|  |
| --- |
|  |
| Is Vancouver Island University a Leader in Sustainability? |
|  |
| A Comparative Analysis of Vancouver Island University, Royal Roads University, and the University of Northern British Columbia |

**Vancouver Island University**

2012-2014

Authored by: Pamela Jack and Don Alexander

Contents

[Acknowledgements from Pamela Jack 2](#_Toc425413797)

[Acknowledgements from Don Alexander 3](#_Toc425413798)

[Executive Summary 3](#_Toc425413799)

[Acronyms and Terminology 4](#_Toc425413800)

[Introduction 5](#_Toc425413801)

[Defining Sustainability 7](#_Toc425413802)

[Research Methodology 8](#_Toc425413803)

[Campus Overviews 10](#_Toc425413804)

[UNBC 10](#_Toc425413805)

[UNBC declared its path towards becoming more environmentally responsible in 2007 when it trademarked itself as Canada’s *Green* *University*TM and has since been recognized for following through with action, winning a top campus sustainability award in North America in 2010, first place for the top campus sustainability project in North America in 2010, and the Environmental Stewardship award in 2011 from the Clean Energy Association of BC. As an AASHE member, UNBC had its first STARS evaluation in 2011 and achieved a silver rating (UNBC Sustainability Report, 2007-2012). 10](#_Toc425413806)

[RRU 10](#_Toc425413807)

[VIU 11](#_Toc425413808)

[Governance 11](#_Toc425413809)

[UNBC 12](#_Toc425413810)

[RRU 13](#_Toc425413811)

[VIU 14](#_Toc425413812)

[Food 15](#_Toc425413813)

[UNBC 16](#_Toc425413814)

[RRU 17](#_Toc425413815)

[VIU 18](#_Toc425413816)

[Water 20](#_Toc425413817)

[UNBC 20](#_Toc425413818)

[VIU 22](#_Toc425413819)

[Transportation 22](#_Toc425413820)

[UNBC 23](#_Toc425413821)

[RRU 24](#_Toc425413822)

[VIU 25](#_Toc425413823)

[Energy 26](#_Toc425413824)

[UNBC 27](#_Toc425413825)

[RRU 28](#_Toc425413826)

[VIU 29](#_Toc425413827)

[Waste 31](#_Toc425413828)

[UNBC 31](#_Toc425413829)

[RRU 32](#_Toc425413830)

[VIU 33](#_Toc425413831)

[Curriculum 35](#_Toc425413832)

[UNBC 36](#_Toc425413833)

[RRU 37](#_Toc425413834)

[VIU 37](#_Toc425413835)

[Conclusion 39](#_Toc425413836)

References ………………………………………………………………………………………………………………………………………….. 49

# Acknowledgements from Pamela Jack

My thanks and appreciation goes out to all those who offered their kind support and patience throughout the duration of this project. Working towards sustainability in higher education involves many facets of the university, including the collaboration between higher administration, faculty, staff and students; and is no easy task. There are a number of ‘champions’ at VIU who are extremely passionate and motivated to see VIU become a leader in sustainability. My extended gratitude goes out to my supervisor, Professor Don Alexander, who had the idea for the project and became my mentor and friend over the past two years. He has given me encouragement, direction and inspiration and I am incredibly fortunate to have had the opportunity to work with him. Great thanks go out to Margot Croft, who has answered my countless questions along the way, pointed me in the right directions on campus, and has been extremely helpful with her valuable and constructive guidance. Her dedication to sustainability at VIU is inspiring. Comments by professor emeritus Steve Earle, former member of the Sustainability Advisory Committee, were also helpful. I also wish to acknowledge the assistance of Wayne Hiles and Nancy Wilken, who provided support in the collection of my data. I would also like to thank the many other faculty and staff have provided gracious support for the project, and am grateful to all those who I was honored to meet and speak with along the way.

# Acknowledgements from Don Alexander

This project would not have been completed without Pamela’s indefatigable hard work, enthusiasm, and resourcefulness. It was a great pleasure to have the opportunity to work with her. It was my good fortune that she applied to be my Work Opportunity student, and she managed to combine this with her inspiring work on other sustainability projects on campus, for which she won a well-deserved award for Community Engagement. Celia White (2014) has also produced a very useful companion government, “Report on VIU’s Context of Sustainability,” in her capacity as Healthy Communities Coordinator for Vancouver Island University. She provided helpful comments on this draft, and Melissa Garside did yeoman’s work in proofreading and improving the whole document. In addition, Margot Croft provided helpful assistance with her suggestions regarding how to get the word out about the document.

# Executive Summary

This study is a critical analysis of Vancouver Island University’s (VIU) progress towards sustainability. While outlining the concept of what sustainability means in higher education, this paper will also assess VIU in the context of similar, comparable universities including Royal Roads University and the University of Northern British Columbia in their initiatives towards becoming sustainability leaders. Vancouver Island University, Royal Roads University (RRU), and the University of Northern British Columbia (UNBC), all signatories to the international Talloires Declaration, were evaluated in seven categories: energy, water, waste, food, governance, transportation, and curriculum. Higher education sustainability assessment indicators have been developed to mark and measure sustainability targets, and guide the document in helping identify the notable actions each university has taken.[[1]](#footnote-1) These indicators are effective for marking where we are, where we may be headed and what our options are. They are instruments that can help set goals and targets, be used to monitor and report on progress, and help to explore alternative futures.

Sustainability is being pursued similarly at all three institutions in their efforts to increase recycling, retrofit buildings for energy efficiency, and develop a culture of sustainability on campus. However, differences lie in their governance approaches, energy generating strategies, levels of institutionalization of sustainability, and environmental focus in educational curriculum. While many inspiring initiatives are taking place at VIU, lack of funding for any major sustainability projects is cited as a barrier and the governance structure to support sustainability is weak. There is a noted disconnect between departments for collaboration on sustainability education, research and projects on campus; by contrast, integration would likely encourage the holistic approach necessary to achieve sustainability objectives. This research will contribute to the growing empowerment of VIU to become a leader in sustainability through its demonstration of a sustainable future for life on Earth.

# Acronyms and Terminology

**AASHE**: Association for the Advancement of Sustainability in Higher Education- AASHE’s mission is to empower faculty, students, and administrators to lead the sustainability transformation by providing resources, professional development, and a network of support to enable institutions of higher education to model and advance sustainability in everything they do, from governance and operations to education and research (AASHE, 2013).

**CFSP:** The Campus Food Systems Project is building the student movement to get more local, sustainable food onto university campuses in Canada. Launched in October 2011 and run in partnership with Sierra Youth Coalition and Meal Exchange, the Campus Food Systems Project is working with twelve campuses across the country to help students improve the multi-stakeholder organizing, procurement practices, and applied student research for the food systems on their campuses and in their regions. The resources used, best practices developed, and lessons learned from these campuses are shared on StudentFood.ca to inspire and support change on campuses nationwide (<http://studentfood.ca/>).

**CFSG/CFM:** Campus Food Strategy Group/Campus Food Movement: both are part of the national cohort of the CFSP. The CFSG is UNBC’s chapter and the CFM is VIU’s chapter.

**CSAF:** Campus Sustainability Assessment Framework: a sustainability assessment methodology developed by Lindsay Cole as part of her Master’s thesis. It includes a set of over 175 indicators, short- and long-term performance benchmarks for each indicator, and an aggregation process leading to a campus sustainability index.   
**LEED:** Leadership in Energy and Environmental Design: this is a sustainability rating system for evaluating buildings, and more recently, neighbourhoods, developed through the Canada Green Building Council as an adaptation of a system developed in the US.

**PGPIRG:** Prince George Public Interest Research Group: part of a non-profit model that began in the 1970s on university and college campuses across North America and Australia. This non-profit model looks at organizing grassroots action around public interests, such as the environment and social justice. This group is student-funded and all students are members. Using a consensus decision-making model, projects are run through smaller Action Groups focusing on specific areas of interest.

**STARS:** Sustainability Tracking, Assessment and Rating System; a rating system designed by the Association for the Advancement of Sustainability in Higher Education for university institutions to track and assess their sustainability initiatives and have a sustainability rating awarded to them.

**ULSF**: Association of University Leaders for a Sustainable Future that developed the Talloires Declaration in 2008., since signed by over 400 institutions of higher learning.

Introduction

For higher education, today is the time of its greatest success and authority. It is also a time of an emerging crisis that mirrors the disparate ecological and social crises enveloping the globe. As its power grows, the seemingly scientific truths at the core of the modern university are open to question, rife with contradictions between faculties, and challenged by the very expertise housed within it. (M’Gonigle & Stark, 2006, p. 38)

We are living in an age of environmental crisis. Natural resources are dwindling and the state of the environment is degrading as we continue to push the ecological boundaries of our planet in the pursuit of economic growth as the primary means to prosperity. As the 21st century unfolds, we identify climate change as one of our greatest challenges and hail ‘sustainability’ as the answer, and we look to our political and economic institutions for solutions. M’Gonigle and Starke (2006), however, have recognized that “they have clearly failed us” (p. 12). For example, in 2007 the B.C. provincial government introduced into legislation *Bill 44:* *Greenhouse Gas Reduction Targets* *Act,* which mandates that public institutions reduce their greenhouse gases by 33% before 2020 compared to a 2007 baseline analysis. By 2010, these institutions were required to be carbon neutral either operationally or through purchased carbon offsets (Legislative Assembly of British Columbia, 2007).[[2]](#footnote-2)

While public institutions contributing to a carbon trust fund is a worthwhile pursuit, Environment Canada (2012) notes that the three major categories of pollution sources most dangerous to the environment and human health are: industry, transportation, and volatile organic compounds in consumer and commercial products, which are produced largely in the private sector. Yet the BC government has seemingly ignored the culpability of private corporations that are doing the most polluting, leaving it up to the public sector to combat growing greenhouse gas pollution. The commitment the BC government has shown to the continued growth of the economy and fossil fuel industry as a favored means to prosperity is another demonstration of its failure to acknowledge and address the environmental catastrophe we are faced with in an effective manner. Environmentalists, including David Orr (1992), question whether we can rely on the growth of the economic market to help solve the crises we face as it clashes against environmental limits. While there are many inadequacies within the political and economic system in its ability to respond to the climate crisis and adopt sustainability in an effective manner, the teaching, research and community engagement responsibilities of educational institutions make them bridges of hope towards a more sustainable future.

To engage practically with current affairs, universities must first *acknowledge* the depth of the crises we are facing, take steps to transition away from a reckless economic growth model and make radical changes towards a resilient, holistic, and ecologically sustainable model for society. Universities are being called to action for change and many have embraced sustainability as a priority for policy, planning and development, and experiential curriculum development. For instance, over 400 universities and colleges have signed the international Talloires Declaration, developed by the Association of University Leaders for a Sustainable Future (ULSF), which “supports sustainability as a critical focus of teaching, research, operations and outreach in higher education through publications, research, and assessment” (ULSF, 2008).

The Talloires Declaration outlines a 10-point action plan committing signatories to sustainability and environmental literacy in teaching, research, operations, outreach, and practice. It states that university leaders must initiate and support mobilization of internal and external resources so that their institutions can respond effectively to the environmental crises we are facing through unsustainable practices (ULSF, 2008). But what does sustainability look like in action when it is effectively integrated into all aspects of a post-secondary institution? Orr (1992) challenges the pedagogy of the university by asking: how does it function as an ecosystem? Where does its food, energy, water, and materials come from and at what human and ecological cost? Where does its waste and garbage go? More than ever *ecological literacy,* or an understanding of the interdependency between natural and human systems, and the changing dynamics of the climate, oceans, atmosphere, land, and human existence, is required in order to find ways to live sustainably within our planetary means.

However, the ambiguous nature of the term ‘sustainability’ leaves it open to many interpretations and it therefore needs a clear definition and must be rooted in demonstrable, and quantifiable examples. With their unique position of being able to utilize the pedagogy of place, in a center of intellect that drives social change, universities must define sustainability on their campuses and in their communities by creating tangible examples of what it means to be sustainable while encouraging support from students and the greater community to be part of this process.

The objective of this document is to look at sustainability as practiced by three British Columbian universities that are signatories to the Talloires Declaration: Vancouver Island University’s Nanaimo campus (VIU), Royal Roads University (RRU), and the University of Northern British Columbia’s Prince George campus (UNBC). Highlighting seven sustainability categories – Energy, Food, Waste, Transportation, Curriculum, Water, and Governance – a summary of the progressing sustainability initiatives being taken at each institution is provided and compared, recognizing the frequent overlap of these categories. The purpose is to critically assess VIU’s current position in leading the way towards sustainability and to suggest recommendations with respect to how that position can be strengthened.

With sustainability rooted in an environmental context, each university has made notable commitments to sustainability values in principle and vary in their demonstrable success in practice. The findings of this study have shown that while UNBC and RRU are considerably smaller in size than VIU, both have surpassed VIU in many categories, especially with their renewable energy generating strategies, and institutionalization of sustainability governance on their campuses. VIU and UNBC have an advantage over RRU in advancing sustainability goals in their food sectors with recently institutionalized student positions stemming from the Campus Food Strategy Group and Campus Food Movement cohorts of the national Campus Food Systems Project; and VIU enjoys multiple small food production sites on campus, including a new aquaponics greenhouse. UNBC supports a campus-wide on-site composting program, and both UNBC and RRU have done at least one formal waste audit. UNBC and RRU have also completed the Sustainability Tracking, Assessment and Rating System (STARS) evaluation through ASSHE, each achieving a silver rating, while VIU has yet to do an institutional audit of this nature. VIU’s Nanaimo campus has great potential for furthering sustainability and has many ‘pockets’ of sustainability-oriented groups; however, greater institutionalized sustainability management and a ‘hub’ to connect sustainability focused students, faculty, staff and research to initiative development on campus is highly recommended (see Recommendations section).

Above all, sustainability requires leadership, creativity, invention, and inspiration!

# Defining Sustainability

Sustainability is a buzz word associated with the recognition of the global environmental crisis, but its ambiguity leads to confusion as to what it means to be sustainable. What does sustainability actually mean? One of the most common definitions associated with sustainability, which both VIU and RRU cite, is from the Brundtland Commission of the United Nations with (officially, the World Commission on Environment and Development and named after its chair, Gro Harlem Brundtland) . Published in 1987, the commission’s report defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p. 37). Although this definition is widely used it begs the questions: are our present needs and wants unsustainable? What about the needs of non-human species? What is considered a need beyond the basic necessities of food, water, clothing, shelter, love, and a meaningful vocation? Is Starbucks, factory farmed food, and a new cell phone each year considered a necessity in the modern world? Are we not already living way beyond our means?

Orr (1992) has critiqued the Brundtland definition and the Commission itself for holding contradictory views of sustainability which he sees as seeking to appease both environmentalists and businesspeople and bankers, and that it has added to the confusion of ‘sustainability’ by defining sustainable development as involving economic growth. Noticing economic growth and environmental deterioration occurring in tandem, he questions the promises that economic growth and market solutions will solve the problems that got us into this conundrum in the first place. He also chastises the Brundtland Commission report for its “near total neglect of environmental education” (ibid., p. 28). In order to assess what is sustainable in the first place, Orr (1992) suggests that sustainable development requires “that we know, or can discover, levels and thresholds of environmental carrying capacity, which is to say what is sustainable and what is not” (p. 23) before further development occurs. He warns, based on evidence from societies that have previously collapsed due to overshooting their carrying capacity, that “the normal response to crises of carrying capacity has not been to develop a carefully calibrated response meshing environmental demands with what the ecosystem can sustain in the long run” (ibid., p. 19).

Instead, Orr (1992) proposes the task “of finding alternatives to the practices that got us in trouble in the first place; it is necessary to rethink agriculture, shelter, energy use, urban design, transportation, economics, community patterns, resource use, forestry, the importance of wilderness, and our central values” (p. 24). Assessing a relative carrying capacity region-by-region basis and developing strategies to live sustainably within them is key. This seemingly radical transformation of our current society will involve a considerable de-linking of the economies and politics of local communities from those of the larger world, and require the strength of an active, competent citizenry possessing a high degree of sustainability literacy. The importance of university institutions in this pursuit cannot be underestimated. Universities, as institutions of intellect and innovation (and with the resources available to them), are the most equipped centers to advance social change, and help foster the necessary paradigm shift by providing clear definitions and demonstrable examples of what it means to be ‘sustainable’.

