Creating Effective University Carbon Inventories: Best Practices and an Implementation Plan for Grenfell Campus

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Universities have a special capacity and responsibility to address climate change and this paper focuses on carbon inventories as an important tool for reducing emissions on university campuses. I first describe carbon inventories then analyze three universities that have already developed sustainability action and baseline inventories: Dalhousie University, Mount Allison University, and the University of Victoria. From the case studies, I identify and discuss six conditions important for the successful implementation of carbon inventories. Finally, the case study findings are applied to Grenfell Campus and a carbon inventory implementation plan is proposed for this institution. The paper draws on qualitative methodologies (interviews and case studies) using the theoretical framework of ecological economics and the concepts of externalities, sustainable development, and policy instruments.

Introduction

> It starts from a simple, but logical, realization: we cannot have a sustainable world where universities promote unsustainability. But neither can we change the university without also changing the world; the two are entwined (M'Gonigle & Starke, 2006, p. 12).

Universities have a central role and responsibility in the global effort to address climate change. Although not the largest contributors to Greenhouse Gases (GHGs), universities do release large amounts of emissions. More importantly, universities have a crucial, central role given their educational and research mandate. Many university students seek an opportunity to become active, engaged members of the community who can contribute to diminishing major real-world problems like climate change that will affect current and future generations. Thus, universities have a special responsibility—and special *capacity*—in the climate change debate (McMillin & Dyball, 2009).

Governments and corporations have failed to produce the needed transformative shift. Consider, for example, Canada's recent withdrawal from the Kyoto Protocol or British Petroleum's absence of preemptive safety measures which led to the Gulf of Mexico oil spill. Given the failure of these institutions and the unique place of universities in society, M'Gonigle and Starke (2006) challenge universities to take a leadership role in addressing sustainability and, I would argue, climate change. They argue it is time for "the university sustainability movement to develop new strategies that allow universities to lead change at a micro level without waiting for some big government or some megacorporation" (p. 170).

Most Canadian universities are beginning to respond to this challenge by developing and implementing policy tools and programs to reduce institutional emissions. One specific example of application is the compilation of campus GHG inventories (also referred to as tracking campus carbon footprints). A GHG emissions inventory is one essential, initial way to make progress on reducing GHG emissions. The inventory measures emission sources and builds a baseline to mark progress towards goals, thereby "allow[ing] institutional leaders to identify specific areas

where dramatic reductions can likely be made in the short term, even as they work towards longer term adjustments, which could prove more difficult" (APPA, 2008, p. 6).

This paper discusses three successful GHG emissions inventories implemented at Dalhousie University, Mount Allison University, and University of Victoria. Each university has successfully established a baseline of emissions and targets and developed public reporting of sustainability indicators toward the common goal of carbon neutrality. I discuss the inventories individually then focus on how each university implemented them effectively while often overcoming significant obstacles. Drawing on this case study research, I then analyze why these inventories have succeeded. I have isolated key required conditions for success, including a proactive university community, an existing policy on GHG reduction, knowledge about inventory benefits, selection of inventory framework and process, and access to accurate data. In addition, an available budget is a final important—although not necessarily required—condition for inventory success.

Through this analysis, I argue that inventory effectiveness (and arguably campus sustainability initiatives generally) require strong support from university administration and an action plan developed with support from the whole university community. This plan, in turn, must have clearly defined and time-lined reduction targets, as well as specific strategies to achieve those targets (for example, reducing energy consumption, enhancing energy efficiency, and shifting to renewable energy sources).

Based on this assessment, in the final section of this paper I turn my attention to Grenfell Campus which has begun to calculate baseline data through the research done by Susan Pottle and myself (2012). I recommend an implementation plan including a timeline to ensure Grenfell's new inventory can meet—or even exceed—the efficacy of the inventories studied here.

I first present the theoretical framework guiding this research. Ecological economics provides the framework for the specific concepts of sustainable development, externalities, and policy instruments used throughout this paper to discuss inventories and their economic benefits and savings. The comparative efficacy of policy instruments to reduce GHGs is also noted. I then discuss the research process and methodology, and describe GHG inventories in more detail.

