

A Comparison of Energy Efficiency Initiatives at Grenfell Campus and Other Similar-Sized University Campuses Across Canada

Lianne Tyson

Grenfell Campus

Memorial University of Newfoundland

Abstract

Exponential global population growth, driven by increasing personal consumption, has escalated the demand for energy, especially from non-renewable fossil fuels by both developed and developing economies. This ever-increasing demand for fossil fuels like coal, oil and natural gas has contributed to the continued rapid rise in greenhouse gas (GHG) emissions. GHG emissions contribute to global warming and climate change. International initiatives like the United Nations Framework on Climate Change (UNFCCC) have promoted programs to reduce GHG emissions globally. In an effort to reduce these emissions, the involvement of universities was deemed essential and was actively sought.

As institutions of higher learning, universities have an important role as exemplars of sustainability. These institutions promote the public good through education of their students and through the creation of knowledge. Universities also bring together a wide variety of the academic and professional schools that can address complex issues such as global warming and climate change. To assist campuses in becoming greener, two action plans have been developed as guidelines for sustainability. These are the Talloires Declaration of 1990 and the UNEP's *Greening Universities Toolkit* of 2013.

This paper will focus on a comparison of sustainable energy management practices among Grenfell Campus, Memorial University in Newfoundland and Labrador and three other universities. They are Acadia University of Nova Scotia, Algoma University of Ontario and the University of Northern British Columbia. These universities were chosen for their comparable sizes, their diverse locations across Canada and their sometimes-remarkable sustainable achievements. Energy management practices will be discussed in terms of energy conservation and efficiency in renewable energy sources, innovative building construction and design,

transportation, green IT initiatives, environmental courses and programs, environment and sustainability-focused groups and clubs as well as efforts by individuals on campus to conserve energy.

This comparison was undertaken to determine the extent to which sustainable initiatives are adopted by Memorial University's Grenfell campus. Grenfell Campus began its green initiatives program well after the other campuses and lags behind in areas such as renewable energy sources, transportation and efforts by individuals on campus to conserve energy. However, it compares quite favorably in the areas of energy conservation and efficiency in building construction and design and matched other universities in the academic courses and programs offered. In addition, Grenfell has quantified its GHG emissions in an effort to become a more climate-responsible campus. Finally, Grenfell Campus could employ a combination of the Talloires action plan and UNEP's Greening Toolkit to help better inform its decisions when implementing its green projects, thereby becoming more environmentally sustainable.

Introduction:

Many are aware that global population continues to grow at an exponential rate with little or no sign of slowing down, especially in developing economies. According to the CIA World Factbook (2014) the current global population is 7.2 billion! Besides rapid population growth, increases in consumption both in the developed and developing economies means that more and more energy will be required, especially as economies become ever more energy-demanding.

Despite this realization of increasing energy demand, Global Greenhouse Gas Emissions Data obtained by the Intergovernmental Panel on Climate Change (IPCC) shows that global greenhouse gas (GHG) emissions are still at an all-time high, with carbon dioxide, (CO₂) comprising the greatest portion of GHGs emitted by human activities. CO₂ is a by- product of the burning of coal, oil and natural gas (IPCC, 2007).

The CIA World Factbook (2014) states that China, (with a population of 1.3 billion) and India, (with a population of 1.2 billion) are among the largest emitters of GHGs from fossil fuel combustion and industrial processes. The USA is also another very large GHG polluter.

Awareness of the detrimental effects of global warming led all United Nations member countries to ratify the United Nations' Framework Convention on Climate Change (UNFCCC) and to sign a treaty at the Earth Summit in 1992. This treaty commits parties to implement programs to reduce their GHG emissions with the objective of stabilization at a level that prevents dangerous interference with the earth's climate (UNFCCC, 1992).

The Role of Universities in Sustainability

As institutions of higher learning, universities play an important role in developing and implementing green strategies. Therefore, at the Ninth Round Table Meeting on Sustainable

Development in 1993, the International Association of Universities (IAU) adopted the Kyoto Declaration. This declaration urged universities to, among other things, “seek to establish and disseminate a clearer understanding of sustainable development.” (Kyoto Declaration on Sustainable Development, 1993, Item 1).