Looking towards evolving definitions of sustainability on university campuses, AASHE characterizes sustainability as “in an inclusive way, encompassing human and ecological health, social justice, secure livelihoods, and a better world for all generations” (AASHE, 2013, n.p.). The organization has developed STARS, which many universities are using to monitor and evaluate their progress towards sustainability. Cole (2003) defines a sustainable campus as a community that “acts upon its local and global responsibilities to protect and enhance the health and well-being of humans and ecosystems. It actively engages the knowledge of the university community to address the ecological and social challenges that we face now and in the future” (p. 30). Similarly, The Association of University Leaders for a Sustainable Future (ULSF) defines campus sustainability in the following terms:

‘Sustainability’ implies that the critical activities of a higher education institution are ecologically sound, socially just and economically viable, and that they will continue to be so for future generations. A truly sustainable college or university would emphasize these concepts in its curriculum and research, preparing students to contribute as working citizens to an environmentally healthy and equitable society. The institution would function as a sustainable community, embodying responsible consumption of energy, water, and food, and supporting sustainable development in its local community and region. (ULSF, 2008)

So, in light of these definitions, what is the goal of sustainability at university campuses?  M’Gonigle and Starke (2006) assert that “[to] achieve a steady state at the university is the highest definitive goal for the planetary university” (p. 113). This means material flows to and from the campus must decline, energy for the campus should as much as possible produced on campus, waste generated should be processed on campus aiming towards a zero waste benchmark, food produced and composted locally, rainwater is collected and water stored in ponds and marshes. In essence, to the greatest degree possible, the campus should model a closed-loop system.

Currently, most of the resources we consume here on Vancouver Island are imported. Research completed by a recent graduate of VIU discusses the biophysical limits to growth in the Regional District of Nanaimo (RDN), while determining whether the Sustaining Human Carrying Capacity (SHCC) assessment framework can be applied to this area (Baijius, 2013). Baijius (2013) has noted that due to the impacts of climate change, oil price volatility, and loss of biodiversity there has been increasing awareness “of the likelihood that residents of the RDN will need to rely on local ecosystems to meet their basic needs” (p. 5). There is opportunity for VIU to play a significant role in investigating how this re-localization could be undertaken.

# Research Methodology

Studying place, Orr (1992) says is important because it “cultivates the habit of careful, close observation and with it the ability to connect cause and effect” (p. 104).

To begin this study, research concerning sustainability assessment in higher education was pursued. Using sustainability assessment, monitoring and evaluation tools can be effective for studying place, advancing sustainability goals, and benchmarking for continual improvements. Frameworks for this type of assessment have developed over the years and a comprehensive analysis of this work was done by Lindsey Cole while completing her master’s thesis at Royal Roads University. The outcome of her research led to the co-researched development of the Campus Sustainability Assessment Framework (CSAF), which outlines over 177 sustainability indicators accompanied by a measurement protocol (Cole, 2003). It is lengthy to complete and, as Beringer (2006) notes, it “requires a substantial commitment of both human and financial resources.” However, the Sierra Youth Coalition has taken this research to produce a more manageable smaller scale approach to the CSAF in a document outlining the *CSAF Core* aimed at “students and university managers who are running an assessment for the first time, or don’t have the capacity to take on a full sustainability audit” (Sierra Youth Coalition, 2009, p. 2).

Another prominently recognized tool is STARS, which approximately 300 universities have used so far. Participants can record, track, and share sustainability best practices through an online medium. Data collection methods used to produce this report were drawn from the CSAF Core *and* STARS evaluation guide. RRU and UNBC have both had a group of student researchers complete the STARS evaluation which provided a baseline assessment of sustainability on each of these campuses respectively. VIU is a member of AASHE but has yet to do an evaluation so the CSAF Core, which is a less complicated system, was used to draw a baseline from which a comparison could be made.

Since 2008 the Greenhouse Gas Reduction Targets Act has required universities to prepare Carbon Neutrality Action Reports (CNARs) which are then published online through the Ministry of Environment.[[3]](#footnote-3) These on-going reports were used to evaluate and compare each university’s self-assessed sustainability progress between the years 2008-2012. As well, extensive online research of each university’s published sustainability documents, programs, events, renovations, and projects was carried out.

Throughout the two years of this study, participant observation included taking part in three student clubs on VIU’s campus – the Campus Food Movement, Solutions: a Sustainability Network, and the Community Peace Garden. These student clubs contribute to the bottom-up approach to sustainability and embody the student commitment to sustainable practices on campus. Observation included attending meetings and being involved in various sustainability events and conferences held in the two year time period in which the study took place. Informal interviews were also conducted with thirteen key staff and faculty on VIU’s campus, the Sustainability Manager and Custodial and Housekeeping Supervisor of RRU, as well as brief conversations with UNBC’s Purchasing Manager, Sustainability Manager, and Campus Food Strategy Group (CFSG) students.

While the universities chosen were done so because of the shared commitment to the Talloires Declaration, the population and size difference between VIU and both UNBC and RRU should be noted as a limitation to the study. Quantitative measures of energy and paper usage et cetera recorded in the Carbon Neutral Action Reports were recorded but not used for comparison because, while VIU’s Nanaimo campus and UNBC’s Prince George campus were the focus of this study, the data presented in the Carbon Neutral Action Reports includes all campuses and therefore could not be an accurate measure for the specific campuses reflected in this study.

It is necessary to state that regular assessments of sustainability in higher education to ensure progress (and ultimately success) must be taken seriously, funded properly, and done through collaboration between faculty, administration and students. Working towards clearly outlined sustainability goals through a campus-specific vision and strategy requires commitment from the institution, all campus departments, an engaged student body and support from the greater campus community.

## Campus Overviews

## UNBC

The University of Northern British Columbia in Prince George was built between 1990 and 1994, and sits on 550 hectares of university property (University of Northern British Columbia, 2012a). UNBC has 14 buildings on site, with the Bioenergy Plant having achieved LEED® Platinum certification. Designated as a research-intensive university, the UNBC community hosts 3588 students (UNBC Fall Headcount Enrollment, 2012) and 191 faculty members (UNBC faculty population, 2013). UNBC also occupies regional campuses in Fort St. John, Terrace, Quesnel, and Gitwinksihlkw.

## UNBC declared its path towards becoming more environmentally responsible in 2007 when it trademarked itself as Canada’s *Green* *University*TM and has since been recognized for following through with action, winning a top campus sustainability award in North America in 2010, first place for the top campus sustainability project in North America in 2010, and the Environmental Stewardship award in 2011 from the Clean Energy Association of BC. As an AASHE member, UNBC had its first STARS evaluation in 2011 and achieved a silver rating (UNBC Sustainability Report, 2007-2012).

## RRU

Located within Hatley Park in Victoria, Royal Roads University (RRU) sits on 236 hectares of oceanfront property. At its center sits Hatley Castle, built in 1908 by former coal baron Lord Dunsmuir. RRU transitioned from a Military College to an accredited special purpose university in 1995. There are twenty-four buildings which are remnant of its Dunsmuir and military history, and have been converted to university use. In addition, there is one new academic building, the Learning and Innovation Center, which is LEED® Gold certified. RRU is a community of 2329 full-time students and roughly 400 full-time faculty members (Royal Roads University, 2012).

               Recognizing climate change as “one of the most critical challenges of our time,” sustainability is a pillar in RRU’s values where it is stated that “environmental sustainability is not only intrinsically linked to our teaching and research mandate, it’s a challenge that calls for the kind of interdisciplinary and collaborative problem-solving at which we excel” (Royal Roads University, 2013). RRU has defined sustainability as living and managing activities in a way that balances social, economic, environmental and institutional considerations, using the Brundtland Commission definition of “meet[ing] the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 8).

In 2011 the Royal Roads Office of Sustainability, School of Environment and Sustainability, and the City of Colwood won the Climate and Energy Action Award sponsored by the Union of BC Municipalities (UBCM). RRU is a member of the AASHE and has completed the STARS evaluation twice. RRU was the first Canadian institution to submit a STARS report which was completed by Bachelor of Science candidates from Royal Roads Universities Environmental Science program (BSc.-ES) in the School of Environment and Sustainability and sponsored by the Office of Sustainability. Achieving silver rating on its first report, RRU awaits the results of the second.

## VIU

Starting as a vocational training school in 1936, Vancouver Island University has evolved from a trade school to a college, and then officially became a university in 2008. It was at this time that Vancouver Island University was designated as a new special purpose teaching university with a mandate to serve a geographic area or region of the province, and to offer Adult Basic Education, English as a Second Language, Adult Special Education, career, technical, trade or academic programs (Vancouver Island University, 2012). Vancouver Island University’s main campus in Nanaimo occupies a land base of 37.2 hectares with 42 institutional buildings (Vancouver Island University, n.d.). The population consists of 12,384 full-time and part-time students and employs approximately 2000 faculty members and staff. VIU also hosts regional campuses in Cowichan, Parksville/Qualicum, and Powell River.Sustainability has been recognized as an important value of VIU since 1990, beginning with the green design of building 356 (Vancouver Island University, 1996), and the adoption of a recycling program. VIU has become a signatory to not only the Talloires Declaration but also the Association of University Leaders for a Sustainable Future and the Earth Charter, and is a member of the Association for the Advancement of Sustainability in Higher Education. VIU’s sustainability website states the institution’s commitment towards sustainable development by “working to reduce our environmental footprint, foster a strong sustainability ethic in the VIU community, and increase our leadership role in advancing comprehensive environmental, social, economic and cultural sustainability best practices on our campuses and in the communities we serve,” using the Brundtland Commission definition of sustainable development (Vancouver Island University, n.d.[h]).

In addition, VIU’s Nanaimo Campus Master Plan includes a comprehensive sustainability policy which pays particular attention to the cultural dimension of sustainability recognizing “its responsibility to develop and maintain not only local (campus) sustainability practices, but also those practices and policies that promote the sustainability of the adjacent community and bioregion, as well as those that promote sustainability of the general global environment” (VIU Campus Master Plan, 2009, Appendix C, p. 262). Both the Gathering Place and the Faculty of Management Centre buildings are certified basic LEED®. VIU is a member of AASHE, but has yet to complete the STARS assessment program.

# **Governance**

Making headway towards sustainability goals in higher education can be guided by both a top- down structure (institution and administration), and a bottom-up structure (student demand and engagement). The institution sets sustainability guidelines through policy, while the student body contributes through unions, clubs and movements. These are often complementary; however, differing sustainability priorities can also cause tension between students and university administration. A current example is the Fossil Free movement, through which students nationwide are pressuring universities to divest themselves of their investments in fossil fuel companies, as an obligation of morality and in recognition of the seriousness of the climate crisis (Fossil Free Canada, 2014). Governance with progressive, visionary, and strong leadership is essential to advancing institutional sustainability goals and requires a dedicated sustainability-management staff to develop policy, establish strategies, and engage students with relevant sustainability research and action projects.

The CSAF outlines 19 institutional policies and documents to look for in sustainability governance assessment: Energy Management, Waste Management, Clean Air, Health and Safety, Ethical and Environmentally Sound Purchasing, Solid Waste Management, Hazardous Waste Management, Transportation Demand Management, Community Engagement in Campus Decision Making, Ethical and Environmentally Sound Investment, Sustainability in Education, Sustainability in Research, Equity, Wellness, Long-term Campus Land-use Planning, University Mission, Strategic Plan, Preferential Purchase of Local Goods and Services, Conflict and Dispute Resolution Processes (Sierra Youth Coalition, 2009).

## UNBC

UNBC’s overall governance operates under a bicameral structure with a fifteen member Board of Governors and a Senate. Sustainability governance, from the top-down perspective, is advanced through the Green University Planning Committee (GUPC) under the guidance of the “UNBC Green Strategy” (UNBC, 2009). This extensive multi-stakeholder advisory body is made up of twenty-one representatives from various sectors of the university and community who meet monthly to discuss and further their environmental, social, and financial sustainability goals (University of Northern British Columbia, 2012c). Key members include the UNBC President and Vice Chancellor, VP Academic and Provost, VP External Relations, VP Finance, VP Research, Facilities Director, Alumni Representative, UNBC Energy Manager, Pacific Institute for Climate Solutions (PICS) UNBC Campus Coordinator, and UNBC’s Sustainability Manager. Formed in 2007, GUPC acts as an “advisory and policy development body with respect to all initiatives at UNBC” (UNBC, 2012c). Several subcommittees have also been formed through the GUPC including: a Carbon Neutrality subcommittee, an Energy subcommittee, a Food subcommittee, a Green Day subcommittee, a Green Fund subcommittee, a Green Teaching subcommittee, and a Transit subcommittee (UNBC [2], 2012). In 2011 UNBC opened its Green University Center (GUC) which houses the UNBC Energy Manager, UNBC’s Pacific Institute for Climate Solutions campus coordinator, and the UNBC Sustainability Manager. The GUC operates under the Provost’s office. Centrally located off of the winter garden, the GUC provides a visible hub for sustainability and an outlet for student engagement.

Policies that guide the campus directives and include sustainability indicators outlined in the CSAF include an Energy policy, a Hazardous Waste Identification and Reporting policy, an Occupational Health and Safety policy, a Radionuclides and Radiation Hazard policy, and a Purchasing policy which includes as an aspect “minimum impact on the environment” (UNBC Purchasing Policy, 2004). The *UNBC Strategic Research* *Plan* outlines its interdisciplinary research priorities from 2010-2015 in four areas. These include: Environment and Natural Resources, Community Development, Northern Rural and Environmental Health, and First Nations and Indigenous Studies (UNBC Strategic Research Plan, 2010-2015).

From the bottom-up perspective, the Northern Undergraduate Student Society (NUGSS) includes a Sustainability Representative and hosts the Students for a Green University club and the Campus Food Strategy Group (CFSG), each pursuing opportunities to advance sustainability on campus. UNBC also houses a Prince George Public Interest Research Group (PGPIRG) which is a student-funded non-profit grassroots organization around public issues such as the environment and social justice (Prince George Public Interest Research Group [1], n.d.).

## RRU

Royal Roads University operates under a unicameral governance system, meaning that there is no academic senate. Through RRU’s corporate governance model, the Board sets broad administrative and academic policy and the President, as the chief executive officer, administers the university’s operations. On academic matters, the President is assisted by an academic council comprised largely of professors (Royal Roads University , 2013a). RRU’s mission statement does not mention sustainability but it is expressed in their goals that education and research should contribute to environmental sustainability (Royal Roads University , 2013b). Sustainability is guided by the RRU Campus Plan (2006) and the RRU Sustainability Plan (2008).

From the top-down perspective of sustainability governance, RRU hosts an Office of Sustainability. Found in the Boat House, the office employs one full-time Director of Sustainability and two part-time employees working for the Solar Colwood Initiative. The current director has a quarterly reporting relationship with the VP Academic and Provost, the Associate VP of Community Relations, and the Associate VP of Human Resources. The Director of Sustainability plays a vital role in connecting sustainability to tangible projects throughout the campus and community, hosting sustainability meetings, and advancing RRU’s sustainability goals. As a member of the Capital Regional District's (CRD) Roundtable on the Environment, which provides support for the CRD on environmental sustainability issues, RRU’s Director of Sustainability is also actively engaged in sustainable community development (Royal Roads, 2013c).

Policies that guide the campus directives and support the CSAF indicators include: the Royal Roads Policy on Corporate Social Responsibility B1020, Research Policy C1000, and Environmental Stewardship Policy B1200. RRU’s research model “centers the production of useful knowledge and tools under the unifying theme of sustainability” (Royal Roads University Research Policy C1000, 2005), and the philosophy of the Environmental Stewardship Policy recognizes the RRU “operations must in themselves reflect the highest standards of sustainability and environmental consciousness” (Royal Roads University Environmental Stewardship Policy B1200, 2000).

