX 1A House nearly all employees and students on or within walking distance to campus

This recommendation builds on recommendations FIV1A and FIV3D. The Director of Campus Planning could work with the BCIT Community, Board of Governors and City of Burnaby to radically increase the level of residential and mixed use development on campus and in immediately adjacent areas to campus. Options could include expanding housing along the east side of campus for students (e.g. adjacent to Beta Avenue) and within proximity to class rooms and campus amenities, and for employees (e.g. adjacent to Wayburn) to blend with the residential uses east of Wayburn in the Green Tree Village development. Mixed use academic, residential and commercial buildings could also be located along the north and west sides of campus, parallel to Canada Way and Willingdon. Careful consideration will need to be given to where and how housing could be incorporated on campus without compromising availability of green space for ecosystem services, agriculture, and natural resources (fibre, water, etc.). A multi-disciplinary and multi-agency task group could convene a process, including an integrated planning charrette, to explore how best to incorporate housing on campus and in surrounding neighbourhoods.

FX 1B Build high-density, mixed use, clusters of buildings with flexible spaces and shared walls

Almost every building will need to be high-density, mixed use, and clustered with other buildings to achieve the Factor Ten goal. Furthermore, buildings will need to be designed for flexible use of space and/or designed for deconstruction so that materials can easily be re-used in new configurations. Design guidelines should direct attention to thermal massing and opportunities for efficient use of materials and resources through shared walls and infrastructure systems, such as district energy systems. Rather than impose prescriptive

solutions, design guidelines, including infrastructure servicing solutions, could be performance based, using equivalencies to encourage innovation in meeting the Factor 10 goal.

FX 1C Convert parking to buildings or green spaces (there is no need for cars in an ecovillage)

This recommendation builds on recommendations II1A-D and FIV3D. Achieving the Factor 10 goal requires the virtual elimination of automobiles for personal use, dedicating the space that heretofore was used for roads and parking to enhanced bio-productivity (e.g. ecosystem services and agriculture) as well as housing and non-fossil fuel dependent forms of transportation. Admittedly, the farther into the future the recommendations reach, the harder it becomes to anticipate disruptive technologies that could radically alter the challenges and solution spaces to achieving sustainability in the built environment, the natural environment and the relationship between them. Therefore, an adaptive management approach could be used to allow for interim assessment and testing of innovative approaches in response to emerging technologies. The Director of Campus Planning could phase out single-use parking areas and/or introduce design guidelines that call for parking structures to be designed for flex-use to allow for their easy conversion to class room and/or commercial and residential uses. Similarly, parking structures could be buried in the basement of future buildings, and designed for flex-use to enable their conversion to alternative uses over time.

FX 1D Remove or relocate some buildings to expand room for natural resource cultivation

The Director Campus Planning could work with faculty and students in the School of Construction and the Environment's Ecological Restoration and Sustainable Resource Management programs and the Centre for Infrastructure Management to develop an ecosystems services plan that addresses cultivation of natural resources on campus for food, fuel, fibre and water. This plan could inform the Campus Master Plan with regard to mapping locations on campus that should be reserved for natural resource cultivation and preservation of ecosystem services and where development should be concentrated, including which buildings could be removed or relocated. Other considerations such as the seismic integrity of the buildings and infrastructure servicing needs would also be brought to bear following an integrated approach to planning identified in recommendation FIV3C.

FX 1E Use low embodied energy materials in buildings and/or amortize over long periods

The BCIT Building Science Centre could be engaged in developing a strategy for identification and use of low-embodied energy materials for construction, such as wood, as well as development of design guidelines to inform their use in new buildings on campus. Some aspects of building construction may require high embodied energy materials, such as steel and concrete, for use in footings and load bearing. In such cases, these materials should be used thoughtfully so that their service can be amortized over the very long term. Design and

infrastructure guidelines that account for the long-term use of high-embodied energy materials could be developed through a collaborative effort between the Building Science Centre and Centre for Infrastructure Management. Design guidelines could also be developed to maximize use of low embodied energy materials in all new construction on campus, e.g., the proposed use of wood in the new Health Sciences building.