As microcosms of the larger community, universities are equipped to transform both their campuses and host communities and have been specifically selected to become exemplars of sustainability. Universities are well positioned, therefore, to bring together all the academic disciplines and professional schools to address large, complex issues such as global warming. They can also have a local impact through a reduction of campus' carbon footprints. A sustainable university is one in which its activities are “ecologically sound, socially and culturally just and economically viable” (Bekessy et al, 2003, p.18).

To aid this transition, the United Nations Environment Programme (UNEP) developed a *Greening Universities Toolkit* to help transform universities into green, sustainable campuses (UNEP, 2013). The toolkit is part of the UNEP Environmental Education and Training Unit's "Greening Universities" idea. The toolkit gives universities basic guidelines to evolve into more sustainable institutions to “enhance ecosystem management and minimize waste and pollution” (UNEP, 2013, section on “Using this Toolkit,” paragraph 1).

Based on this toolkit, universities are expected to increase resource efficiency while reducing their carbon footprint. The primary goal, therefore, is to allow these institutions to apply their own approaches to becoming green campuses. One approach is to establish a sustainability office, comprising faculty, staff and students to plan green projects, set targets and timelines for completion and, more importantly, to engage with both the campus and the wider community.

Also geared specifically towards institutions of higher learning, is the Talloires Declaration of 1990, a ten-point action plan for incorporating sustainability and environmental literacy into campus teaching, research, operations and outreach programs (The Talloires Declaration, 1990). One of the means of fostering such a transformation is by reducing energy consumption on campus. This often involves transitioning from conventional energy sources to renewable energy, or at the very least, reducing the campus' dependency on non-renewable fossil fuels through energy conservation initiatives. A university which is genuinely sustainable will convert its energy consumption for heating, cooling and transport to renewable sources such as solar, wind, hydro, geothermal and bio fuels.

Why Energy Management?

While there are several themes in environmental sustainability, including water, waste and ecosystem management, energy derived from fossil fuels was chosen because of the serious, detrimental impact of GHGs on global warming and climate change. This paper will focus on the green initiatives in energy management adopted by the Grenfell Campus, Memorial University, Newfoundland in comparison to three other comparably small campuses across Canada. The comparison cases are Acadia University, in Wolfville, Nova Scotia, with a student population of 4358 students of which 605 are post-graduate (About Acadia University, 2014); the University of Northern British Columbia (UNBC) with headquarters in Prince George, British Columbia, comprising 4152 students (UNBC Facts and Statistics, 2013) enrolled on four campuses; and Algoma University in Sault Ste. Marie, Ontario which has a student population of 1609 (Algoma University Fast Facts, 2015).

In 2013, Memorial University's total enrollment was 18678. The university's main campus is located in the St John's, Newfoundland and Labrador. There are three sister campuses in the Memorial University system including the Marine Institute in St. John's, the Harlow Campus in the United Kingdom and Grenfell Campus, which is the primary focus of this paper. Grenfell is situated in Corner Brook, Newfoundland and Labrador and currently hosts 1400 students.

These three campuses were chosen for comparison with Grenfell, due to a combination of their smaller sizes, diverse locations across Canada and for their accomplishments in environmental sustainability. For example, Acadia was chosen because it was among six Canadian universities making the list of the world's most sustainable and eco-friendly campuses in 2012 (*The Huffington Post*, 2013). The UNBC, on the other hand, received multiple awards for its innovative use of renewable energy from dying forests while Algoma University was chosen mainly because of its similarity in student membership to the Grenfell Campus.

Energy management practices among the various campuses will be addressed in terms of energy conservation and efficiency in building construction and lighting, renewable energy sources, transportation, IT energy conserving initiatives, environmental courses and programs, environmental and sustainability-focused groups and clubs as well as efforts by individuals on campus to conserve energy. Grenfell is a small campus that introduced a green initiatives program only in February, 2011 as a step towards becoming more sustainable and eco-friendly. This campus thus commenced its program well after the other campuses used for comparison.

Acadia University, by 2006, became a signatory to the Talloires Declaration and also adopted the Acadia Strategic Plan for incorporating the principles of sustainability (Acadia university- Sustainability n.d.). Memorial University, issued a Sustainability Declaration in 2009

in response to requests by students to sign the Talloires Declaration. Although the latter has not been signed to date, the Sustainability Declaration encourages each department and unit to work towards integrating sustainable practices in their respective areas (*Memorial University Gazette*, August, 2009)

Energy Management

Energy management is often the primary focus of a university's climate action plan. Energy consumption based on fossil fuels can be the largest contributor to a university's GHG emissions. Energy management has been selected for inclusion here because there is a direct positive correlation between the production of GHGs, the carbon footprint, global warming and, ultimately, climate change.