From the bottom-up perspective, a student sustainability committee is formed through RRU’s Students Union each year which works to engage the student body in environmental issues and to reduce their impact on the planet. In 2007 a Sustainability Action For the Environment (SAFE) fund was created by students and staff to support environmental projects such as ecosystem restoration, alternative energy initiatives, and transportation planning to and from campus (Royal Roads University: Sustainability Action For the Environment, 2014).

## VIU

VIU’s bicameral governance structure is run, in accordance with the *University Act* of British Columbia, by a Board of Governors and a VIU Senate. Its current mission statement does not include sustainability content (Vancouver Island University , 2011c); however, key documents, such as *Framing Our Future: Nanaimo Campus Master Plan* (2009), highlight a sustainability priority.

From the top-down perspective of sustainability governance, VIU established an Office of Environment and Sustainability in 2010, located below the library. The office was established to research, develop, and implement sustainable practices on campus. A Sustainability Manager was hired in 2010 for a brief time period; however, the position has not been filled since. Sustainability initiatives are moved through the Sustainability Advisory Committee (SAC), which is a volunteer advisory committee made up of 6-9 regular attendees, including two Student Representatives chosen by Vancouver Island University Students’ Union (VIUSU), and receives support from the Administrative Assistant of Environment and Sustainability.

The SAC used to meet monthly to discuss the various sustainability events on campus, transportation strategies, and sustainability projects (Approved Minutes, Sustainability Advisory Committee 2012-2013), and also make recommendations to be considered by the Office of Environment and Sustainability in accordance with the VIU Academic Plan and the Nanaimo Campus Master Plan (Vancouver Island University. n.d.[h]), but it has been dormant for the past number of years . In the academic year of 2013-2014, BC Hydro and VIU’s Infrastructure and Ancillary Services funded two sustainability-related Work Opportunity positions, including a Sustainability Initiative Assistant and a Waste Behavioural Study, and three Campus Food Movement (CFM) Coordinators.

Sustainability as incorporated within strategic planning documents and policy includes five priorities: Institutional Sustainability, Social Sustainability, Fiscal Sustainability, Operational Sustainability, and Environmental Sustainability. VIU institutionalized the Sustainability Policy 44.14 in 2010 which applies to all activities under the governance of Vancouver Island University and states:   
“Vancouver Island University is committed to being a sustainability leader, in our operations, teaching, research and community engagement. This includes: implementing local and regional campus sustainability policies and practices; policies and practices that promote the sustainability of the adjacent community and bioregion; and policies and practices that advance the sustainability of the general global environment” (Vancouver Island University, 2009a). VIU includes the following as sustainability-related policies and procedures: Health and Safety Policy 41.09, Prevention of Violence in the Workplace Policy 41.10, Personal Safety on Campus Policy 44.05, Employment Equity Policy 21.04, Investment of Funds Policy 42.02, Purchasing Policy 42.31, Recycling Policy 44.02 (currently expired), and Security and Maintenance of University-College Assets Policy 44.04.

From the bottom-up perspective, sustainability is initiated through the following student groups: Solutions: A Sustainability Network, the Campus Food Movement (CFM), the Community Peace Garden, and Awareness of Climate Change through Education and Research (ACER). Many dedicated professors and support staff also contribute to sustainability practice in teaching and operations. In March 2014, Solutions and other groups – in collaboration with the Administrative Assistant of Environment and Sustainability – organized a conference on sustainability initiatives called “Avenues for Action” that was attended by students, faculty, and community members.

**Comparison**

Each university has considerable documentation outlining their sustainability directives; however, UNBC’s institutionalized Sustainability Manager, as well as its Green University Planning Committee, testifies to its leadership in governance to advance sustainability goals and initiatives. RRU has a Director of Sustainability that reports quarterly to key members of the administration, and is actively involved in community engagement, while VIU lacks institutionalized sustainability management. UNBC has an accessible and centrally-located outlet or ‘hub’ for sustainability in its Green University Centre, which gives students and staff alike a place to get involved in sustainability on campus; VIU’s Office of Environment and Sustainability is remotely tucked away under the library as part of the Facilities department and is not easily accessible. Active student involvement is essential to pursuing sustainability initiatives because of the impetus their volunteer efforts and passion provides. However, without institutionalization of sustainability and financial support, related projects struggle to be carried forward.   

Food

Food is one of our most basic needs; however, the current industrial food systems that support us are severely unsustainable and increasingly unhealthy. Reliance on a global food system requires long distance transportation, adding to greenhouse gas pollution, and decreases the available nutrients from produce. Chemical fertilizers and pesticide use further contaminate the environment, diminishes healthy soil structure, and is unhealthy for humans. As well, food production abroad is challenging to monitor for labour ethics and food safety acceptability. With the threats of climate change disrupting global food production, it is essential for universities to reassess their food security strategies and create local sustainable growing practices and distribution networks, either borrowing from established replicable models or developing their own. Universities could provide a center for innovative urban food strategies and be a pillar in the development of local food systems as a tangible solution to reducing greenhouse gas emissions and promoting healthy, affordable, and accessible food.

The CSAF does not have a category specific to food. Instead they use the heading ‘health and wellbeing’ which encompasses a more broad analysis of mental and physical health and well-being on campus. Their indicators for food include diet types such as vegan, vegetarian, kosher, Hindu, Muslim, diabetic, gluten free, low calorie, low cholesterol and salt, and dollar values of organic, non-GMO, and Fair Trade food offered on campus (Sierra Youth Coalition, 2009). This study did not use quantifiable dollar value measures of food purchased on campus but included food initiatives related to sustainability, and on-campus food production.[[4]](#footnote-4)

## UNBC

Eurest Dining Services is UNBC’s current food service provider which works alongside UNBC’s sustainability commitment to provide and promote local, healthy products in its menu selection; however, they are in the process of making changes to food services that will be more flexible, diverse, and built on local and community suppliers (UNBC, 2012d).

A University Farmers’ Market was created in 2011 in partnership with UNBC, the Northern Undergraduate Student Society (NUGSS), the Prince George Public Interest Research Group (PGPIRG), the Prince George Farmers’ Market, and Students for a Green University to promote local food sustainability and security (UNBC, 2012n). This weekly market of local vendors is hosted on Tuesdays from 11 am until 3 pm at the Northern Undergraduate Student Center and includes a hot meal vendor. It is run exclusively by volunteers. With clear sustainability goals, this market aims to “recruit a diverse mix of vendors and products, with a target of 60% or more local foods and 40% or less of local crafts” (UNBC [5], 2012). The current definition of ‘local food’ is food produced within British Columbia, and priority is given to vendors within the Prince George region (UNBC, 2012n).

The PGPIRG Garden grows fruits and vegetables to be consumed by the UNBC community and is staffed by two undergraduate students during the spring and summer (UNBC Sustainability Report, 2007-2012). It also hosts a monthly Good Food Box program at the University Farmers’ Market to help build a healthier community and local food system. For $15 students and faculty can register to receive “a 20 lb box of grown Prince George produce, supplemented with other fresh fruits and vegetables from B.C. and Washington/California” (PGPIRG, n.d.).

UNBC hosts a Campus Food Strategy Group (CFSG), which is a student group that is part of a larger cohort of students involved in the national Campus Food Systems Project (CFSP). Its mission is to encourage and develop more local, sustainable, healthy food systems on campus. In 2014 the CFSG, in partnership with VIU’s CFSP chapter, was awarded a grant from the Vancouver Foundation to support their funding capacity for three CFSG Coordinator positions as well as a new Healthy Communities Coordinator within the institution. The Vancouver Foundation’s grant will also help fund a Greenhouse Manager to oversee the construction and production of a Geodesic Dome Greenhouse at UNBC. The Green Fund provided the funds for the purchase of the Geodesic Dome Greenhouse which, when complete, will provide food for UNBC’s Thirsty Moose Pub. Financial support from UNBC matched the Vancouver Foundation’s generous contribution and demonstrates institutional support and commitment towards the shared goals of the CFSG and UNBC.

## RRU

The Truffles Group is RRU’s food and beverage provider on campus. Its Habitat Café currently spends 10% of its total food expenditures on local food; of that, 5% is spent on food that is both local and certified organic (RRU, 2014). The Habitat Café recently received certification with the Greentable network, and is part of the Ocean Wise program. RRU is the only food establishment on Vancouver Island to obtain certification from the Greentable Network which helps guide food establishments to become more sustainable by encouraging the use of services and products that are beneficial to the local economy, use more eco-friendly processes, incorporate water and energy conservation where applicable, and reduce packaging and food waste (Greentable Network, n.d).

The RRU campus hosts a greenhouse utilized by students from Camosun College who undertake their practicum at RRU. They have planted a vegetable garden in the Dunsmuir walled garden and added vegetable starts to their semi-annual plant sales (CNAR, 2012). A small culinary herb garden has been planted, and the logistics of growing food on campus for the cafeteria is currently being explored (Nancy Wilkin, personal communication, January 10, 2014).

Expanding the capacity of research in food studies, RRU’s Masters of Environmental Management program had three cohorts out of seven devoted to the study of food security in 2012 (Carbon Neutral Action Report, 2012).

## 

## VIU

VIU demonstrates a commitment to healthy food and sustainable practices in principles as highlighted in VIU’s *Campus Master Plan* (2009) and the *Strategic Plan for 2012/2013-2014/2015*. In its *Campus Master Plan* it is stated that “[t]he University will promote a policy of healthy food consumption, including ongoing educational programs, a diversity of food choices, and the serving of locally grown, including grown on campus food” (p. 267). In addition, the *Strategic Plan for 2012/2013-2014/2015* states that “Vancouver Island University Food Services will use quality food products to provide a variety of cost effective menu options that will be responsive to change while enhancing the customer service experience and encouraging community involvement” (p. 267).

In practice, VIU’s Culinary Arts program presents challenges and opportunities to sustainable food system strategies. Challenges lie around purchasing, as food orders are combined between the Culinary Arts program and the cafeteria. These orders are very large and cannot be compromised due to the necessity to follow curriculum; therefore, changing policy on food purchasing is challenging due to concerns of availability (Melissa Townsend, personal communication, 2012). While Sysco is the main food provider on campus, VIU purchases 10% of its food from local food providers such as Good Bite Lunch Company, Island Farmhouse Poultry, Hertel Meats, and Mountain View Farms (Melissa Townsend, Manager, Food Services [Cafeteria], personal communication, November 14, 2012).

In a move towards overcoming some of the challenges of kitchen waste, sustainably sourcing, and reducing greenhouse gases, the department has cut down to two big truck deliveries per week using larger orders for less travel. The kitchen also does the majority of processing and packaging, to cut down on waste and Styrofoam use. Additionally, VIU’s Food Services hosts fair trade Reciprocate brand coffee, a sustainably produced and ethically sourced brand. There are many opportunities within the Culinary Arts program to incorporate sustainable practices even more. Curriculum development around food literacy and nutrition, farm to plate processing, and seed breeding for flavour and nutrition development are just a few of the possibilities. Indeed, there are several courses offered at VIU that focus on food issues, in addition to a Centre of Agriculture, Aquaculture and Food Security/Sustainability that has been established at VIU’s Cowichan campus.

Chefs can also play a big part in designing and operating practical food gardens for culinary purposes on campus and in the community, supporting the increasing demand for sustainable urban food production. In 2013, VIU’s Culinary Arts students worked with Horticulture students to draft design proposals for a new community garden at a nearby high school. Recently, VIU Culinary Arts faculty has started its own campus garden for vegetables and herbs, and purchased twelve plots from the VIU Community Peace Garden in order to incorporate Seed to Plate curriculum. Both COOK 104T and COOK 117T integrate a garden project in the vegetable, starch, salad and sandwich curriculum (Debbie Shore, personal communication, March 6, 2014). Students harvest perennial edibles, such as rosemary, from around the campus landscaping, and get a chance to go to the GR Paine Horticultural Training Centre to assist with harvesting food grown there that they can then use to cook (Debbie Shore, Instructor, Culinary Arts, personal communication, March 6, 2014).

The VIU Community Peace Garden student club currently operates 22 garden plots, rented for $10 per year, and maintains several additional boxes growing food to be consumed by the campus community. It also hosts workshops, such as mushroom inoculation and compost tea, as well as garden work parties, and sustainability events.

Since 2010, a cohort of the national Campus Food Systems Project (CFSP), VIU’s Campus Food Movement (CFM), has been operating as a student club promoting sustainable, healthy food systems on campus. After developing a diverse stakeholder group with these shared values, the Campus Food Movement has had many notable achievements which include hosting educational events in the Community Peace Garden, securing funding from the Sustainability Advisory Committee for three paid coordinator positions, and collaborating with students from UNBC to apply for and receive a grant from the Vancouver Foundation. With matched funds from the VIU’s Provost Office, secured from January 2013 until December 2014, this allowed for the financing of a VIU Healthy Communities Coordinator position and a Farmers’ Market Manager. In the fall of 2013, sustainably produced vegetables were sold on campus from a local farmers’ cooperative, the Farmship Cooperative, with 25% of the proceeds supporting VIU’s Workplace Essential Skills and Training program. Currently, the Healthy Communities Coordinator is working with VIU’s Food Services and Purchasing departments to include more local food prioritization in its Request for Proposals, as well as developing and institutionalizing a VIU Food Strategy, increasing food literacy in curriculum and more food-oriented applied student research. Unfortunately, this position has nearly expired, and a gap in research and programming will remain after the current holder’s departure.

VIU’s Nanaimo campus offers a Good Food Box program run by a local non-profit organization, Nanaimo Foodshare, and supported jointly through VIU Students' Union (VIUSU) and VIU Student Residences. It is offered monthly for $12.50 in order to “stretch your food dollar further and provide everyone the opportunity to have fresh, healthy produce” (VIUSU, 2010).

VIU’s Fisheries and Aquaculture program has a small aquaponics demonstration project rearing tilapia fish stock and edible plants making efficient use of natural energy by-products. This work is contributing to the growing research on sustainable food solutions and clearly illustrates principles of zero waste and closed loop systems. A recently built greenhouse intended to expand the aquaponics operation is currently growing lettuces and kale, which the Culinary Arts program will then purchase at market price.

**Comparison**

Each university is working at making their food systems on campus more sustainable by increasing local, sustainable food purchasing, expanding campus food production, and contributing research to the growing field of food studies. RRU works with the Greentable Network to guide its sustainability practices, while UNBC and VIU have the benefit of actively engaged student involvement in food sustainability strategies, procurement, and curriculum development. The CFSG, CFM, and newly hired Healthy Communities Coordinators give UNBC and VIU the benefit of dedicated staff making further strides on their shared food sustainability goals. Each university currently produces small amounts of food on campus, but UNBC and VIU lead the pursuit of increasing campus grown food production and incorporating campus grown food into the pub and cafeteria. VIU is a forerunner in the aquaponics field and its greenhouse serves as a demonstration of food security to the greater community. Unfortunately, the greenhouses at the G.P Paine Centre for Horticulture grow only herbs and ornamentals.

Water

Water is one of our most precious resources and is essential to all life. As access to fresh water is declining through overuse, contamination and climate change, management of water use through conservation and eliminating pollution is essential. Local collaboration with municipalities, regional districts, non-profit organizations, universities, and others on water conservation and protection issues is important. Water efficiency studies, conservation techniques, and bioremediation offer opportunities for applied student research, while protecting storm drain runoff and decreasing the use of chemicals in cleaning and agriculture are solutions a university could pursue.

The CSAF’s water indicators include: Potable Water Consumed, Efficiency of Fixtures, and Wastewater Produced. This study did not use quantifiable data and therefore did not calculate potable water consumed or wastewater produced; however, conservation and protection techniques and awareness campaigns were included.

## UNBC

Since 2010, UNBC has been using Pulse Digital monitoring systems, which displays water usage in each building on campus in real time. This data can be used for analytical and research purposes and to promote water consumption awareness. Low flow shower heads were installed in 2013 and signs have been put up in the shower areas requesting that they be kept to a three minute maximum, which has reduced UNBC’s water usage (Carbon Neutral Action Report, 2012).