Theoretical Framework

Daly and Farley (2004) define ecological economics[1] as "the union of economics and ecology, with the economy conceived as a subsystem of the earth ecosystem that is sustained by a metabolic flow or 'throughput' from and back to the larger system" (p. 431). This fairly new discipline attempts to define ecological limits and measure the interface between the natural system and the societal system.

The difficulty is that while many impacts in nature can be measured, it is unlikely that the effects of society upon nature can be fully understood and addressed. The interface between the natural system and the societal system is fraught with externalities, most often negative externalities such as pollution, which are contributing to global climate change. An externality is the uncompensated impact of one person's actions on the well-being of a bystander, while a

[1] See Røpke, 2004 for more about ecological economics.

negative externality is the consumption or production choices of one person or firm entering the utility or productive function of another entity without that entity's permission or compensation (Harris, 2006). By internalizing the negative externalities of institutions, such as universities, progress can be made towards the goals of sustainable development.

Sustainable development is a concept used to provide guidance on achieving a balance between the two often conflicting natural and societal systems. *Our Common Future*, commissioned by the United Nations in 1987, defined the concept as the "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (p. 43). Yet, the lack of support for sustainable development from the industrial sector is slowing down the transition to a more sustainable world. Presently, the negative externalities from industry are tempered to some extent through regulation. Ecological economics plays an integral role by supplying tools to develop environmental policies that, when used, can motivate society to reduce emissions. The field of ecological economics is useful in how it treats economics and policy as inextricably connected.

What role can *policy* play in building a sustainable society, using what mechanisms? Negative externalities can be addressed by altering incentives which encourage or pressure people, companies, or governments to take ownership of the uncounted negative environmental impacts of their actions. Policy is one way to create these incentives and I analyze two types of policy instruments: regulatory instruments (sometimes called prescriptive regulations) and voluntary instruments. GHG emissions inventories are implemented for two reasons: requirement of completion or voluntary initiative. For this reason, I chose these two policy instruments that directly relate to why and how environmental action begins. However, each has benefits and drawbacks and the timing of their use also plays a crucial role in determining their environmental effectiveness.[2] Prescriptive regulations are a type of command and control policy governing environmental standards—they are defined by Winfield as relying on "the establishment of legal obligations based in legislation that prohibit certain types of behavior or that require the explicit permission of the government to engage in specified activities" (2009, p. 47). Regulatory instruments have historically been used in Canada. Examples include limits on emissions levels, energy efficiency standards, or required technologies. If regulations are not followed, there is a financial or legal penalty for non-compliance.

British Columbia has employed these regulations to require completion of inventories by all public sector organizations (PSOs) (including universities). Regulatory policy instruments are highly effective when employed rigorously and have played a major role in the reduction of pollution from industrial sources in Canada. However, there are some drawbacks to required regulations. The main issue today with regulatory instruments is the lack of consistent enforcement efforts. There has been a decline of enforcement concerning environmental regulations since a peak in the mid-late 1980's.[3] Furthermore, as seen in section 1 below, there can be a lack of financial support from government and unintended consequences if the regulation is not properly implemented.

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[2] See Jaccard (2005) and Pindyck (2007) for more on the choice of policy tool and timing.

[3] See Winfield (2009) and Jaccard (2005) for more details on regulatory instruments as a solution for environmental issues.

4 CREATING EFFECTIVE UNIVERSITY CARBON INVENTORIES

In contrast to regulatory instruments, voluntary instruments are, as their name suggests, done on a voluntary basis according to the will of the person or institution. Most voluntary actions include information and moral suasion campaigns designed to appeal to the ethics, values, and especially the self-interest benefits of businesses and consumers alike to reduce energy and material consumption, which in turn will reduce pollution. Voluntary policies within society aid in informing the public about the issue. This awareness can lead to a ground-swell interest and support for action and stronger policies. As such, there are incentives for universities to voluntarily take a stance on lowering emissions. Public recognition of a school's sustainable performance will promote it as a leader and role model for other schools, businesses and society as a whole. Volunteering to reduce emissions and protect the environment allows PSOs to create an image of good corporate citizens. However, as with the regulatory tools, there are drawbacks in solely relying on voluntary instruments. Jaccard (2005) makes this point clearly by referring to OECD data which demonstrates that the "environmental effectiveness of voluntary approaches is still questionable," and "the economic efficiency of voluntary approaches is generally low" (p. 281). If there is no information or hard data to show the need to reduce emissions and become a sustainably developing society, there will be no forward progress.