A campus could reduce its GHG emissions by quantifying the amount produced on site. Such baseline inventories assist in developing emissions reduction plans. In addition, various energy conserving strategies, mentioned before, might be utilized to reduce the environmentally damaging effects of GHGs.

In cases where the green initiatives among the universities are too similar, a campus' details will be omitted in order to avoid too much repetition.

Grenfell Campus

The UNEP Toolkit (2013) recommends the quantification of GHG emissions as a minimum requirement in developing strategies to reduce the overall carbon footprint on campuses. Grenfell Campus, Memorial University completed its first carbon footprint inventory to measure GHG emissions on campus in 2011. Pottle and Reagan, (2012) developed a baseline study as part of an emissions reduction plan to take action on climate change. At the time, results

showed that the campus emitted a total of 407.5 tonnes of carbon dioxide equivalent ($\text{CO}_{2\text{eq}}$) from both Scope 1 and 2 sources. Scope 1 sources include direct emissions from fuel consumed by the campus vehicle fleet, site maintenance equipment and refrigerants and equaled 102 tonnes CO_2 equivalent while Scope 2 sources relating to electricity consumption equaled 306.5 tonnes. Quantification of GHG emissions is thus a positive step towards developing a strategy for overall emissions reduction on campus.

UNBC:

While Grenfell has only recently measured its GHGs on campus in order to reduce emissions, the University of Northern British Columbia has already developed a renewable energy source from nearby forests. The UNBC utilizes a very innovative method of efficient heating in their Enhanced Forestry Laboratory. This heating system uses clean-burning wooden pellets, which are manufactured from the waste of pine trees killed by the mountain pine beetle epidemic. Since late 2014, the pellet plant has also been heating UNBC residences and daycare, as part of their sustainable communities' development plan. The heating plant has a capacity of 400kW; a fuel input of 40-90 tonnes/year of wood pellets with a heat output of 850-1500GJ/year. The resulting emissions reduction is 50-90 tonnes of CO_2 /year. The pellets are also used to produce hot water (The UNBC Energy Initiative n.d.)

In 2007, UNBC adopted the trademark of "Canada's Green University" and uses this to guide their green initiatives. In October, 2010 the Association for the Advancement of Sustainability in Higher Education (AASHE) co-awarded UNBC, The Campus Sustainability Award for its second bio-energy project; the biomass gasification plant which heats the Bioenergy Plant. In addition, it was also given the Environmental Stewardship Award for 2011 by the Clean Energy Association of British Columbia (The UNBC Energy Initiative n.d.).

This gasification plant utilizes local sawmill residue from lumber production termed hog fuel. Hog fuel consists of bark, shavings, chips and sawdust and replaces natural gas to heat buildings on the campus. In 2012, about 4100 tonnes of hog fuel was used to produce 62000 gigajoules (GJ) of energy, offsetting close to 90% of UNBC's fossil fuel consumption as compared to heating buildings connected to the district energy system. (The Bioenergy Plant achieves the highest level of Environmental Certification, 2013).

Algoma University:

Algoma University embarked upon a renewable energy project in 2011, installing 540 solar panels at its athletic facility. This new 135 kilowatt system is part of a joint \$1.5 million venture with the public utilities. The campus plans to sell back energy generated from their solar panel system to the provincial grid. Annual revenue under the province's Feed-in Tariff program is expected to raise \$127,356, a portion of which will go to the university (Growing Greener Campuses, 2013) and (Algoma U Continues to Go Green n.d.).

Construction/ Building Design and Controls:

Another strategy to aid the transformation to sustainability is the construction of new buildings and retrofitting old ones. In addition to the increasingly common practice of constructing a showcase green building, universities must embrace a commitment to ensure that all future buildings are certified by green industry standards. Significant reductions in a university's GHG emissions, carbon footprint and other negative environmental impacts can be achieved through green building design.