UNBC makes use of green roof technology on the roof of its Agora building, which incorporates sections of green roof at the Winter Garden, and along Student Services Street. A Storm Water Management Plan was done by Duncan & Associates Engineering Ltd. and I.D. Engineering Company Limited in 1992 to assist UNBC in its development plans. Currently “campus storm water is collected and treated in on-site detention and settling ponds” (Carbon Neutral Action Report, 2012).

Organized through Students for a Green University as an awareness campaign, UNBC annually participates in Bottled Water Free Day. Part of the Back the Tap movement, they host bottled water free events to raise awareness of the environmental impacts of bottled water. A petition has been created to pursue the goal of UNBC becoming a bottled water free campus (UNBC Sustainability Report, 2007-2012).

**RRU**

RRU’s newest building, the Learning and Innovation Center (LIC), uses recycled grey water for toilets, non-potable water for irrigation, and features rainwater collection which results in an estimated saving of 1.7 million litres of water per year (Carbon Neutral Action Report, 2011). Although it has not been developed yet there is the potential for waste water recycling at the LIC (RRU Water, 2013).

Discussed further in the energy section, RRU’s two residency buildings use solar power to heat the water, and in 2011 all shower heads were replaced with water saving shower heads (Carbon Neutral Action Report, 2011). As well, RRU uses 90% non-potable water from an underground spring on campus for irrigation and its micro fibre cleaning system (RRU Water, 2013). Water bottle filling stations have been installed on all floors of the LIC as well as in the Habitat café, and RRU participates in Bottled Water Free Day annually.

Part of RRU’s responsibility is the stewardship of the natural and cultural heritage of a national historic site. As such, RRU joined with the Capital Regional District (CRD) and installed a stream flow monitor on Colwood Creek to contribute to the region’s monitoring system. Regular water quality testing is part of this monitoring. RRU is also a member of the Esquimalt Lagoon Stewardship Initiative (ELSI), “which regularly monitors the entire watershed, including Esquimalt Lagoon and the Coburg Peninsula located directly across from the university” (Carbon Neutral Action Report, 2012).

RRU has launched a pilot project that will help protect the environment from pollutants that get washed down the drain. The storm water management project will use “Petro Barriers’ patented drain barrier systems coupled with new sensors and communication technology to create a wireless drain monitoring system that will both strip run-off water of oils and hydrocarbons and alert clients when there is a problem with water quality” (Duffy, 2013).

## VIU

VIU became BC’s first bottled water free campus as of June 2012. This student led-initiative, with the support of VIU’s administration and the university’s labour groups, included the installation of water filling stations throughout the campus buildings (VIU University Relations Department, 2011). VIU’s ‘ban the bottle’ campaign was a sustainability success that not only eliminated the sale of bottled water on campus, but improved access to tap water through the installation of water filling stations at most fountain outlets throughout the campus.

VIU’s three LEED® built buildings are installed with water efficiency fixtures. One of these buildings (which opened to the VIU community in 2011), Shq’apthut the Gathering Place, was built with a partial green roof, and a non-potable water system was installed in the toilet facilities. However, at some point the non-potable water system was turned off because complaints were made concerning the color of the water, due to the amount of silt from the topsoil on the roof causing the water to look quite brown (Wayne Hiles, Interim Director, Facilities Services, personal communication, March 10, 2014). Concerns will be reassessed when the plants are better established and the system is turned back on (Wayne Hiles, personal communication, March 10, 2014). The green roof provides a site for carbon sequestration research, and provides better stormwater management.

**Comparison**

Each university has committed to LEED® standards, using low flow fixtures for hardware replacements and new development; however, UNBC’s PULSE Digital monitoring system stands out as a strong educational approach to water conservation awareness, and offers opportunities for further research towards conservation. RRU’s newest building, the LIC, has been built with progressive water conservation methods and demonstrates exemplary participation in water monitoring and community stewardship initiatives. VIU has pioneered banning bottled water on campus.

Transportation

Pollution from transportation is a major concern for the stability of the atmosphere and human health, not to mention the obvious automobile dependence/peak oil conundrum the world currently faces. Reducing the use of petroleum-fueled transportation by students, faculty and the institution is essential to lowering local greenhouse gas emissions. To advance sustainable transportation systems will require increasing public transit and other modes of alternative transport. M’Gonigle and Starke (2006) recognize that “[t]o call for the university to spark a transportation revolution is a bold, but fitting, objective” (p.72). But with cities built for cars, how do we transition to new methods of transportation?  M’Gonigle and Starke (2006) suggest that “[s]ustainable transportation is about replacing cars (and the systems that produce them) with more efficient alternatives (trams and buses) and more human energy (bikes)” (p. 84).

However, while universities can promote the use of buses and bikes, these options require adequate transit service, safe bike routes, and relevant infrastructure. Therefore, collaboration with municipal government and regional districts is necessary in order to develop these alternatives. University leadership should support these alternatives and foster a change to cultural values associated with transportation. As primary steps to encourage alternative transportation, M’Gonigle and Starke (2006) suggest introducing the U-Pass and staggering the start times of classes so that transit loads are more evenly distributed. As an example of the success of the U-Pass at the University of Victoria, M’Gonigle and Starke (2006) note, “traffic to campus declined 13 percent since 2000, cycling rose by 12 percent, and transit ridership increased by 33 percent” (p.87). The idea of the U-Pass “should make public transit essentially free to pass-holders, taking them out of their cars by shifting the costs of the pass onto parking charges for those who still drive” (M’Gonigle and Starke, 2006, p.87).

Another method of encouraging the use of alternative transport includes discounted parking permits for rideshare and carpooling. In addition to this, it is necessary to consider that some students have a restricted range of options for getting to campus and that merely penalizing them for driving is not the answer. Recognition of students and faculty traveling to campus outside of the capacity of public transit must also be considered. Although financial barriers are the most notable deterrent to institutional sustainability, M’Gonigle and Starke (2006) profess “[t]he issue is not whether society can afford a new transportation infrastructure or trams and light rail, buses and bicycles, but the reverse – how we can no longer afford the resource misallocations of the systems we have” (p. 88).

The CSAF does not have a specific transportation category but indicators within the framework include calculating GHG emissions for commuting transport, and the existence of a Transportation Demand Management Office and/or reports. Types of vehicles, bicycle accommodation and awareness campaigns were also used.

## UNBC

Mobile fuel combustion (fleet and other mobile equipment) represents 0.4% of UNBC’s tCO2e (total CO2 equivalent)for 2012 (Carbon Neutral Action Report, 2012). This was for all campuses combined.

In 2007 UNBC started a Green Fund which is generated “primarily from a $10 per month levy on monthly parking passes” (UNBC Green Fund Report, 2010-2012), and used it to fund its Sustainability Manager position as well as provide Green Grants for sustainability projects. One such project is car sharing. UNBC shares an electric car with Northern Health, the City of Prince George, and the Fraser-Fort George Regional District, which was partially funded through the Green Fund, and displays its support of electric vehicles (Carbon Neutral Action Report, 2011).

As of 2008 UNBC has used the U-Pass program for undergraduate students. In 2009 this was extended to graduate students as well. The U-Pass includes free access to the Prince George Aquatic Center and the Four Seasons Pool, and has resulted in a considerable increase of student ridership (University of Northern British Columbia, 2012i). In 2011, with the intent of reducing carbon emissions, UNBC adopted a Vehicle Idle Free policy and procedures outlining restrictions to idling vehicles on campus (University of Northern British Columbia, 2011). It also offers reduced parking fees for carpoolers of three or more with discounts ranging from $14.17 for a monthly pass to a $170.10 discount for an annual pass (University of Northern British Columbia 2012l).

UNBC borders more than 40 kilometers of biking and hiking trails and, in 2011, the UNBC Connector Trail opened which connects the university with the Cranbrook Hill Greenway and Forests for the World trails (University of Northern British Columbia, 2012a). In addition, UNBC has bike racks located throughout the campus and the Northern Undergraduate Student Society encourages students and staff to participate in Bike to Work Week annually. It also hosts a daycare facility and Farmers’ Market on site which helps to reduce the transportation distances for students and staff.

## RRU

Mobile fuel combustion (fleet and other mobile equipment) represents 3.8% of RRU’s tCO2e for 2012 (Carbon Neutral Action Report, 2012). Royal Roads started the U-pass program for on-campus undergraduate students in 2011 (Carbon Neutral Action Report, 2012). Since then, RRU has seen a notable increase in ridership. While the majority of people who commute are still single occupancy vehicles, the numbers are slowly declining with the help of transit-oriented applied student research (Nancy Wilkin, personal communication, January 10, 2014). For example, “Bachelor of Commerce students do a *Cars on Campus* challenge project each year, and make recommendations for reducing the number of single occupant vehicles coming to campus” (Royal Roads University, Carbon Neutral Action Report, 2012, p. 4), which recently encouraged the university to accept a one week grace period of free parking at the beginning of the academic term to enable students to sort out their travel arrangements (Carbon Neutral Action Report, 2011). In 2013, a Bachelor of Science student project undertook a transportation demand study to measure public transportation ridership and single occupancy vehicle use (Carbon Neutral Action Report, 2012). Additionally, RRU’s transportation website encourages the use of the Jack Bell ride-share program, Victoria Car Share and bicycles. Every building on campus offers a bike rack and showers are available for riders at the Learning and Innovation Center (Royal Roads University: Transportation, 2014).

In 2012 RRU received $2.1 million from the Province of BC which supported the construction of a new bus loop, developments to make the campus more pedestrian friendly, and improved cycling infrastructure (Carbon Neutral Action Report, 2012). As of 2010, RRU’s fleet contains 21 electric vehicles, including 18 golf carts, 3 John Deere Turf Gators, and 13 vehicles that use gasoline, propane, or diesel fuel (STARS, 2010, p. 71). Recently, RRU has become part of the EV Charging Station network across BC installing two electric vehicle charging stations on campus (Carbon Neutral Action Report, 2012).

## VIU

Mobile fuel combustion (fleet and other mobile equipment) represents 7.6% of VIU’s tCO2e for 2012 (Carbon Neutral Action Report, 2012).

In 2000, VIU introduced parking fees under Parking Services Policy 44.11 to encourage the use of alternative transportation, and fees have been steadily increasing since. Revenue generated from the parking fees were to be contributed to a sustainability fund; however, the profit margin has not been sufficient to support this initiative thus far or has been allocated elsewhere (Ric Kelm, personal communication, February 18, 2013). VIU’s *Integrated Transportation Demand Management (TDM) Strategy* (2011) reviewed previous studies from 2005 and 2008 as part of an on-going transportation planning process and to provide further recommendations “directed towards action” (p. 2). A transit exchange project was completed in 2011 in partnership with the Nanaimo Regional District, BC Transit, and the City of Nanaimo “to allow for additional transit routes and increased service over time” (Carbon Neutral Action Report, 2011). To encourage a reduction in the number of vehicles on the road, VIU offers its employees the Nanaimo Regional Transit ProPass (Vancouver Island University, n.d.[f]).

Noting that VIU has a Heavy Equipment Operators program, which requires a larger campus vehicle fleet and consumes more fuel than a university without this program, the campus fleet includes 64 insured vehicles—63 that use gas, propane, or diesel fuel, including two fuel efficient gators, as well as one Hybrid Toyota Prius (Vancouver Island University Insured Vehicle List, 2014).

As part of a student initiative through Solutions: A Sustainability Network, and funded by VIUSU and VIU, two covered bike facilities have been built on campus since 2011 to encourage and support cycling. The facilities provide an electric bike charger as well as bike repair equipment. Three locations throughout the campus host 30 bike lockers and numerous uncovered bike stands are available for cyclists (Vancouver Island University, 2013). Alternative transportation for faculty and students alike is encouraged through events such as Bike to Work Week, and free on-campus bike tune-ups provided by Hub City Cycle. Showers are available in the Gym and in a couple of other buildings on the VIU Nanaimo campus to support bike commuting.

VIU’s transportation website encourages carpooling by advertising the Jack Bell Ride-Share Program, and carpool parking permits. Vinci Park, VIU’s parking and security service, offers priority carpool spaces from 7am-11am for carpoolers of two or more with the purchase of a regular priced parking pass (Vancouver Island University, n.d.[a]). Signs that say “No Idling” are posted throughout the campus parking lots to discourage unnecessary emissions. As well, the campus features a daycare which decreases driving time for students and staff with children.

**Comparison**

Each university encourages alternative transportation among staff and students, participating in Bike to Work Week and increasing bike infrastructure. Anti-idling behaviour is supported through campus signage, although only UNBC has formally adopted an anti-idling policy. The notable differences between the campuses’ transportation strategies are that both UNBC and RRU have adopted the U-Pass, and have installed EV charging stations. The U-pass has been debated at VIU over the past few years but continued opposition has been shown by VIUSU, despite the success that has been seen on other campuses and the financial benefit that it would provide to Nanaimo Regional District transit services (Spalding, 2011). VIUSU’s opposition to the U-pass, considered by M’Gonigle and Starke (2006) to be a primary step in encouraging alternative transportation, is a barrier to VIU making further progress.

Energy

Energy is at the core of our society and economy and currently many of our energy demands, products, and services, are powered by fossil fuels. As Orr (1995) points out, “the rate and volume of fossil fuel use is the most distinctive feature of the modern world” (p. 55), and is contributing greatly to the environmental problems we face. Further, M’Gonigle and Starke (2006) warn:

Continued oil dependence ensures a predominant national security objective of “access to supply” that actually produces insecurity, oil wars and terrorism. The result is a spiral of economic and ecological decline, and military instability. Underlying this spiral is a simple fact: our sprawling infrastructure subsists on ecological debt, and the ecological capital we are borrowing against is fast falling to empty (p. 73).

It is clear that fossil-fuel-derived energy and products must be phased out to reduce the risk of global instability and ecological collapse. Using locally sourced, sustainably produced materials can boost the local economy and save unnecessary transportation. LEED® standards are a step towards greener buildings; however, a more rigorous standard is found in the design of living buildings that create their own energy, treat their own wastewater and are constructed entirely out of earth-friendly materials. A good example is the Omega Center for Sustainable Living, located in Rheinbeck, New York, which has achieved LEED® Platinum certification and Living Building Challenge certification (Omega Institute, 2014). Considering the principles of embodied energy and ecological economics in practice and education, and demonstrating the efficient use of onsite-produced clean, renewable energy, is a key sustainability goal for higher education.[[5]](#footnote-5)

The relevant CSAF indicators include: renewable energy in buildings; reduction in greenhouse gas emissions in buildings and commuting transport, and overall reduction in energy consumption (Sierra Youth Coalition, 2003).

To prepare the Carbon Neutral Action Reports for each university, SMARTTool software is used to determine baseline information and calculate emissions created from buildings (energy and electrical consumptions), fleet vehicles (and non-standard fleet), fugitive emissions (refrigerants and anaesthesia), and paper procurement (8 ½ x 11, 8 ½ x 14, and 11 x 17 paper) to determine greenhouse gas emissions.

## **UNBC**

Carbon offset payments through the Greenhouse Gas Reduction Act for 2012 amounted to $54,175 (Carbon Neutral Action Report, 2012).

To analyse its energy usage, UNBC commissioned an energy audit, done in 2009 by MCW Custom Energy Solutions. In 2010 an Energy Manager was hired to further facilitate energy maintenance and strategies through UNBC’s Energy Management program (UNBC Sustainability Progress Report, 2012). Since then UNBC has installed sub meters for gas, electricity, heat, cooling and domestic water. A utility corridor links the main campus buildings to a central power plant and has provided the infrastructure necessary for UNBC to make the transition to green energy sources. Connecting the main campus buildings has enabled efficient distribution of heat, air conditioning, electricity, telecommunications, and water.