5.1.2 Regional Sourcing of Food, Energy, and Materials

Recommendations FX 2A-C address regional sourcing of food, energy and materials

FX 2A Grow as much food as possible on campus and source the rest from within the region

This recommendation builds on recommendation FIV1D and poses an interesting challenge to present dietary norms that rely on significant meat and cereal grain consumption. The lower mainland's fertile soils are well suited to the cultivation of legumes, and green houses and/or hot houses offer the capacity for year-round production of fruits, such as tomatoes, and warm-weather crops such as peppers. There may be limited scope, however, for production of grain crops. A shift to an entirely regionally sourced diet would require significant cultural transformation within the BCIT community. Furthermore, although BC's southern coastal and river waters still maintain viable fisheries, their capacity to provide sufficient protein and calories to meet the demand of the BCIT community, assuming most students and employees now live on campus, may prove to be cost-prohibitive. Some capacity for aquaculture could complement the call for more agricultural production on campus, e.g., tilapia fish thrive in shallow concrete pools as part of a bio-engineered waste water treatment process that can be kept separate from Guichon Creek's stream ecology. BCIT Food Services could work with Compass Group and Metro Vancouver to explore food security options, including whether and how food for the BCIT community could be sourced entirely from within the region.

FX 2B Source building materials on campus, in the region, or from recovered building supplies

This recommendation builds on recommendation FX1E. Faculty and students in the School of Construction and Environment's Architectural Science and Architectural Building and Engineering Technology programs could explore whether and how materials could be salvaged from existing campus buildings that are slated for demolition or adaptive restructuring. They could also work with students from the Sustainable Resource Management program to explore opportunities to source building materials from natural resources occurring on campus, e.g. such as from the forest at the south end of campus, or from the off-site BCIT wood lot. The Director of Campus Planning could work with the Building Science Centre to research and develop design guidelines that specify that new construction on campus use regionally sourced materials, including salvaged materials, or set appropriate equivalence standards in order to

meet the underlying objectives of reducing the ecological footprint of new building construction (with regard to materials) by a Factor of Ten.

FX 2C Phase out use of fossil fuels and replace with clean and renewable energy sources

This recommendation addresses both the use of motor vehicles and other mechanical equipment on campus, including building heating and ventilation systems. It builds on a variety of recommendations including: FIV1A-C, FIV2C, FIV3A-D, and FIV4E. The Director of Campus Planning could work with the Safety and Security Department, Centre for Energy Systems Applications, Centre for Infrastructure Management, BC Hydro and Terasen Gas to develop a strategy to phase out the use of fossil fuels on campus. A primary consideration would include replacement of the existing gas fired boiler with either a single bio-mass fuelled boiler or a distributed-integrated district energy system that relies on several renewable energy technologies, e.g. geo-exchange coupled with bio-mass and augmented with solar water heating and photo-voltaics.

5.1.3 Behaviours and Habits

Recommendations FX 3A-C address behaviours and habits

FX 3A Replace throw-away and impulsivity with frugality and thrift

This recommendation builds on recommendations FIV2A-E. BCIT Supply Services, could work with Ancillary Services, Food Services, the Learning and Teaching Centre, the Information Technology Services Department, the Director Sustainable Development and Environmental Stewardship, and faculty and students in the School of Construction and the Environment's Environmental Engineering program to assess the lifecycle impacts of disposable products used on campus. The 2006-2007 BCIT Ecological Footprint Assessment serves as a valuable starting point for this research. Once the profile of each products' ecological footprint is understood, the Director of Sustainable Development and Environmental Stewardship could work with the above named groups to identify appropriate alternative products that have a lower footprint. Subsequently, these departments can work with Purchasing and Supply Services to phase-in purchase of these more appropriate products and BCIT's Marketing and Communications Department could be recruited to develop a campaign to engage the BCIT community in reducing demand for disposable products and learn how to use more durable ones, e.g. provision of online course reading materials instead of paper hard copies.