Grenfell Campus

Although Grenfell may lag behind in converting to renewable energy sources, it is on par with the other campuses in terms of certification for building innovation and design. Grenfell Campus' new Residence Complex, which opened in 2013, was awarded Leadership in Energy and Environmental Design (LEED) silver certification (Newfoundland and Labrador Industrial Association, n.d.). In energy and atmosphere, the complex boasts a cost savings of 31% over conventional building design. For this sustainable site, there are 34 covered bike storage spaces for use by faculty, staff and students. This building is 38% more water efficient than older structures on campus. Of the materials and resources used in construction, 23% came from recycled sources while 36% was sourced from within the region. There is 99% access to exterior views and a green power certification of 100% in building efficiency for Innovation and Design (neia 2013).

The Arts and Science Extension, opened in 2012, was also designed and constructed to LEED silver certification standards. The main environmental objective in this construction was to minimize the loss of trees and green space. This new academic wing boasts occupancy and daylight sensors for lighting often referred to as motion-sensors or motion light sensors. This allows the campus to conserve energy further by reducing the demand for unnecessary lighting (The Gazette, Memorial University, 2012).

UNBC:

The UNBC campus is known for its innovative architecture. In addition to its GHG reductions, the Bioenergy Plant was also awarded the LEED platinum certification from the Canada Green Building Council. More than 20% of the building materials were sourced regionally. Sustainable construction practices resulted in a 60% reduction in energy use. These

practices include installing low-emitting materials and finishes such as sustainably certified adhesives, sealants, paints and coatings and composite wood and laminates; providing various means of light, airflow and temperature controls with ample daylight views; and reducing the ‘heat-island’ effect by using light-colored roofing materials. Pulse dashboards display the energy being consumed by each building in real time and continuously perform measurements and calculations to provide live feedback on how each is performing (UNBC Newsroom: News Release, 2011).

Acadia University:

At Acadia University, all new buildings are energy efficient and existing ones have undergone retrofits. In order to help to reduce energy loss, new buildings utilize lighting and window replacements to improve their efficiency and double glazed windows, which create an insulated barrier between two panes thus reducing heat transfer. Acadia’s new Biology building is also LEED certified and all its new buildings are cooled by geothermal steam systems (Acadia Sustainability Guide n.d.). In addition, a new ice freezing system in the Athletic Centre recovers otherwise-lost energy to heat the swimming pool.

Since 2009, a Holiday Management Program was introduced to reduce oil, electricity, and GHG emissions and costs when the campus is closed (Acadia Holiday Energy Program n.d.). In the Johnson Controls Energy Efficiency Project, a company was contracted to conduct a campus energy audit to reduce energy use while implementing energy efficient projects, including lighting replacements, occupancy controls and the new ice plant (A Brief History of Sustainability at Acadia. n.d.).

Since 2013, older compact fluorescent lighting (CFL) and any remaining incandescent bulbs in academic and administrative offices, and student residences have been replaced by light emitting diodes (LED) light bulbs which are 25% more efficient than CFLs and 80% more efficient than incandescent lights. These constitute low cost, high impact projects (A Brief History of Sustainability at Acadia n.d.).

Transportation

Transportation is another relatively low-cost, high-impact means by which universities can reduce their GHG emissions. Campuses continue to make progress in reducing emissions by introducing various energy-saving initiatives. Such projects include car-and-bike-share programs, bike friendly campuses with bicycle lanes, subsidized transit passes, flexible work arrangements and even smart car-use initiatives, such as preferred parking for high-efficiency vehicles.

Algoma University

Since 2009, Algoma's parking lots were offered at reduced rates for vehicles powered by alternative fuels such as hybrid electric cars and for car-pooling initiatives. The campus has bicycle trails that are now connected to the city-wide municipal hub trails.

By 2013, this University's state-of-the-art Biology Facility installed fixtures such as bicycle racks under the main apron and outlets for electric vehicles which promote green transportation. It also promotes bike-share and leaving the car at home for a day initiatives. There is also a Sault Ste. Marie Transit stop on campus (Going Greener Report, 2013).