Installed in 2009, UNBC hosts the first university-owned and operated biomass heating system in Canada. The wood pellet heating system is a much more high energy efficient system than fossil fuels, which saves 140 tonnes CO₂e/year, and is fueled by locally produced wood pellets (UNBC energy, 2013). Third-party emission tests revealed that the system produces particulate emissions at the same level as natural gas and is shown to be an attractive alternative heating system (UNBC Sustainability Progress Report, 2012). In 2011 UNBC installed its Biomass Gasification System which provides heat to ten of the core campus buildings, and is offsetting 85% of previous fossil fuel consumption. In addition to being carbon neutral, the cost of acquiring the sawmill residue is approximately 35% cheaper than the cost of natural gas. As the first LEED® Platinum certified university building in BC, this bioenergy plant reduces greenhouse gas emissions by 3500-4000 tonnes per year and, together with the wood pellet heating system, has eliminated the use of over 63,640 GJ of fossil fuels per year (UNBC Sustainability Progress Report, 2012). Funded by the BC Public Sector Energy Conservation Agreement, the provincial Innovative Clean Energy (ICE) fund, and the federal Knowledge Infrastructure Program, the construction cost of the Bioenergy Plant was about $15.7 million (University of Northern British Columbia, 2012j).

UNBC has also installed Pulse Dashboard, a real time energy monitoring system connected to the buildings energy meters, which performs measurements and calculations on how its buildings are performing and displays the data online. As part of its Energy Management program, UNBC’s Energy Technician can track energy usage and relate it to monetary savings. The online access to the dashboard also provides an engaging tool for the entire campus community to be involved in sustainability education and monitoring (UNBC Pulse Energy, n.d.). For example, UNBC residence students participate in ‘Do it in the Dark’, an annual province-wide energy competition in student residences asking students to lower their energy consumption, which they can then view and compare online in real time.

To increase the financial assets available for energy efficiency projects at UNBC, $250,000 was set aside in 2012 in an Energy Conservation Revolving Loan Fund. Money from this fund contributes to capital projects “with 80% of the realized savings returned to the fund to repay that loan. When the loan is repaid, those payments drop to 50% for the lifetime of the project, growing the fund’s balance” (University of Northern British Columbia, 2014). Energy savings from energy efficiency projects such as interior and exterior lighting upgrades, heating and ventilation system cleaning, free air cooling, and a boiler upgrade, all contribute to this fund. In 2012, 23 energy efficiency projects were completed and resulted in roughly $100,000 of savings. Projects such as replacing shower heads and the humidification system in the Medical Building were completed in 2013 (University of Northern British Columbia, 2012m). UNBC’s Green Fund has also contributed to energy efficiency projects and renewable energy research. For example, the lighting in the Thirsty Moose Pub was replaced with LED and a Renewable Energy Feasibility Study was completed in 2011.

## RRU

Carbon offset payments through the Greenhouse Gas Reduction Act for 2012 were $31,750 (Carbon Neutral Action Report, 2012).

In 2009 RRU commissioned an energy study to “investigate energy use reductions and cost avoidance, and as a step toward their goal of lessening the environmental impact of their buildings” (Avalon Energy Management, 2009). Since then RRU has undergone extensive energy retrofits including air sealing on all the buildings, upgrades to direct digital control systems, spark igniters for the gas stoves in the cafeteria, a new hot water boiler in the gymnasium, and new LED and compact fluorescent units for all of the office desks and residences (Royal Roads University Carbon Neutral Action Report, 2011). Additionally, an energy efficient boiler was put in the Hatley Castle and solar thermal units were installed in the Millward and Learning Innovation Centres, which have reduced greenhouse gases by 20% over two years (Carbon Neutral Action Report, 2011). RRU’s Learning and Innovation Center is LEED® Gold certified and equipped with high efficiency lighting and sensors. Energy is monitored through two meters, one for the Learning and Innovation Center and one for the rest of the buildings (Nancy Wilkin, personal communication, January 10, 2014). Additionally, replacing oil tanks and furnaces in 2012 with high efficiency heat pump systems on four of the buildings on campus saved 10,306 litres of heating fuel and RRU no longer requires heating fuel to be delivered to campus (Carbon Neutral Action Report, 2012).

In 2012 RRU welcomed a new Energy Manager, funded by BC Hydro, and a new Energy Specialist, funded by FortisBC; both are shared with Camosun College. A Strategic Energy Management Plan was completed and RRU now tracks its energy use quarterly. An energy committee was also created to expand the capacity to look for additional energy savings (Carbon Neutral Action Report, 2012).

## VIU

Carbon Offset payments through the Greenhouse Gas Reduction Act for 2012 were $83,650 (CNAR, 2012).

To evaluate mechanical and electrical energy and oversee purchases, and operational aspects of energy efficiency, an Energy and Building manager position was created in November 2008 as part of the BC Hydro PowerSmart program (Vancouver Island University, 2014). Since then, an Energy Management Program with the slogan “Power to Change”, and an Energy Policy have been established. Energy Policy goals are to: reduce energy consumption, reduce waste and emissions, seek environmentally neutral sources of heating, cooling and energy, and to reduce pollution (Vancouver Island University Energy Management, n.d.[d]). Additionally, the Energy Policy states: “We seek the use of alternative clean energy sources in all of our development and maintenance projects, and apply those technologies that are economically, socially, and environmentally responsible” (Vancouver Island University Energy Management, n.d.[d]).

With funds from the Public Sector Energy Conservation Agreement “to reduce institutional energy consumption and greenhouse gas emissions” (Vancouver Island University Energy Management, n.d.[d]), energy retrofits such as lighting upgrades and replacing weather stripping were completed on several buildings. Heating, ventilating, and air conditioning (HVAC) systems in 13 buildings on campus have been re‐commissioned and Direct Digital Controls (DDC) in those same buildings have been replaced with modern open architecture systems. These are designed to improve conservation performance and to simplify operational functions (Carbon Neutral Action Report, 2011). All new buildings since 2005 have been built to LEED® standards and incorporate locally manufactured building materials to reduce their carbon footprint (Carbon Neutral Action Report, 2011). Currently, three buildings on campus meet these standards: The Gathering Place, which was built in 2011 has no air-conditioning, low e-glass windows, dimming classroom lights and a partial green roof; the Management Building has low e-glass, a heating control system, and can accommodate a green roof; and the International Center for Sturgeon Studies, Building 395, is built to LEED® standards but still needs certification (Daryl Amos, personal communication, 2013). Outdoors, LED light fixtures have been installed inside bus shelters and around the bus loop, and one solar-powered crosswalk control light has been installed to test its reliability (Daryl Amos, personal communication, 2013).

VIU monitors energy through the use of utility meters. BC Hydro has recently changed out its analogue utility meters for digital Smart Meters; however, data is still received in analogue format (Daryl Amos, personal communication, 2013). VIU has contracted with Prism Engineering over the past four years to analyze the monthly metering data of electricity, natural gas, and water consumption of the Nanaimo Campus, and to perform weather normalizing calculations on the data in order to make year to year, and month to month comparisons possible (Daryl Amos, personal communication, January 7, 2013). Additionally, VIU has digital sub-meters installed on 16 of the 48 buildings on the Nanaimo Campus which can provide more detailed information, although that data is used for troubleshooting as opposed to energy monitoring (ibid.). VIU’s Energy Manager notes, “Further configuration changes would be needed to render the data from these digital meters suitable for energy accounting purposes” (ibid.).

In 2012, Power Management software licences were implemented on approximately 2000 desktop computers on campus to conserve energy (Carbon Neutral Action Report, 2012). Conservation efforts are also demonstrated through VIU’s energy awareness campus events including ‘Do it in the Dark’, a challenge to the campus residency occupants to lower their energy consumption; ‘How Low Can We Go’, a campaign during Power Smart month which visibly displayed energy consumption for 13 of the buildings on campus to encourage a reduction; and ‘Ugly Sweater Week’, which rallied students and staff alike to wear warm ugly sweaters during a week where the heat is turned down in all campus buildings (Carbon Neutral Action Report, 2012).

Additionally, a test well has been drilled in the lower part of the campus for a geo-exchange system to heat and cool buildings on the Nanaimo campus, and studies have shown that it would be viable (Daryl Amos, personal communication, 2013). This geo-exchange system is included in the priorities of the Nanaimo Campus MasterPlan(Vancouver Island University, 2009).

**Comparison**

Each university has taken steps toward energy reduction through building retrofits and energy awareness campaigns; however, as UNBC hosts the first university-owned biomass heating system in Canada, it stands out as an exemplary model of onsite-produced alternative energy. UNBC’s combined energy production systems are not only operationally beneficial, reducing its reliance on natural gas by approximately 85%, but they also serve as a demonstration site to the public. UNBC’s Energy Management program is staffed with an Energy Manager and an Energy Technician, and includes a revolving fund structure to realize energy savings going into continued projects, which greatly increases its capacity towards energy sustainability. RRU has also adopted alternative energy strategies incorporating solar heaters on its residence buildings, and demonstrates community engagement and leadership in alternative energy installation by collaborating with the City of Colwood on the Solar Colwood project. While VIU is taking the minimum steps to energy conservation through retrofit projects, lighting replacement and behavioural awareness campaigns, it has the potential to develop the geo-exchange heating and cooling system advocated in the Nanaimo Campus Master Plan and to begin to match the achievements of the other two institutions*.*

Waste

Standard waste procedures within the university include recycling and waste reduction strategies; however, comprehensive solid waste management programs and zero waste goals are some of the challenges facing campus sustainability. One of the most effective methods of an institution to get to know its waste is direct waste analyses or waste characterization studies. Smyth (2008) notes that “[a]ssessment tools, such as waste audits are an effective means for campuses to move beyond knowledge of sustainability principles towards actions that minimize negative environmental impacts of institutions” (Smyth, 2008, p. 3). Getting to know the waste generated on campus is the key to understanding what is contributing to the waste stream in order to develop strategies to mitigate, replace, eliminate or compost the most commonly found items. Waste reduction education and awareness are important to facilitate the cooperation of all campus community members towards a zero waste strategy for sustainable waste management.

The CSAF does not have a category specific to waste but its relevant ‘materials’ category outlines waste indicators including: paper consumption, recycled content of paper, solid waste and recyclables produced, recyclables being landfilled, and chemical-free cleaning.

## UNBC

Paper offsets applied to UNBC’s carbon payment in 2012 equalled 56.73 tCO₂e (Carbon Neutral Action Report, 2012).

UNBC has several approaches to waste reduction although no formal policies exist. Recycling bins are scattered throughout the campus, and in 2012 the Green University Committee started a recycling program for batteries, cell phones, and print cartridges. Recently the campus recycling program was expanded to accommodate fluorescent lamps, which requires extracting and separating mercury so that they can be recycled (UNBC Sustainability Report, 2007-2012). It currently uses FSC Certified C001844 white paper and all colored paper is 30% recycled, while “stationary is made from 17% local northern BC fiber and 83% post-consumer content (Carbon Neutral Action Report, 2012). UNBC’s library printers and photocopiers were switched to default to double-sided to reduce paper waste (Carbon Neutral Action Report, 2012).

A waste audit was completed by a UNBC student in 2008. Smyth (2008) used an ‘activities approach’ to track waste from different areas within the institution, then audited each area separately in order to “capture the spatial variation of waste” (p. 4). Smyth (2008) gathered waste from sixteen locations throughout the campus over a five day period, and then weighed and sorted the waste into nineteen different categories (p. 5). Results from the audit determined that 26% of the waste was compostable and 47% could have been recycled (Smyth, 2008, p. 5). One of the biggest waste culprits was reusable fine white paper and disposable paper cups; close to 2000 cups were found in the waste stream (Smyth, 2008, p. 6). Smyth (2008) suggested that “[p]roviding incentives for the use of re-usable mugs and charging for the use of disposable will send a clear message to the campus community” (p. 8).

Beginning as a joint action project between Recycling and Environmental Action Planning Society (REAPS) and Prince George Public Interest Research Group (PGPIRG) in 1995, UNBC’s campus hosts a compost program with green bin receptacles located throughout the campus and residences. PGPIRG’s alternative waste management program includes compostable waste from “UNBC Food Services, Ground Maintenance, the Residences, and the campus community” (Prince George Public Interest Research Group [4], n.d.). Located behind the Teaching and Learning building the composting program “reduces the university’s waste disposal costs and diverts large quantities of organic matter from entering the regional landfill” (Prince George Public Interest Research Group, n.d.). The compost site and organic garden also provides an educational facility for both the university and broader Prince George community.

With funding approval from the Green Fund, a School of Nursing Lab Waste Management Project provided a lab waste management education module to all healthcare students and initiated a plastics and paper recycling in nursing labs (UNBC Sustainability Report, 2007-2012). As well, UNBC adopted a Hazardous Waste Identification and Reporting Policy in 2005 “to ensure that hazardous wastes are disposed of in a responsible manner” (UNBC, Hazardous Waste Policy, 2005).

## RRU

Paper offsets applied to RRU’s carbon payment in 2012 equalled 165.36 total carbon dioxide equivalent [tCO₂e] (Carbon Neutral Action Report, 2012).

Royal Roads takes waste seriously and has reduced the amount of waste on campus considerably over the past decade. Waste audits have been done in 2004 and 2013 and are important to its tracking records and waste diversion strategies. Zero waste is RRU’s goal for the future (Nancy Wilkin, personal communication, January 10, 2014). Since 2001 small green compost bins have been available throughout classrooms and offices, and since 2003 paper towels from washrooms are composted (Czypyha, 2004, p. 5). User-friendly waste management centres have been installed at several locations in every building, and have resulted in a 72.6% diversion from the landfills (Royal Roads University: Waste, 2014). Recently, RRU has developed a *Wildflowers* sustainability brand for new recycling and waste stations, which launched in the Learning and Innovation Center in 2011. Each floor has a *Wildflowers* station with compost bins, paper/waste/returnables, a water bottle filling station, as well as information and education about what can be recycled, including pictures. These will be incorporated throughout campus as funds become available (Royal Roads University: LEED, 2014).

RRU is “part of a cooperative purchasing network, which focuses on the procurement of environmentally responsible products” (Carbon Neutral Action Report, 2012). 95% of the campus’s printing paper purchased is 30% post-consumer recycled, while all printers and photocopiers on campus default to double sided, and its marketing materials have high recycled content. In order to track, bring awareness to, and reduce individuals’ printer usage, the IT department designed a program in 2012 that provides quarterly reports for staff and faculty outlining their current and previous paper usage (Carbon Neutral Action Report, 2012).

Fourteen years ago RRU’s custodial cleaning service adopted the use of a virtually chemical-free micro fibre cloth cleaning system. Using minimal Eco-logo or Green Seal certified cleaning products, this system employs a color coded cloth arrangement for different areas of the university which are then washed at high temperatures making this system as healthy and safe as possible for workers, students, and the environment (Darren Gardham, personal communication, January 30, 2014). Extensively researched and proven very effective, this has encouraged other institutions to adopt chemical-free micro fibre cleaning as well, including the University of Victoria, Camosun College, the Capital Regional District, and the Lodge at Broadmead (RRU, Waste, 2014). RRU’s custodial staff continues to look for the most effective, safe, healthy and environmentally conscious cleaning method and is currently experimenting with Chrisal probiotic cleaning products (Darren Gardham, personal communication, January 30, 2014).

In the kitchen waste department, RRU’s Habitat Café does not have a garbage can in its kitchen, so the staff is trained to be conscious about the disposal of food waste and other recyclables (Royal Roads University: Waste, 2014). The Habitat Cafe uses compostable cups made with a corn-base liner instead of petroleum, to-go containers are bio-degradable and can be put in the compost bins, and there are recycling and compost receptacles available, replaced recently with the *Wildflowers* branding. As well, the Habitat Café offers a reusable mug discount for coffee purchases and a “buy 10 get 1 free” coffee card that can only be used with a reusable mug (Bauman, A. *et al.,* 2010). While RRU does not compost food waste on site and instead ships it to Mill Bay for processing, all yard work refuse is composted on site (Nancy Wilkin, personal communication, January 10, 2014).

## VIU

Paper offsets applied to VIU’s carbon payment for 2012 equalled 978 tCO₂e (Carbon Neutral Action Report, 2012).

Recycling has been a priority at VIU since 1991 when Recycling Policy 44.02 was introduced and facilities were made available. Although the policy was annulled in 2012, recycling continues to be a priority and has expanded to include Styrofoam, florescent lamps, batteries, cell phones, and pens (Vancouver Island University: Recycling, n.d.[g]). Paper recycling receptacles are available throughout the campus. Recently, new receptacles which include pictures for waste, paper recycling, and drink container recycling have been installed in the library. Similar pictorial receptacles have been upgraded in the cafeteria, which also includes compost containers. All paper towel bins in the washrooms throughout the campus are composted. The cafeteria also uses 25% post-consumer recycled to-go paper cups, and offers a small discount for people who bring their own mug (A Point of VIU, 2009). The campus coffee shop, Jumpin’ Java offers this discount as well.