FX 3B Waste nothing

Waste is a misplaced resource. The BCIT Energy and Sustainability Manager could work with BC Hydro to document behaviour change initiatives that result from a Sustainability Engagement Strategy that is currently underway. The intent is to create a culture of sustainability on campus

as a means to achieve greater energy savings. The belief is that the more people participate in environmental stewardship behaviours, the higher their participation rate. For example, people who recycle may also be more inclined to turn off the lights. BCIT is uniquely positioned to explore the way that technology and behaviour change interact. Students from BCIT's Sustainable Energy Management Program, developed in collaboration with BC Hydro, could study a variety of scenarios at the AFRESH Home, a net zero building on campus, to learn under what conditions people engage in energy-saving activities. BCIT's Smart Micro Grid Project could work with BC Hydro and the BCIT Energy and Sustainability Manager to study how students in BCIT residences respond to smart-meters and information and engagement campaigns that encourage them to conserve energy. Faculty and students in the School of Construction and Environment's Environmental Engineering program could be recruited to study the campus metabolism for energy and materials consumption, in order to identify where and how waste is occurring. Faculty and students from Environmental Engineering could then work with the School's research centres, including the Centre for Architectural Ecology, Centre for Infrastructure Management, Centre for Energy Systems Applications, and Building Science Centre to explore how application of industrial ecology and bio-mimicry could reduce the waste.

FX 3C Localize production and consumption of goods and services

This recommendation builds on recommendations FX1E, FX2A-B. The Director Supply Services could work with the BuySmart Network to identify sourcing of locally produced goods and service suppliers, and develop standard operating procedures that prefer these products and vendors when making purchasing orders or issuing requests for proposals to bid on BCIT service contracts.

5.1`.4 Planning, Leadership and Investment

Recommendations FX 4A-D address planning, leadership and investment

FX 4A Develop a plan that can lead to achievement of Factor Ten outcomes

The Director of Sustainable Development and Director of Campus Planning could work with an inter-departmental, multi-stakeholder, and multi-agency team or group of teams to develop an integrated plan for the long-term achievement of Factor Ten outcomes. This plan could be reflected in the Campus Master Plan, Facilities Operational Plans and the School of Construction and Environment's Operational Plan and Applied Research Strategy.

FX 4B Commit to long-term planning in order to achieve Factor Ten goals

The Campus Master Plan sets the long-term planning direction for the Campus. The Director of Campus Planning can work with the BCIT Community and Board of Governors to incorporate

the Factor Ten goal and its related recommendations coming out of the Sustainability Precinct Charrette, as further articulated in this report, in the Campus Master Plan. The Director Sustainable Development and Environmental Stewardship and Director of Campus Planning can revise the draft Greening Campuses Strategic Plan to further articulate the strategy for moving from immediate, to Factor Four to Factor Ten goals. The Director Sustainable Development and Environmental Stewardship can work with the School of Construction and the Environment, including its applied research centres, to develop a plan for advancing the recommendations contained herein and to continue the exploration and assessment of how to transform the campus, starting with the Sustainability Precinct into a Living Laboratory of Sustainability. It is anticipated that much will be learned on this journey and the recommendations contained here-in are subject to change as this work proceeds.

FX 4C Create a compelling vision to sustain commitment that accompanies a detailed plan

The Director Sustainable Development and Environmental Stewardship could work with the Director Campus Planning, the Director of Facilities Management and the School of Construction and Environment management team, research centre directors and program heads to create a compelling vision to sustain commitment to the Factor Four and Factor Ten goals of the Sustainability Precinct and their role in catalyzing the transformation of BCIT's campuses into living laboratories of sustainability.

FX 4D Invest for the long-term in order to amortize benefits over many years

The Director of Sustainable Development and Environmental Stewardship could work with the BCIT Foundation to assess the total project costs for implementation of the Sustainability Precinct, including implementation of prioritized catalyst projects and related administration, capital investment, and maintenance and monitoring costs. Base on this information, the BCIT Foundation can then work to recruit donor funding to help leverage BCIT in-kind and capital resource contributions.

6.0 Summary and Conclusions

6. 2 Design Guidelines:

Passive Haus or equivalent passive building design guidelines for new construction. Adaptive restructuring of existing buildings to incorporate passive heating and cooling, natural daylight, renewable energy technologies.

6.3 Planning Requirements:

Increase housing and mixed use development. Naturalization of green spaces. Increase permeability and stipulate no-net loss of permeability for all new development.

6.4 Infrastructure Design:

Distributed, diversified and Integrated energy systems that incorporate renewable energy such as geoexchange and wood waste. Green infrastructure services. Integrated storm water management