Acadia University

Acadia is a pedestrian oriented campus with numerous sidewalks and pathways. Parking is mainly located at the periphery to promote walking and biking and to reduce vehicle use. Bike racks are located throughout the campus and bicycles can be stored at all residences. There are five dedicated parking areas for car pool vehicles. Public transit also provides a bus service with stops near to the campus. In addition, as part of its commitment to reduce GHG emissions, Acadia has been declared an ‘idle-free campus.’ Motor vehicles are thus banned from idling for longer than two consecutive minutes on school property (Acadia Sustainability Guide n.d.).

UNBC

UNBC encourages car-pooling to decrease its carbon footprint by reducing emissions as well as managing the limited parking resources on campus. Its parking services offer a car pooling pass at a reduced cost (divided amongst the car pooling group) for groups of over three persons arriving together (Dive into the (Car)pool! n.d.). In addition, the campus motor vehicle fleet benefits from the purchase of efficient vehicles as well as regular maintenance to optimize fleet efficiency.

Grenfell Campus

Grenfell Campus needs to plan a more efficient means of reducing the heavy vehicular traffic around campus. As many students live off- campus, Grenfell should imitate Acadia and raise awareness about car-pooling and other initiatives. Grenfell campus currently issues parking permits to students living on campus to whom designated parking areas are allotted. City Cabs, a local taxi service has committed to providing students with a free shuttle service to and from the campus to the local grocery store on specific days of the week, thereby reducing GHG emissions for personal vehicle use. Student Striver, a weekly Student Services publication informs all

students of such services at the beginning of the year. A public bus stop is also located on campus. This service allows people to travel on different routes around Corner Brook (Transportation n.d.).

Much more can be done, however, to make student transportation to and from the campus more efficient, such as coordinating carpooling for students coming from the same areas off-campus. In addition, subsidized transit passes could encourage students to make more use of the Corner Brook Transit system since students are considered to be one of the key users. There is little need for a bike-share service on the campus itself, as academic and residential buildings are very closely spaced and well within walking distance. Students living nearby should be encouraged to reduce their carbon footprint by riding/walking to campus during warmer weather. Grenfell campus can also promote their summer walking trails and winter snowshoe trails more frequently via posters and events and through a dedicated green website.

Individual Efforts aimed at Reducing Energy Consumption on Campus:

Individuals can also play an important role in reducing energy use on campus. Involvement in sustainable awareness initiatives and programs encourage students to change their behaviors by reducing their energy consumption as individuals. Such awareness programs might include events, posters, stickers, competitions, awards and incentives.

Acadia University:

At Acadia, students are encouraged to participate in individual energy conservation measures. These include, but are not limited to: turning off and unplugging unused appliances/electronics; walking/biking/running whenever possible; putting computers in power-saving mode; turning off lights when not in use; closing curtains in winter; reaching for a blanket

instead of the thermostat; washing clothes in cold water; air drying clothes; using own shopping bag; and editing twice and printing once. These are just some of the green initiatives promoted by Acadia to encourage a more sustainable student lifestyle and, consequently, to reduce overall campus energy consumption (ISSUU-Arcadia Sustainability Guide n.d.).

Grenfell Campus

Grenfell encourages students, faculty and staff to practice sustainability by providing showers in the new extension of the Arts and Science building- for those who choose to bike, walk or run to campus. There is also a dedicated room for recycling.

However, Grenfell needs to do much more to increase the awareness of environmental sustainability in terms of Point 1 of the Talloires action plan (See Appendix 1). As part of its energy awareness campaign, adhesive stickers could be placed on all light switches to remind everyone, especially in residence rooms to conserve energy by turning off lights.

In addition, Vending Misers are gadgets that could be installed on vending machines to automatically switch off vending machine lights when not in use, while still keeping beverages cold. These gadgets are said to cut energy consumption in half for beverage vending machines.

To further raise awareness, new incoming students should be introduced to the campus' greening initiatives during orientation week. This will promote an appreciation of environmental conservation that students can be encouraged to adopt. It will also partly fulfill Points 2 and 4 of the Talloires action plan to create an institutionalized culture of sustainability and to foster environmental literacy for all (See Appendix 1).

Information Technology (IT) Initiatives:

Information Technology (IT) initiatives can integrate a spectrum of sustainable aspects which relate to energy use, not the least of which is simply the considering of computer heat loads in building design. For instance, centralized or dedicated server spaces are often utilized by campuses to help reduce electrical overloads and to avoid dispersing server heat loads across multiple buildings.