Waste tracking at VIU has been limited to organics, construction wood, yard waste, and Styrofoam, as records have not been maintained for garbage and cardboard waste taken off campus until 2013, and no formal waste audit has been done (Wayne Hiles, personal communication, 2013). Hazardous chemical waste produced on campus is diverted into two streams: recyclable and land fill.  Most waste that is collected can be recycled or sent to an incinerator for power generation; however, “typically solid waste or small mixtures of liquids that can’t be separated or isn’t economically viable to purify, are packed in barrels and sent to a landfill” (Peter Diamente, personal communication, January 30, 2014). As for ‘green’ practices in chemistry and biology at VIU, labs have been modified “to use more water-based solvents/reactions, or have been phasing out the use of several chlorinated solvents and recycle some of the commonly used solvents for general lab needs, mainly acetone” (Peter Diamente, personal communication, January 30, 2014). Custodial services at VIU use the Healthy High Performance Cleaning model developed by JohnsonDiversy, which values environmentally preferable products and methods (Wayne Hiles, personal communication, 2013). A list of cleaning products used on campus is provided in Appendix A.

  VIU’s standard paper procurement requirement is 30% recycled paper. Printers in central locations are reported in the Carbon Neutral Action Report (2012) to be set to default to print double sided; however, the main student printing stations do not currently default to print double sided. Many faculty members are using Desire2Learn and other computer-based tools to post handouts and accept assignments, which help in consuming less paper. All printers available to faculty and staff are capable of printing double-sided, but many faculty persist in printing single-sided simply because it’s easier.

**Comparison**

Each university has made extensive efforts to utilize the benefits of recycling; however, both UNBC and RRU have done formal waste audits while VIU has not. Waste management is hard to assess at VIU as there has not been a formal waste audit done, and tracking of waste quantities has just recently begun. UNBC’s on-site composting program, hosted by PGPIRG, leads the way in its ability to ‘take care of its own waste’ and demonstrate closed loop systems. RRU’s unique microfiber cleaning system has limited the amount of cleaning products used on campus dramatically and stands out as a model that other institutions have followed. VIU continues to expand its recycling program but lacks progressive waste reduction strategies.

# **Curriculum**

Concerned about the most pressing matter of our time, university students are learning about environmental issues and their causes, then seeing the hypocrisy within the very institution they are learning from. M’Gonigle and Starke (2006) point out, “different departments are teaching radically different ‘truths’ about the world; the Department of Economics under the predication of unending economic growth, and earth sciences about the impossibility of such growth” (pp. 32-33). While continuing to encourage academic freedom, universities must narrow this gap. Universities must not only acknowledge and educate students to deal with the crises our world is facing, but lead by example through relevant progressive curriculum, their own institutional practices, and their ability to demonstrate sustainable systems in action.

Progressive curriculum, involving ecosystems in all disciplines of study, is of the utmost importance for universities as the environment cannot remain as a mere sub-discipline. Where has ecology been left out? It is time to radically re-evaluate the university curriculum to ensure all the interrelated systems in a post-industrial society, including economy, politics, culture, and education will be rooted in ecological systems, functions, thresholds and appropriate knowledge. The University of British Columbia’s Center for Sustainable Food Systems at UBC Farm, and its Practicum in Sustainable Agriculture are great examples of innovative experiential learning and research, and offer a model for strengthening community involvement. Furthermore, to understand the somewhat ambiguous nature of ‘sustainability’, engaging practical application courses can be designed. For example, class work developed at the University of Prince Edward Island around the Campus Sustainability Assessment Framework involved teachers and students in conducting sustainability assessment on its campus (Beringer, 2006).

According to M’Gonigle and Starke (2006), institutional practices must support sustainable systems because “[t]he university teaches as much by the nature of its physical existence – the pedagogy of place – as it does explicitly in its seminars and research papers” (p 93). Sustainability is demonstrated in not only the design of the university’s buildings and surrounding environment, but how it treats its waste, how it uses water and energy, the types of transportation it uses, the purchasing choices of the university, and the investment portfolio it supports. The capability of the university to demonstrate sustainability in action, unique to its own environment, depends on the will and priorities of the institution’s leaders, along with their support of innovation and creativity from students, faculty, and the greater community they are a part of, to co-create a truly sustainable, post-industrial university campus. Educational institutions are the bridges of hope towards a sustainable future.

The Sierra Youth Coalition’s CSAF Core in the knowledge category, which translates to ‘curriculum’ in this document, looks at the following indicators: new faculty orientation would receive at least one hour of in-person orientation to campus and local community environment/social issues; faculty sustainability training; sustainability research expenditures, and courses with sustainability content. For this study, faculty orientation and sustainability training, or dollar values of research expenditures for sustainability is not evaluated; however, courses with sustainability content, sustainability research, educational awareness campaigns, and campus sustainability events were included.

## UNBC

Environmental and sustainability education is a primary part of UNBC’s sustainability mission (University of Northern British Columbia, 2012m). In 2010 it hosted a “green teaching” workshop, and in 2011 it created a Green Teaching Subcommittee within the GUPC (University of Northern British Columbia, 2012g). With 21 academic programs focusing on sustainability and 202 courses with sustainability content, environmentalism is in almost every academic program (UNBC Sustainability Report, 2007-2012). UNBC was recognized in the Canadian Environmental Education Guide, published by *Alternatives Journal* yearly for these environmental degrees: Environmental Engineering (BASc), Environmental Planning (BPlan), Environmental Science (BSc), Geography (BA, BSc, MA, MSc, MNRES, PhD), Natural Resources, Environmental Studies (BA, MA, MNRES, MSc, PhD), Natural Resource Management (BA, BSc), and Nature-Based Tourism Management (BA) (Alternatives Journal, 2012).

Sustainability in research at UNBC is defined as “a concept that addresses the human relationship to the environment, a relationship that has multiple dimensions,” and is “generally solutions oriented” (University of Northern British Columbia: Green Research, 2012). Sustainability oriented research is conducted by faculty and students alike, from as many as 15 different academic programs, and is highlighted in its online presence (ibid.).

Student clubs contribute to the educational awareness pursuits within the campus community. For example, Students for a Green University aims to educate, inspire, and motivate the UNBC community to reduce its environmental impact; and the Campus Food Strategy Group raises awareness about the benefits of local food production and purchasing. Sustainability-related campus events at UNBC include its annual Green Day. Started in 2007, Green Day is a “growing piece of the green knowledge puzzle” which “communicate[s] what Canada’s Green University™ is about to the UNBC community, UNBC alumni and off-campus communities and institutions of central and northern BC” (University of Northern British Columbia: Green Day, 2012). This event inspires more community engagement each year with interests in solutions to long-term sustainability (ibid.).

## RRU

RRU’s website states that “[e]nvironmental sustainability is not only intrinsically linked to Royal Roads' teaching and research mandate, it is a challenge that calls for the kind of interdisciplinary and collaborative problem-solving at which Royal Roads excels” (Royal Roads University: Sustainability, 2014). RRU is recognized in the Canadian Environmental Education Guide,published in *Alternative Journal,* for several environmental degrees including: Environment and Management (MA, MSc), Environmental Education, Communication (MA), Environmental Management (BSc), Environmental Practice (BA, BSc, MA, MSc), and Environmental Science (BSc) (Alternatives Journal, 2012). Other sustainability programs offered at RRU include Graduate Certificates in Sustainable Community Development, and Environmental Education and Communication; and two Undergraduate Certificates in Carbon and Energy Leadership and Ecological Literacy. RRU learning outcomes are enhanced by incorporating sustainability into curriculum design and using real life case studies to apply student learning to a current issue. Examples of this can be seen in the Solar Colwood project, and a transportation challenge project completed by Bachelor of Commerce students (RRU Carbon Neutral Action Report, 2012).

RRU’s Environment and Sustainability research “is an overarching value of the university and a central area of focus, led by the Canada Research Chair in Sustainable Community Development and the Centre for Livelihoods & Ecology” (RRU, Environment and Sustainability, n.d.). Sustainability research is organized and highlighted in its online presence. There is a diverse range of sustainability research at RRU including, but not limited to: community vitality and resilience; natural resource based enterprise and livelihoods; local and sustainable food systems; urban and post-industrial landscapes and sustainability; community responses to green/sustainability initiatives, and environmental citizenship (ibid).

Mobilizing knowledge and connecting students to the greater community, RRU participates in the Ready, Set, Solve Project, which is a Capital Regional District Climate Action Plan program that partners undergraduate students with the community to solve energy-efficiency and climate related challenges (Capital Regional District, 2014). RRU also hosts a student Sustainability Committee that works to engage and educate the student body in reducing its own, as well as RRUs environmental impact.

## VIU

VIU has been recognized in the Canadian Environmental Education Guide, published by *Alternatives Journal* for its Fisheries and Aquaculture (BSc), Geography (BA, BSc), Global Studies (BA), and Natural Resource Protection (BNRP) programs (Alternatives Journal, 2012). It also hosts a Master of Arts in Sustainable Leisure Management and an Environmental Technician Certificate Program. While environment and sustainability in education does not appear to be a focus at VIU, sustainability related content is emphasized in various courses. A list of courses VIU offers with sustainability related content is provided in Appendix B.

From 2007-2010 VIU offered a green building and renewable energy technician program which is no longer available. There has also been intermittent discussion of an interdisciplinary Environmental Studies program, but this is currently dormant. There was also a renewable energy technician program at one time, but that has long since ceased (Don Alexander, personal communication, April 18, 2014).

Sustainability-specific research being done at VIU includes projects such as Improving Aquaculture Practices in Baynes Sound, BC; Carbon Sequestration in Managed Forest and Grassland Ecosystems in Western Canada; and Restoring Eelgrass Systems in the Nanaimo River Estuary. To showcase research that is being done at VIU, the annual Celebration of Research Excellence and Knowledge Transfer Event (CREATE) gives students an opportunity to present a synopsis of their research to the VIU community and the general public (Vancouver Island University: CREATE, n.d. [b]). As well, VIU also hosts the Applied Environmental Research Laboratories (AERL) which are equipped for water, soil and air analysis quantifying contaminants and naturally occurring substances (Vancouver Island University: AERL).

VIU supports immersed student-community involvement in research and experiential learning opportunities, demonstrated through its Community Based Research Institute, which strives to “develop research collaborations on issues of concern to communities” (Vancouver Island University n.d.[c]). As well, the Healthy Community Coordinator is facilitating food sustainability related curriculum and applied student research projects. While not on Nanaimo’s campus, VIU’s Deep Bay Marine Field Station is a state of the art research facility that engages students from the Nanaimo campus and members of the greater community in sustainable shellfish aquaculture development and the preservation of coastal ecosystems.

Sustainability education within the university is also provided through awareness events and student-led initiatives. VIU’s Office of Environment and Sustainability hosts an annual Sustainability Fair, which highlights the various ways the community can take steps to be more environmentally responsible, as well as events to encourage behavioural changes such as Ugly Sweater Week, and Power to Change Week. Student clubs on VIU’s Nanaimo campus that host sustainability-related events and are actively working towards a more sustainable campus include: Solutions: A Sustainability Network, the Campus Food Movement, and the VIU Community Peace Garden. In the spring of 2014 these clubs worked together to bring *Avenues for Action 2014*, a day-long sustainability conference, to VIU. The conference featured Michael M’Gonigle from the University of Victoria as a guest speaker, and presentations highlighting opportunities and success stories in sustainability initiatives on VIU’s campus, and within the wider community (Avenues for Action, 2014).

Another student-based program, Awareness of Climate Change through Education and Research (ACER), is an interactive program for students and the greater community on topics such as global warming, greenhouse gases, and global average temperatures. It hosts a symposium once a year with workshops and guest speakers to help provide a starting point for technical, social, and political solutions. Topics addressed include: the global distribution of greenhouse gases, the time lag between cause and effect, the close linkage to energy production and economic drivers, and the interdisciplinary nature of environmental and social consequences. The organization also conducts outreach about climate change to high schools (ACER, 2013).

**Comparison**

The value and priority of environment and sustainability in curriculum and research at UNBC and RRU is illustrated in their numerous available programs and courses, and is highlighted in their online presence. While not completely absent at VIU, it is not as prominent. Each university hosts behavioural awareness campaigns and sustainability related events, but UNBC’s annual Green Day is the most successful as it has been hosted for seven consecutive years, gaining popularity each year, and brings a diversity of people together on the topic of sustainability information and idea sharing. Similarly, VIU’s ACER symposium and Avenues for Action 2014 conference – which will hopefully be an annual event – offer sustainability education and opportunity for community engagement. There is also a proposal for a new School of Environment, Health, and Society which would provide a platform for community-based research and education.

# Conclusion

Is VIU a leader in sustainability? While there are some promising initiatives, our institution clearly lags behind Royal Roads and UNBC. In the categories of governance, food, water, transportation, energy, waste, and curriculum, UNBC and Royal Roads are leaders; VIU is not.

It is clear that sustainability and resilience are the imperatives of the 21st century. Academic institutions are equipped knowledge centers that host an enthusiastic citizenry able to convey and shape economic, social and political changes. Many of their graduates will be future leaders in political, economic, and cultural sectors, including in the areas of policy and public opinion-shaping. It is part of the responsibility of such institutions to set an example of what sustainability in action looks like by providing relevant and inspiring education and research to better the world we live in, and to help to develop new regional models for resilience . Universities must demonstrate closed-loop zero waste food and energy-producing pedagogic sites to immerse the students and the wider community into what it truly means to be sustainable. Despite financial barriers that can hinder universities from pursuing major sustainability development projects, there is much that can be done internally to increase sustainability in curriculum and policy development.

By trademarking itself Canada’s Green University™, UNBC has staked a bold claim in its responsibility and commitment to being a national leader in sustainability. Its strengths are demonstrated in its sustainability-focused governance within the Green University Planning Committee and subsequent diverse planning committees, its centrally located Green University Centre, and on-site power generation. UNBC has made considerable progress in mobilizing the resources necessary to advance sustainability goals. Its curriculum offers a multitude of sustainability courses and programs, and this is reinforced by a number of student-run initiatives.

RRU’s sustainability strengths are reflected in its institutionalized commitment to sustainability in education and research, alternative solar energy strategy, its aggressive waste management efforts, and its attempts to source local and organic food for the Habitat Café. RRU offers many programs with an environment and sustainability focus and is actively engaged in sustainability initiatives in its wider community.

VIU’s sustainability intentions are well-professed in its Campus Master Plan; however, there is little demonstration that sustainability is a primary focus of the Nanaimo institution at the moment. Demonstrations of sustainability from the institution spring from its energy retrofits, expanded recycling facilities, and the awareness campaigns of the Office of Environment and Sustainability. VIU’s strengths show in its food sustainability initiatives. In the aquaponics, food strategy development, partnership with local farms and student engagement, there is opportunity for the development of an urban agriculture and food culture program at the G.R. Paine site and collaborative programs within Culinary Arts. This would necessitate a re-focusing of the Paine Center’s mandate away from exclusively growing ornamentals and herbs. While there are numerous shoots of sustainability poking up through the soil, VIU lacks strong leadership and cross-disciplinary initiatives. There needs to be a more thorough integration of sustainability into the curriculum, and sustainability needs to become part of the mandate of all parts of the administration.

To take just one example, sourcing food used on campus locally has a number of benefits, not the least of which is strengthening the local economy and building resilience. VIU has made some tentative steps in this direction, but these can be strengthened. At UNBC and RRU, multi-stakeholder collaboration has resulted in more aggressive initiatives regarding local sourcing, and in other areas as well. Another key element of success in advancing sustainability is institutionalizing sustainability or healthy community managers. Such a person needs to have real authority and institutional backing. Moreover, there needs to be increased institutional collaboration, involving a variety of stakeholders and shared goals.