An inventory of emissions from all sources is the missing link between engaging policy and inducing proactive action. Without a measurement of human impacts there can be no concrete action towards sustainable development. The inventory provides two important elements. First of all, an inventory measures emissions and clearly displays the economic incentives which can result from a reduction of GHG emissions. Secondly, the information provided by the inventory is essential to displaying those incentives and can be used to convince the university administration of the benefits of becoming more sustainable. It is integral to understanding which area or activity has the largest impact and is vital in planning to reduce emissions: once emissions are calculated, an institution can draw upon the "toolbox" of policy instruments to frame an action plan through which emissions can be reduced to progress towards sustainable development.

In the analysis section I will be applying the concepts of negative externalities, sustainable development and policy instruments as a means of evaluating how a GHG emissions inventory can be beneficial to an institution such as a university. But first, I discuss the research process and methodology of this project.

Research Process and Methodology

I began the research for this project during the 2011 summer as a research assistant to Susan Pottle. We conducted the first GHG emissions inventory of the Grenfell Campus of Memorial University to establish a baseline and develop a methodology for conducting an annual inventory. I was tasked with locating universities across Canada of similar size to the Grenfell Campus of Memorial University who had already conducted inventories. The case studies analysis gave a basis for our selection of framework for Grenfell Campus' inventory process. Through my search, I realized that most Canadian universities have not developed any baseline inventories, especially in Atlantic Canada. [4]

[4] See Beringer, A., Wright, T, & Malone, L. (2007) for more on sustainability in Atlantic Canadian universities.

We settled on three institutions, Dalhousie University, Mount Allison University, and the University of Victoria, for several reasons. Primarily, all three institutions had completed comprehensive inventories using different methodologies and were currently using these inventories successfully to address areas where environmental action would lower emissions and make their campuses more sustainable. Secondly, the institutions chosen had inventories which were clearly publicized and university policies and information about their GHG inventories that was easily accessible on their websites; promoted as "best cases" that other institutions might emulate. We found that Dalhousie University had one of the most comprehensive inventories and wide-scoping frameworks out of all the universities. Third, each university was located in a different province which provided a range in methods of calculating their GHG emissions. The University of Victoria was a representative of the universities in B.C. who are under the regulatory policy of Bill-44, which required reporting and inventory calculations (see Section 3 of the Case Study Discussion). The comparable size was the fourth consideration when choosing the case studied institutions. Mount Allison University is of similar size to Grenfell Campus, and, although Dalhousie University and University of Victoria are both quite a bit larger than Grenfell Campus, they are similar in size to Memorial University's St. John's Campus.

We then completed a literature review of the options available for completing a GHG inventory and studied a number of methodologies and software options with time and cost as limiting factors. We did not have the background expertise or time to be able to construct our own framework and therefore chose to work with CarbonCounted, a Canadian-based not-for-profit organization, which would be able to give technical support and have knowledge about the process.

Although most of my work was focused on the case studies and framework design, meetings with both the Facilities Management and Administration office were also an important component in the gathering information and data portion of the inventory. Much of the research done over the summer gave support and provided a foundation for the basis of this paper.

Then in fall 2011 this independent project started coalescing, beginning with the design of a proposal of my required independent paper for my fourth year studies. The proposal was created through the integration of the summer work and a more in-depth case study comparison with interviews.[5] It was further supported by a literary review of theoretical concepts and instruments to create a frame under which the climate change policy and GHG inventory from the three different universities could be analyzed. The fall was primarily dedicated to reading numerous articles, books, and textbooks on core concepts, inventories, and the broader environmental responsibility of universities. The information gathered for the case study analysis portion of the paper was completed through a review of the three universities' action plans, inventories, and government documentation.