UNBC

UNBC uses Energy Monitoring Software to collect building data from a variety of sources and applies it to three main areas of reporting, monitoring and analysis. This allows building managers to make informed decisions with respect to energy usage and to enhance building efficiency (The UNBC Energy Initiative n.d.).

Algoma University

All academic computers are designed with energy-efficient hard drives and are automated for nightly shutdown. Servers have also been consolidated for more efficient power management (Ontario Universities: Going Greener Report, 2009).

Grenfell Campus

Currently, Grenfell does not seem to promote many green IT Initiatives. The electronic submission of papers is a very basic requirement. This reduces the need to print paper copies thus avoiding further forest destruction which, in turn, mitigates against the effects of global warming. In 2012, the Student Housing Office implemented Starrez, a software package that uses compatibility criteria to match roommates via an online housing application process. Students who complete an online application are asked a series of questions about their lifestyle, habits and hobbies. Using this information, the software identifies potential roommates who

would be ideally suited. Students also have the option of sending requests to friends to live together as well as the opportunity to accept or decline such requests online. (Grenfell connects, 2012).

This is an opportunity for the campus to place IT initiatives as a ‘goal’ under their sustainable Strategic Plan. They may wish to undertake some of the measures adopted by both the UNBC and Algoma University. In addition, Grenfell could implement energy efficient flash memory data storage. In the latter, solid state drives using flash memory retains data in the absence of a power supply. These energy savers are being installed in personal computers and server installations, replacing the traditional hard drives which require an external power source to retain data. Since the flash memory chip can erase and re-program whole blocks of data, it is suitable for use with applications where large amounts of data require frequent updates. Alternatively, Grenfell could install computer management software that shuts down computers when not in use.

Green Courses and Programs:

Many campuses have now integrated sustainability concepts into the curriculum. Student involvement is paramount since it is at universities that most of the world’s leaders, decision makers and teachers are educated.

Acadia University

Acadia University has accomplished several milestones in environmental and sustainability studies. By Fall, 2010 the Environmental and Sustainability Studies Program was launched. This new interdisciplinary program was created with a vision of becoming an ‘exemplar’ of teaching, scholarship, and community service. It offers several courses including

Environmental Science, Environmental History, Politics of the Environment, Economics of the Natural Environment, and Green Computing and IT to name a few (Acadia University: Environmental and Sustainability Studies n.d.).

Grenfell Campus

Grenfell launched an Environmental Policy Institute (EPI) in 2011. The major goals of the EPI are to promote research, identify environmental problems and come up with solutions as well as engaging the general public in environmental issues. The institute examines oil and gas energy, climate change and other environmental issues both locally and internationally (Environmental Policy Institute, 2011).

Grenfell also specializes in environmental programs, offering a BSc in Environmental Science (both Biology and Chemistry), a BA in Environmental Studies, and a Bachelor of Resource Management. In 2013, the campus established its first graduate program, the MA in Environmental Policy (Grenfell Campus/Programs and Courses n.d.).

Grenfell has fulfilled Actions 2, 3 and 7 of the Talloires Declaration Action Plan in terms of collaboration for interdisciplinary approaches within its curriculum (See Appendix 1). The university offers a wide range of courses and programs which address topics related to sustainability. As both a teaching and learning institution, however, it can do even more to build environmental awareness into the curriculum by making some basic sustainability courses mandatory for all students. One such example is the Introductory Environmental Studies course. This will partially fulfill Action 4, by creating an institutionalized culture of sustainability and educating for environmentally responsible citizenship (See Appendix 1).

Sustainable education for primary and secondary schools must also be included as they are our future conservationists and to maintain the green movement. Action 8 of the Talloires

Declaration outlines the teaching of population studies, the environment and sustainable development in primary and secondary schools (See Appendix 1). This could be achieved by incorporating education in sustainable practices into Grenfell's Bachelor of Education degree program for teachers. Teachers could, in turn, pass on this knowledge to their students.

Student Organizations and Clubs:

Sustainable student organizations and clubs provide a forum for like-minded persons to meet and discuss similar interests.

Acadia University

Acadia's green clubs include the Acadia Environmental and Sustainability Organization (AESO) and Acadia Student Environmental Network, (ASEN). The AESO organizes environmental projects run by the Acadia Students Union. The ASEN was formed to establish and facilitate information sharing about campus sustainability and to foster collaboration among student groups. In 2010, the first Annual Campus Sustainable Week was established to focus on the importance of sustainability and to celebrate the success of sustainability in higher education, in collaboration with students, staff, faculty and community (A Brief History of Sustainability at Acadia n.d.).