Comparative studies like this can offer insight into the development of policy, operations and procedures with regards to sustainability at various institutions in order to compile best practices that can be applied elsewhere.

**The Following Recommendations for VIU have resulted from this Study:**

**Governance:**

The current model of sustainability governance is weak and ineffectual. Strategies for remediation include:

1. Strengthen the institutional support of the Office of Environment and Sustainability by hiring a Sustainability Manager for the Office of Environment and Sustainability. It has been shown that a Sustainability Manager can increase the institution’s ability to coordinate sustainability and further the institution’s sustainability goals and priorities.
2. Create a VIU Sustainability Planning Committee (or evolve SAC), similar to UNBC’s Green University Planning Committee, that hosts a diversity of faculty, staff, students, and community members and acts as a policy and sustainable development advisory board for the advancement of sustainability at VIU. The participation of VIU’s president and/or top administration would demonstrate VIU’s leadership and commitment to sustainability on campus and in the greater community. It has been suggested that the most effective way to achieve this would be through creating a Sustainability Committee through VIU’s academic Senate.
3. Incorporate the environment into all levels of decision making and action. The POLIS Project on Ecological Governance is a good resource to draw from in terms of how to make sustainability thinking part of governance practice ([www.polisproject.org](http://www.polisproject.org)).
4. Create a Student Sustainability Council as part of the Students’ Union and SAC.
5. Hire a skilled grant writer to increase the funding capacity of the institution for sustainability- related projects congruent with the Campus Master Plan.
6. Implement a policy to support ethically and environmentally-sound investment.

**Food:**

“A campus food policy would give high priority to local and regional organic sources” (Orr, 1996, p. 107).

1. Institutionalize a VIU Food Strategy to outline its food values and goals. This will be helpful to advise on the transition to a more sustainable system that supports the procurement of healthy, local food for consumption and educates about the benefits of local food systems.
2. Develop policy to support the priority of local, regional and organic food sources on campus.
3. Establish an addition to the Horticulture Technician program at the GR Paine Horticultural Training Centre to incorporate food studies, natural building training, rain water harvesting, permaculture, and urban agriculture. More food could be produced through this program for the campus cafeteria. Involve AERL in the water contamination issues at the Paine Centre site and increase rain water collection.
4. Foster collaborative studies between aquaculture and horticulture.
5. Take a stance against genetically modified food and food that is produced with chemical pesticides and fertilizers; their safety remains heavily debated throughout the scientific community. Chemical fertilizers and pesticides, produced from fossil fuels, are not only dangerous to human health and the ecosystem, but are part of an industry that must be eliminated in order for sustainable systems to emerge.

**Water:**

1. Incorporate rainwater collection at the top of campus.
2. Assess feasibility of a micro-hydro power generating strategy utilizing the topography of the campus and rainwater collection.
3. Use the decorative ponds for rainwater collection if it can be done in a way that respects the aesthetic of the Japanese gardens.
4. Fund a small rainwater irrigation system for the VIU Community Peace Garden.

**Transportation:**

Increasing parking fees and decreasing parking spaces is a popular strategy used to encourage the use of alternative transportation; however, one cannot penalize drivers in the absence of adequate alternatives.

1. Implement the student U-Pass in order to support alternative transportation and increase bus ridership. This would require overcoming resistance on the part of VIU Student Union.
2. Use applied student research to conduct transportation studies aimed at quantifying and increasing cycling ridership, and improving the transport systems on campus and in Nanaimo.
3. Create a VIU commuter program with its own buses, and offer specific location and time pick-ups.

**Energy:**

1. Invest in LED lighting.
2. Applied student research focused on small scale power generation for LED lighting.
3. Pursue funding to make use of the geo-exchange heating and cooling system outlined in the Campus Master Plan.
4. Onsite power generation at the aquaponics project would make for a progressive example of sustainability in action.
5. Assess the feasibility of micro-hydro power generation.

**Waste:**

1. Conduct a formal waste audit on campus using Work Opportunity positions or applied student research. This will develop a waste audit methodology that can be reused and refined, and will provide a better understanding of the waste stream VIU generates and how to manage it.
2. Develop waste reduction policy and strategies. As Smyth (2008) notes, “Beyond environmental considerations, the strategy must take into account, and even modify, the attitudes, behaviours and decision-making structures of the campus community, particularly as they pertain to key areas such as purchasing and waste handling” (p. 7).
3. Charge for disposable cups (already more expensive in the cafeteria and Jumpin’ Java) and use the money towards sustainability projects, or ban the use of disposable cups altogether.
4. Ban the use of plastic bags on campus to enforce the habit to use backpacks or reusable bags.
5. On-site composting is important as a demonstration of closing the loop on waste, treating waste as a resource, and could even be developed as a revenue stream. We recommend an on-site composter such as Earthtubs, an in-vessel composter that can compost up to 100 pounds of material per day (Green Mountain Technologies, 2012) as a start. This can be incorporated into the Culinary Arts food waste practice and the compost could then be used in the Community Peace Garden and the Horticulture program.

**Curriculum**:

David Orr points out that “students learn that it is sufficient only to learn about injustice and ecological deterioration without having to do much about them, which is to say, the lesson of hypocrisy. They hear that the vital signs of the planet are in decline without learning to question the *de facto* energy, food, materials, and waste policies of the very institution that presumes to induct them into responsible adulthood” (1996, p. 104).Because VIU is a “special purpose teaching university with a mandate to serve a geographic area or region of the province” (qtd. in the VIU Academic Plan, 2011, p. 10), it is necessary for the teaching curriculum to dynamically evolve with the times and the vibrant community in which it is situated.

1. Critically evaluate and refine the curriculum. VIU could strive to become a leader in progressive sustainability curriculum by incorporating sustainability and environmental content into ALL courses.
2. Develop required Sustainability 101 courses for all students in every program to provide an understanding of the concept and why it is important across all disciplines.
3. Organize current sustainability-focused courses and research onto an accessible and highlighted webpage.
4. Develop a research outreach webpage that connects Requests for Proposals, for research or projects, from the community to the campus faculty for cross-pollination of tangible experiential student learning opportunities that help build a better community. Class research assignments could be integrated into the development of sustainability on campus. For example, in Global Studies 490 in 2013, the class divided into groups and did a virtual Request for Proposal for a Canadian International Development Agency project and presentation. Similar to this, students could work on actual grant proposals for sustainability projects and then present them to the SAC for review. This would provide students with a sense of purpose and meaning to their research and the possible sustainability outcomes deriving from it.
5. VIU-developed Sustainability courses could be offered in Local Open Online Courses (LOOCs) to make them accessible for the benefit of the community.
6. A thorough sustainability audit based on the STARS methodology, using a team of student and faculty researchers, would be beneficial to the university as a biennial review of sustainability progress and goals. This would give more context to the areas in which the university could improve and contribute to the development plans of the future. A STARS audit is a great way for students to better understand sustainability and get engaged in sustainability-related issues on campus. Sustainability audits in all categories explored in this document could be included into student led projects. An Ecological Footprint Analysis and Carrying Capacity Analysis of VIU could be included in this type of audit research.
7. Invest in living walls as a site of education, research and sustainability; and for improved air quality indoors when windows are open.
8. Bring plants into classrooms for improved air quality, health and wellbeing, student performance and happiness. (http://www.wolvertonenvironmental.com/Plants-Classroom.pdf)
9. Enrich the campus with environmental art and murals. The pillars in the library, for example, could be vines and trees.
10. Hire Work Opportunity students for sustainability related projects, interdisciplinary sustainability education curriculum suggestions/development, and cost analysis and funding options for sustainability projects. Students are a valuable resource!
11. Host “Greening the Campus” mapping seminars that encourage attendees to identify sustainability opportunities around campus, and develop strategies related to these.

**Discussion Section**

Ban the Bottle’s success was somewhat undermined when the university changed its exclusive soft drink vendor contract from Pepsi to Coke. The change brought to campus more flavored water and an increase in vending machines with bottled drinks. This will no doubt increase the sale of bottled drinks requiring much more water in the processing, add to the environmental problem concerning bottle waste, and contribute to the deterioration of human health noticed in our society. VIU’s responsibility and commitment to human health and wellbeing is outlined in the Campus Master Plan where it states: “The University acknowledges that factors promoting human health and wellbeing must be considered in the design and operation of the local campus environment, and in the effect that campus operation has on the larger environment” (Campus Master Plan, Appendix C, p. 264). An editorial published in the campus’s newspaper, *The Navigator*, mentions similar concerns and questions the endorsement of Coca-Cola, considering VIU’s goal of wanting to be a healthy campus (Editorial, April 3, 2013).

**Campus Master Plan**

The VIU Campus Master Plan notes that the “[t]he unique hillside topography of the campus also lends itself to opportunities for gravity-fed rainwater delivery for non-potable use in lower level buildings. Rainwater collected from buildings located up-hill could be delivered to the high water-demand residence buildings for storage, treatment and reuse in laundry and toilet flushing” (p. 80). Building 395 and the new greenhouse have been built since the Campus Master Plan was published, yet rainwater collection was not included into the design of either. Small sustainability demonstration projects create momentum and are less costly. The Campus Master Plan is a far-reaching document. It can provide much guidance for further concrete action by VIU. It just needs to be followed.

**Appendix A:**

<http://www.ulsf.org/pdf/TD.pdf>

<http://www.aashe.org/files/documents/STARS/stars_1.2_credit_checklist.pdf>

**List of cleaning products used at VIU**

ACME Invasion Stripper, Wood Wyant Carpet Spot and Stain Remover, Wood Wyant Chewing Gum and Candle Wax Remover, Deb Citrus Power Wash, Florafree Anti-Bacterial Gel Skin Cleanser, Debonaire Foaming Skin Cleanser, Deb Hair and Body Wash, Deb Instant Foam, Boraxo Powdered Hand Soap - Industrial, special heavy duty, household and pink, Dial Complete Antibacterial Foaming Hand wash, Hot Springs Heavy-Duty General Purpose Cleaner, Mainstay Floor Finish, Eco-Max Hypoallergenic Skin Cleanser, Sprayway Stainless Steel Polish and Cleaner, Technical Concepts Lotion Soap with Moisturizers, Wood Wyant Vardet 383 – Degreaser, Wood Wyant Vert-2-Go All Purpose Cleaner, Wood Wyant Vert-2-Go Bio Washroom Cleaner and Deoderizer, Wood Wyant Vert-2-Go Blue Force, Wood Wyant Vert-2-Go Disinfectant, Wood Wyant Vert-2-Go Glass Cleaner, Wood Wyant Vert-2-Go Oxy Neutral Cleaner, Diversy Percept concentrated general virucide Disinfectant cleaner

**Waste tracking from 2012**

*Organics*: 47,150 kgs. of organics was removed from campus in 2012.

*Construction Wood*: 160 yds. removed from campus in 2012.

*Yard Waste*: 160 yds. removed from campus in 2012.

*Styrofoam*: 40 bags were removed from campus in 2012.

*Drink Containers*: 544 bags of pop cans collected in 2012.

**Appendix B:**

**Courses with sustainability/ecological literacy offered at VIU**

ANTH 141 (3) Culturally Responsive Resource Management

ANTH 324 (3) Food and Culture

ANTH 401 (3) Ecological Anthropology

ANTH 415 (3) the Anthropology of Progress

ANTH 418 (3) Researching Community

ANTH 419 (3) Globalizing Culture: A Critical Perspective

BIOL 457 (3) Biodiversity and Conservation Biology

BIOL 332 (3) Microbial Ecology

BIOL 202 (3) Ecology

CHEM 301 (3) Aqueous Environmental Chemistry

CHEM 302 (3) Atmospheric Environmental Chemistry

CHEM 311 (3) Environmental Chemical Analysis

CHEM 331 (3) Environmental Organic Chemistry

CHEM 333 (3) Natural Products Chemistry

CHEM 390 (3) Field Studies in Environmental Chemistry

CYC 360B (3) Special Topics: Youth and Active Lifestyles

CYC 360I (3) Special Topics: Building Family and Community Partnerships

CYC 360M (3) Special Topics: Rediscovering Rites of Passage

ESFB 115T (3) the Emerging Workplace

ECON 330 (3) Environmental Economics

Forestry Resource Technology Diploma

FNAT 204 (6) Indigenous Perspectives on the Environment

FNAT 300 (3) Indigenous Knowledge: Land as Life

All Geology courses

All Geography courses

GEGD 503 (5) Charters for Change

GEGD 504 (5) Resilience

GLST 390 (3) Globalization: An Interdisciplinary Inquiry

GLST 490 (3) Selected Topics in Global Studies

Horticulture Technician Program

HOSP 170 (3) Food Science

HOSP 240 (3) Principles of Food Production

HOSP 241 (3) Food Service Management

INTD 494 (3) Integrated Seminar in Natural and Cultural Resource Management

LBST 214 (3) Wonder and the Order of Nature

LBST 314 (3) Wonder and the Order of Nature (Advanced)

MGMT 494 (3) Strategies for Sustainable Development

Master of Arts in Sustainable Leisure Management

Natural Resources Extension Program

PHIL 233 (3) Environmental Ethics

PHIL 333 (3) Issues in Environmental Ethics

POLI 457 (3) Public Policy and Global Resources

POLI 470 (3) Canadian Political Economy in a Global Era

Resource Management Officer Technology

SOCI 112 (3) Introduction to Sociology: Canadian Society in the Contemporary World

SOCI 280 (3) Consumer Society

SOCI 370 (3) Environmental Sociology

SOCI 372 (3) Urban Sociology

SCIE 303 (3) Energy and the Environment

SCIE 403 (3) Environmental Science: Perspectives and Inter-relationships

SLM 600 (3) Foundations of Sustainable Leisure Management

SLM 601 (3) Leisure and Sustainability: Principles and Paradigms

SLM 602 (3) Case Studies in Sustainability and Innovation

SLM 604 (3) Influencing Change Toward Sustainability

TOUR 159 (3) Environmental Stewardship in Tourism

TRMT 353 (3) Community Development in Recreation and Tourism

TRMT 359 (3) Management of Parks and Protected Areas

TRMT 396 (3) Aboriginal Tourism

TRMT 444 (3) Rural Development Through Recreation and Tourism

TRMT 475 (3) Lifestyle Management

**References**

A Point of VIU. (2009). VIU makes environmentally friendly changes to reduce waste. Retrieved from, [http://www2.viu.ca/news/page.asp?ID=1709#](http://www2.viu.ca/news/page.asp?ID=1709)

Alternatives Journal. (2012). Higher Learning for a Smaller Footprint. *Canadian Environmental Education Guide*, *38*(6).

The Association for the Advancement of Sustainability in Higher Education. (2013). About AASHE. Retrieved from <http://www.aashe.org/about>

Avenues for Action. (2014). About. Retrieved from <http://studentblogs.viu.ca/avenuesforaction/about/>

Awareness of Climate Change through Education and Research. (2013). Retrieved from <http://web.viu.ca/acer/>

Avalon Energy Management. (2009). <http://www.avalonmechanical.com/energy_management.html>

Bigger. J. (2009). Report on Greenday Feedback. Retrieved from <http://www.unbc.ca/assets/green/unbcgreendayreport.pdf>

Bauman, A. *et al.* (2010). STARS Major Project Report. Seven Minutes in Heaven. Retrieved from <http://sustainability.royalroads.ca/sites/default/files/web_files/Seven_Minutes_STARS_Final_Report_.pdf>

Baijius, W. (2013). *Analysis of Indicators for Sustaining Human Carrying Capacity in the Regional District of Nanaimo.*

Beringer, A. (2006). Campus sustainability audit research in Atlantic Canada: pioneering the campus sustainability assessment framework. *International Journal of Sustainability in Higher Education*. Vol. 7, No. 4: pp. 437-455. Emerald Group Publishing Limited.

Capital Regional District. (2014). Climate Action: Ready, Set, Solve. Retrieved from <https://www.crd.bc.ca/education/at-school/for-educators/educator-guides-resources/climate-action>

Carlsson-Kanyama, A. and M. Faist. 2000. Energy Use in the Food Sector: a data survey. Stockholm, Sweden and Zurich, Switzerland.