Based on the readings, I constructed interview questions which I used in interviews with key people involved with the current GHG emissions inventory at the three different universities (see Appendix 1 for a list of the interview questions). By compiling the data gathered during the interviews, analyzing and contrasting the differences and similarities between responses to questions, I drew conclusions about the key trends and required conditions that made for a smoother implementation of a GHG inventory at universities. These key trends and required

[5] The development of interview questions was informed by Wright (2009).

conditions are outlined, analyzed and then applied to Grenfell Campus below. First, however, I provide background information on GHG inventories.

Inventories: Background & Benefits

GHG inventories are the collection, measurement, and analysis of emissions that an institution is releasing into the atmosphere. The inventory is often the first step towards development of a Carbon Management Plan to reduce emissions.[6] Ann Rappaport and Sarah Hammond Creighton[7] (2007) compare carbon inventories to a weight loss plan: the inventory is the equivalent of the initial weigh-in to create a comparison for the amount of loss, then "the action plan is equivalent to your diet and your exercise plan" (p. 34). The inventory is effectively a measure of the negative externality of GHG emissions. These are typically expressed by amounts of carbon dioxide or carbon dioxide equivalent (CO2e) and other GHG using the carbon dioxide equivalents through the multiplication of the amount of gas to the Global Warming Potential (GWP) (Pottle & Reagan, 2012).

There is no set standardization that all institutions employ for calculating their inventory. Therefore, each university must define their inventory by the organizational and operational boundaries (World Resources Institute, n.d.) that they decide upon while developing their baseline. The operational boundary states the scope of emissions that will be measured and reported concerning the facilities and departments which are included in the "organizational boundary". For example, Dalhousie University decided to design their inventory framework to include three scopes: direct, (Scope 1), indirect (Scope 2), and, where credible data exists, indirect consequences of their operations, for example, commuter travel (Scope 3) (see the Dalhousie University case study analysis below for more details on the scopes and see Figure 1.0 for a summary of scopes for all case studies) (Dalhousie University, 2009, p. 3). Many universities have followed this general framework of scopes because it covers all sources of emissions as well as eliminating the potential for "double-counting".

There are three key benefits of conducting an inventory at a university. Firstly, it takes account of the known and unknown sources of emissions and indicates inefficiencies in the system. The University of Victoria representative from the Office of Campus Planning and Sustainability I interviewed supported the fact that an inventory can "find out which buildings aren't performing properly through the use of metering…which the university should benefit from in the long run" (personal communication, February 1, 2012). Institutions are incessantly expanding with new buildings and development around campus which typically augments the GHG emissions that are released. Therefore, careful planning must occur to limit the amount of impact to a university's footprint. By using the concept of sustainable development—by accurately measuring the impact and limiting it through GHG inventory analysis—a university will be able to control inefficiencies and internalize externalities.

Second, the initial inventory is created as a baseline to take account of the negative externalities initially produced. Rappaport and Creighton (2007), stress that it is "essential to

[6] For more information on importance of inventories as a tool for implementing an action plan see Boswell (2010).
[7] Creighton (1998) also wrote 'Greening the Ivory Tower' which outlines ways in which the sustainability movement can be started by a campus.

justifying the commitment of resources" (i.e., spending money) and that "quantifying the effectiveness of actions that reduce energy and material use and that lead to reductions of emissions will assist in the justification of resource allocations" (time and money) (p. 35).
The final benefit is perhaps the most important for further action. The inventory is a key tool in identifying and articulating the importance of emissions reduction effort at the institution. The numbers gathered will create a foundation upon which action and commitment to sustainability will occur. Jaccard (2005) emphasizes how "the link between our actions as consumers and the resulting GHG emissions is not readily apparent to most people" (p. 266). Inventories are a tool used to clarify what is intangible, in this case the amount of GHG emissions released by everyday functions. If the institution is aware of the inefficiencies, be it heat loss from a poorly insulated building or lights needlessly left on, they will be able to locate and address the major problem areas by looking at the hard data. One of the key notions highlighted during the interview process was that public institutions should do everything they can to use their resources effectively (meeting emission goals) and efficiently (economic savings) to progress toward the goal of sustainable development.