Grenfell Campus

Grenfell's environment- related clubs and societies include Divest Grenfell and the Environmental Affairs Committee. Divest Grenfell is a group formed to promote efforts to remove the university as an accomplice in the fossil fuel industry's massive contribution to climate change (*The Independent*, 2014). Run by the Grenfell Campus Student Union, the Environmental Affairs Committee is responsible for undertaking various environmental

initiatives on the campus. Both these groups can participate in green initiatives that would broaden service and outreach to involve all stakeholders both nationally and internationally. This involves Points 6 and 9 of the Talloires Action Plan (See Appendix 1).

Conclusion:

A concerted effort must be made to combat global warming. Educating the youth in green initiatives is a priority, so that future generations can contribute to a more sustainable world. The role of universities, therefore, is of paramount importance because these institutions of higher learning are in a unique position to bring together academic disciplines and professional schools to create the knowledge so as to target climate change. As exemplars of sustainability, they can each transform both their campuses and wider communities. Starting on a small, localized scale, one must look at the measures adopted by campuses in different Provinces to mitigate energy wastage. Many green initiatives can be borrowed from the other campuses and adopted by Grenfell Campus.

By adapting either the UNDP Toolkit, or the Talloires ten-point action plan as a means to help guide environmentally sustainable efforts, universities can exert a positive influence in terms of energy management. So far, Grenfell's approach to energy sustainability appears to be sporadic, without the strong linkages required between departments working closely together. Memorial University's 2009 Sustainability Declaration needs to be revisited, revised and updated with the close involvement of faculty, staff and students. Creation of a Sustainability Office, involving members of all departments and the formulation of a strong sustainable policy

would direct the campus' green initiatives within a framework of cooperation among stakeholders.

Grenfell could utilize a combination of both the UNDP Toolkit and the Talloires action plan as a guide for implementing its green policies. As compared to the other campuses, Grenfell seems to have started its sustainability initiatives much later. However, as part of creating a climate- responsible campus, it has completed a baseline inventory of its carbon footprint by quantifying its GHG emissions. Like the other universities, it has complied with LEED certification for sustainable construction and design in new buildings and has retrofitted older ones. Grenfell also needs to focus more on energy-efficient modes of transport by adopting some of Acadia's eco-friendly practices. Sustainable IT strategies, such as those used by UNBC and Algoma Universities, also need to be formulated. Greater student participation through events and incentives could also play an important role in reducing Grenfell's carbon footprint. Through raising awareness about environmental stewardship and through the introduction of environmental and sustainable courses and programs into the curriculum, campuses, like Acadia and Grenfell, will become more sustainable. These are just a few of the steps towards sustainable energy management that campuses, like Grenfell could employ to increase energy efficiency and enhance ecosystem management.

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Appendix I Tailories Declaration 1990**1. Increase Awareness of Environmentally Sustainable Development**

Use every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future.

2. Create an Institutional Culture of Sustainability

Encourage all universities to engage in education, research, policy formation, and information exchange on population, environment, and development to move toward global sustainability.

3. Educate for Environmentally Responsible Citizenship

Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and have the awareness and understanding to be ecologically responsible citizens.

4. Foster Environmental Literacy For All

Create programs to develop the capability of university faculty to teach environmental literacy to all undergraduate, graduate, and professional students.

5. Practice Institutional Ecology

Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.

6. Involve All Stakeholders

Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development. Expand work with community and nongovernmental organizations to assist in finding solutions to environmental problems.

7. Collaborate for Interdisciplinary Approaches

Convene university faculty and administrators with environmental practitioners to develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.

8. Enhance Capacity of Primary and Secondary Schools

Establish partnerships with primary and secondary schools to help develop the capacity for interdisciplinary teaching about population, environment, and sustainable development.

9. Broaden Service and Outreach Nationally and Internationally

Work with national and international organizations to promote a worldwide university effort toward a sustainable future.

10. Maintain the Movement

Establish a Secretariat and a steering committee to continue this momentum, and to inform and support each other's efforts in carrying out this declaration.