<http://www.infra.kth.se/fms/pdf/energyuse.pdf> [link inoperative]

Cole, L. (2003). *Assessing Sustainability on Canadian University Campuses: Development of a Campus Sustainability Assessment Framework.* Retrieved from <http://neumann.hec.ca/humaniterre/campus_durable/campus_memoire.pdf>

Czyphyha, B. (2004). Royal Roads University 2004 Waste Audit. Retrieved from <http://www.docstoc.com/docs/44391641/RRU-Waste-Audit-Report--2004>

Editorial. (April 3, 2013). The Navigator. Retrieved from <http://www.thenav.ca/2013/04/03/health-and-wellness-at-viu/>

Fossil Free Canada. (2014). Retrieved from <http://gofossilfree.ca/>

Greentable Network. (n.d.). About. Retrieved from <http://www.greentable.net/index.php>

Green Mountain Technologies. (2012). Retrieved from <http://compostingtechnology.com/products/compost-systems/>

John Todd Ecological Design. (2012). Retrieved from <http://www.toddecological.com/eco-machines/>

JohnsonDiversey Canada. (2004). Healthy High Performance Cleaning Program. Retrieved from <http://www.viu.ca/facilities/docs/Healthy_High_Performance_Cleaning_Manual.pdf>

Kimmett, C. (October 10, 2013). Campuses Drive Local Food Purchasing: Survey. The Tyee. Retrieved from <http://thetyee.ca/Blogs/TheHook/2013/10/10/Campuses-Local-Food/?utm_source=Campus+Food+Systems+Project+Newsletter&utm_campaign=b4cec9a129-CFSP_Newsletter_27_15_2013&utm_medium=email&utm_term=0_38abf05019-b4cec9a129-27167873&ct=t%28CFSP_Newsletter11_18_2013%29>

M’Gonigle, M. & Starke, J. (2006). *Planet U: Sustaining the World, Reinventing the University*. Gabriola Island, BC: New Society Publishers.

Omega Institute. (2014). The Building. Retrieved from <http://www.eomega.org/omega-in-action/key-initiatives/omega-center-for-sustainable-living>

Orr, D. W. (1992). *Ecological Literacy: Education and the Transition to a Postmodern World*. Albany, NY: State University of New York Press.

Patterson, M. (2010). *Sustainability as a Strategic Driver at VIU.* Retrieved from <http://www.viu.ca/integratedplanning/documents/FINALSustainabilityasastrategicdriveratVIUJune2010web.pdf>. Accessed on November 20, 2012.

Prince George Public Interest Research Group (a). (n.d). PGPIRG Food Group. Retrieved from <http://pgpirg.tumblr.com/food>

Prince George Public Interest Research Group (b). (n.d). Sustainable Garden and Compost Program. Retrieved from <http://pgpirg.tumblr.com/compostingandgardening>

Prince George Public Interest Research Group (c). (n.d). PGPIRG Sustainable Garden and Compost Program. Retrieved from <http://pgpirg.tumblr.com/compostingandgardening>

Prince George Public Interest Research Group (d). (n.d). What is PGPIRG? Retrieved from <http://pgpirg.tumblr.com/whatispgpirg>

Royal Roads University. (2014a). Food. Retrieved from <http://sustainability.royalroads.ca/food>

Royal Roads University. (2014b). LEED. Retrieved from <http://sustainability.royalroads.ca/leed>

Royal Roads University. (2014c). Transportation. Retrieved from <http://sustainability.royalroads.ca/transportation-0>

Royal Roads University. (2014d). Waste. Retrieved from <http://sustainability.royalroads.ca/waste>

Royal Roads University. (2013a). Governance. Retrieved from  [http://www.royalroads.ca/about/governance](%20http://www.royalroads.ca/about/governance)

Royal Roads University. (2013b). Mission Statement. Retrieved from <http://www.royalroads.ca/about/mission-statement>

Royal Roads University. (2013c). Sustainability at Royal Roads University. Retrieved from <http://sustainability.royalroads.ca/>

Royal Roads University. (2008-2012). Carbon Neutral Action Reports. Retrieved from <http://www2.gov.bc.ca/gov/topic.page?id=B4071C74EEC04BF5B131A5B0573F4A64#reports>

Royal Roads University. (2009). School of Environment and Sustainability. Retrieved from <http://environment-sustainability.school.royalroads.ca/>

Royal Roads University. (2008). Sustainability Plan. Retrieved from <https://sustainability.royalroads.ca/sites/default/files/web_files/rru_sustainability_plan.pdf>

Royal Roads University Research Policy C1000. (2005a). Retrieved from <http://www.royalroads.ca/sites/default/files/reports_files/Board_Reports/Approved_Policy_-_C1000_-_Research_15_nov_05.pdf>

Royal Roads University Policy on Corporate Social Responsibility B1020. (2005b). Retrieved from <http://www.royalroads.ca/sites/default/files/tiny_files/Board_Reports/Royal_Roads_University_Corporate_Social_Responsibility.pdf>

Royal Roads University Environmental Stewardship Policy B1200. (2000). Retrieved from <http://www.royalroads.ca/sites/default/files/tiny_files/Board_Reports/Royal_Roads_University_-_Environmental_Stewardship.pdf>

Royal Roads University. (n.d.) Environment and Sustainability. Retrieved from <http://research.royalroads.ca/research-areas/environment-sustainability>

Royal Roads University. (n.d.). Governance at RRU. Retrieved from <http://www.royalroads.ca/about/governance>

Royal Roads University. n.d. *Sustainability Action for the Environment*. Retrieved from <http://sustainability.royalroads.ca/sustainability-action-environment>

Sierra Youth Coalition. (2003). Sustainable Campuses. Retrieved from <http://www.syc-cjs.org/sites/default/files/SYC-CSAF-core.pdf>

Smith, J. (n.d.). *The Agricultural Carrying Capacity of Vancouver Island.* Retrieved from <http://www.communitycouncil.ca/sites/default/files/12d_Carrying_capacity_of_VI.pdf>

Smyth, D. (2008). (2008). *University of Northern British Columbia Waste Audit Report.* Retrieved from <http://www.unbc.ca/assets/green/wasteauditreport.pdf>

Smyth, D., Fredeen, A. & Booth, A. (2010).Reducing Solid Waste in Higher Education: The First Step Towards ‘Greening’ a University Campus. *Resources, Conservation and Recycling 54* pp. 1007-1016.

Spalding, D. (2011, September 9). U-Pass Debate is Back Again at VIU. *Nanaimo Daily News.* Retrieved from <http://www.nanaimodailynews.com/news/derek-spalding-u-pass-debate-is-back-again-at-viu-1.253061>

The Navigator. (April 3, 2013). Health and Wellness at VIU. Retrieved from <http://www.thenav.ca/2013/04/03/health-and-wellness-at-viu/>

University of Northern British Columbia. (January 27, 2014). UNBC Saving Energy and Money. Retrieved from <http://www.unbc.ca/releases/11258/unbc-saving-energy-and-money>

University of Northern British Columbia. (2013). Chemical Laboratory Safety and Methodology Manual. Retrieved from <http://www.unbc.ca/sites/default/files/sections/safety/chemicalsafetyandmethodologymanual2013.pdf>

UNBC. (2013). Faculty Population. Retrieved from <http://www.unbc.ca/sites/default/files/sections/institutional-research/reports/rucbc-t6.2-faculty-age-12.pdf>

University of Northern British Columbia. (2012a). About UNBC. Retrieved from <http://www.unbc.ca/about-unbc/tour/campus-trails>

UNBC Fall headcount enrollment. (2012b). Retrieved from <http://www.unbc.ca/sites/default/files/sections/institutional-research/reports/fall-hc-campus-12.pdf>

University of Northern British Columbia. (2012c). Green Day. Retrieved from <http://www.unbc.ca/green/green-day>

University of Northern British Columbia. (2012d). Green Fund. Retrieved from <http://www.unbc.ca/green/green-fund>

University of Northern British Columbia. (2010-2012e). Green Fund Report. Retrieved from <http://www.unbc.ca/sites/default/files/sections/green/report-green-fund-2010-2012.pdf>

University of Northern British Columbia. (2012f). Green Research. Retrieved from <http://www.unbc.ca/green/green-research>

University of Northern British Columbia. (2012g). Green Teaching. Retrieved from <http://www.unbc.ca/green/green-teaching>

University of Northern British Columbia. (2012h). Green University Planning Committee. Retrieved from <http://www.unbc.ca/green/green-university-planning-committee>

University of Northern British Columbia. (2012i). Newsroom: Graduate Students Approve U-Pass. Retrieved from <http://www.unbc.ca/releases/2008/12-02upass>

University of Northern British Columbia. (2012j). Newsroom: UNBC Saving Energy–and Money. Retrieved from <http://www.unbc.ca/releases/11258/unbc-saving-energy-and-money>

University of Northern British Columbia. (2012k). Newsroom: UNBC’s Bioenergy Plant Achieves Highest Level of Environmental Certification. Retrieved from <http://www.unbc.ca/releases/9842/unbcs-bioenergy-plant-achieves-highest-level-environmental-certification>

University of Northern British Columbia [7]. (2012l). Parking Services. Retrieved from <http://www.unbc.ca/parking/permits>

University of Northern British Columbia. (2012m). Sustainability Report [2007-2012] for the University of Northern British Columbia. Retrieved from <http://www.unbc.ca/sites/default/files/sections/green/unbc-sustainability-report.pdf>

University of Northern British Columbia. (2012n). University Farmers’ Market. Retrieved from <http://www.unbc.ca/university-farmers-market>

University of Northern British Columbia. (2012o). UNBC Food Services. Retrieved from <http://www.unbc.ca/food-services/vision>

University of Northern British Columbia. (2008-2012). Carbon Neutral Action Reports. Retrieved from <http://www2.gov.bc.ca/gov/topic.page?id=B4071C74EEC04BF5B131A5B0573F4A64#reports>

University of Northern British Columbia. (2011). Vehicle Idle Free Policy and Procedures. Retrieved from <http://www.unbc.ca/sites/default/files/assets/policy/facilities/vehicle_idle_free_procedures.pdf> and <http://www.unbc.ca/sites/default/files/assets/policy/facilities/vehicle_idle_free.pdf>

University of Northern British Columbia Strategic Research Plan. (2010-2015). Retrieved from <http://www.unbc.ca/sites/default/files/sections/research/unbcstrategicresearchplan2010.pdf>

University of Northern British Columbia. (2005). Hazardous Waste Identification and Reporting. Retrieved from <http://www.unbc.ca/assets/policy/pcrm/pcrm_hazardous_waste_identification_and_reporting.pdf>

University of Northern British Columbia Pulse Energy. (n.d.). Retrieved from <https://my.pulseenergy.com/UniversityofNorthernBC/dashboard#/location/1803>

University Leaders for a Sustainable Future (2006). Talloires Declaration Institutional Signatory List, University Leaders for a Sustainable Future, Washington, DC. Retrieved from [www.uslf.org/pdf/td\_signatories.pdf](http://www.uslf.org/pdf/td_signatories.pdf)

University of Victoria. (n.d). Sustainability Initiatives. Retrieved from <http://www.uvic.ca/services/food/home/sustainability/initiatives/index.php>

Vancouver Island University. (2014). Facilities Services & Campus Development: Sustainability. Retrieved from <http://www2.viu.ca/facilities/CampusDevelopmentSustainability.asp>

Vancouver Island University. (June 15, 2013). VIU Enrollment Report. Retrieved from <http://www.viu.ca/upa/FactsOnline/docs/VIU_Student_Enrol_AY_2009-2011.pdf>

Vancouver Island University. (2013). Upper Campus Covered Bike Storage. Retrieved from <http://www.viu.ca/facilities/Campus_Development/CoveredBikeStorage.asp>

Vancouver Island University. (2012). Governance. Retrieved from <https://www.viu.ca/gap/documents/GovernanceatVIUstudentorientation2.forweb.pdf>

Vancouver Island University. (2008-2012). Carbon Neutral Action Reports. Retrieved from <http://www2.gov.bc.ca/gov/topic.page?id=B4071C74EEC04BF5B131A5B0573F4A64#reports>

Vancouver Island University. (2011a). Academic Plan: Framing Our Future. Retrieved from <http://www.viu.ca/integratedplanning/documents/VIUAcademicPlanFINALMARCH2011.pdf>

Vancouver Island University. (2011b). Prepared by: Boulevard Transportation Group Ltd. *Integrated Transportation Demand Management (TDM) Strategy.* Retrieved from <http://www.viu.ca/sustainability/documents/TDM2011.pdf>

Vancouver Island University. (2011c). Mission. Retrieved from <http://www.viu.ca/mission/>

VIU University Relations Department. (2011d). Vancouver Island University to go bottled water free. Retrieved from <http://www2.viu.ca/news/page.asp?ID=2064>

Vancouver Island University Students’ Union. (2010). Good Food Box. Retrieved from <http://viusu.ca/section/48>

Vancouver Island University. (2009a). Framing Our Future: Nanaimo Campus Master Plan. Retrieved from <https://www2.viu.ca/masterplan/>

Vancouver Island University Communications and Public Relations. (2009b). The State of the University 2008/09. Retrieved from <http://www.viu.ca/docs/TheStateoftheUniversity200809.pdf>

Vancouver Island University. (March 18, 2009). *VIU launches energy reduction campaign.* Retrieved from <http://www.viu.ca/mainly/page.asp?ID=1606>

Vancouver Island University. (n.d.[a]) Carpool permits. Retrieved from <http://www.viu.ca/carpool/permits.asp>

Vancouver Island University. (n.d.[b]) Celebration of Research Excellence and Knowledge Transfer Event. Retrieved from <http://www2.viu.ca/research/create/about.asp>

Vancouver Island University. (n.d.[c]). Community Based Research Institute. Retrieved from <http://sites.viu.ca/cbri/>

Vancouver Island University Energy Management. (n.d.[d]). Executive Order of Facilities Services and Campus Development: Energy Management Policy for VIU. Retrieved from <http://www2.viu.ca/energymanagement/EnergyManagementPolicy.asp>

Vancouver Island University. (n.d.[e]). Integrated Planning @ VIU. Retrieved from <http://www.viu.ca/integratedplanning/>

Vancouver Island University. (n.d.[f]) PROPASS Program: Nanaimo Regional Transit Frequently Asked Questions. Retrieved from <http://www2.viu.ca/payroll/PROPASSFAQ.asp>

Vancouver Island University. (n.d[g]). Recycling. Retrieved from <https://www2.viu.ca/sustainability/RecycleInformation.asp>

Vancouver Island University. (n.d[h]). Sustainability Advisory Committee. Retrieved from <http://www.viu.ca/sustainability/SAC.asp>

White, Celia (Healthy Communities Coordinator, Vancouver Island University). (January, 2014). “Report on VIU’s Context of Sustainability.”

1. The following website provides an overview of self-reporting on sustainability by Canadian universities: <http://www.canadian-universities.net/Campus/Sustainability.html>. [↑](#footnote-ref-1)
2. Of late, the province has been wavering in its commitment to reducing greenhouse gases in the province. [↑](#footnote-ref-2)
3. [↑](#footnote-ref-3)
4. The high-water mark for local food use has been achieved by the University of British Columbia: “In 2010/11, approximately [48 per cent](https://stars.aashe.org/institutions/university-of-british-columbia-bc/report/2011-08-02/7/28/178/) of [UBC Food Services](http://www.food.ubc.ca/locations-and-hours) and [AMS Food and Beverage Department](http://www.ams.ubc.ca/businesses/) expenditures were on food that was locally grown, raised, or processed within 150 miles of campus or certified organic.” See <http://sustain.ubc.ca/campus-initiatives/food/sustainable-food-initiatives>. [↑](#footnote-ref-4)
5. ‘Embodied energy’ refers to the energy embodied in manufacturing and emplacing infrastructure and buildings. ‘Ecological economics’ is a discipline which, in contrast with conventional economics, shows how the human economy draws from and is an integral part of the natural world and faces innate *limits to growth*. In addition to LEED, *passivhaus* techniques developed in Germany may also offer useful lessons for energy-saving green building. [↑](#footnote-ref-5)