Case Study Discussion

Although the GHG inventory is gaining popularity at universities across Canada, as mentioned before, there is still no agreement on measurement methodology. By conducting case studies to determine the methods other universities employed, there is an increased possibility of avoiding pitfalls (i.e. challenges encountered and overcome) and develop functional and efficient measurement systems. This analysis takes account of the inventories conducted at Mount Allison University in New Brunswick, Dalhousie University in Nova Scotia, and the University of Victoria in British Columbia.

Dalhousie University

On December 11, 2009 Dalhousie University signed, at the behest of the student body, the University and College's Climate Change Statement for Canada. The institution committed to completing a comprehensive inventory of GHG emissions within one year and releasing a climate plan with targets within two years of the baseline inventory.[8] The Office of Sustainability was developed through the students who pushed for support from the head of facilities and the vice-president. Students played a key initial role, going so far as drafting a director's position description (See Figure 1.3).

The Office of Sustainability is responsible for gathering and analyzing the data as well as releasing the report on their website. The first GHG baseline inventory was compiled in 2008-2009 and has been since released annually (see Figure 1.0). From the beginning they decided to use *The Canadian Standards Association "Greenhouse Gases – Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals (Adopted ISO 14064-1:2006, first edition, 2006-03-01)* as a framework and methodology to calculate their GHG emissions. This structure was chosen because it was found by the institution to be the most accurate, transparent and rigorous methodology.

[8] For full details of the inventory calculations see Dalhousie (2009).

As noted above, the Dalhousie Inventory reports all direct (Scope 1), indirect (Scope 2), and, where credible data exists, indirect consequences of their operations (Scope 3). Scope 1 has two sections: stationary combustion and mobile combustion. Stationary combustion focuses on combustion of bunker C oil in the central plant for steam, hot water, and cooling production, propane use for food services and lab use, on-site heating oil, on-campus diesel for backup generators, and fugitive refrigerant losses from cooling units on campus. Mobile combustion focuses on the combustion of vehicle fleet gasoline and diesel. Scope 2 concerns itself with indirect emissions from the generation of imported electricity incurred by Nova Scotia Power during the production of electricity used on campus. Finally, Scope 3 involves the other indirect GHG emissions, such as the commute of students and employees to and from the campus.

Dalhousie University has, in a short amount of time, created a policy on GHG reduction, garnered the support of the university community, and gathered experienced faculty and staff in the Office of Sustainability to be able to implement the inventory. In addition, they have also completed a long-term Climate Change Plan detailing strategies and specific targets for emission reductions (see Figure 1.1). Some of the actions from the 2010 Climate Change plan include conversion and updating of campus energy systems, retrofitting current buildings and new construction of LEED certified green buildings, promotion of sustainable transportation such as bicycles, implementing a ReThink Program, new curriculum pertaining to sustainability, funding for students, faculty and staff research concerning climate change, and purchasing "gold standard" carbon offsets and sinks.

The inventory of 2008-2009 was established as the baseline for further reports with a goal of attaining carbon neutrality by 2050. To stay on track, public reporting of sustainability indicators and targets will be released by the Dalhousie University Sustainability Plan every three-five years. The university has set up an internal loan system where money can be used for the above projects which have a projected payback from the savings of doing the renovations.[9]

Mount Allison University

Mount Allison University adopted their first policy on GHG reduction in 1999, Policy 2102: Environmental Policy. Their second policy, Policy 2101: Carbon Reduction Policy,[10] was enacted in 2009 when the first baseline inventory was conducted (see Figure 1.0). Mount Allison University has a very proactive student body that initially developed an interest in the sustainability movement (see Figure 1.3). University policy was supported by the president; however, the initial movement was a grassroots interest that led to widespread support throughout the university community.

As part of both policies, the Financial Department and the Facilities Management Office developed a GHG inventory baseline in 2009 using the Clean Air – Cool Planet Campus Carbon Calculator software (see Figure 1.0). Although complicated and bulky, this software was chosen as a result of Mount Allison University's departmental structure; all the data needed was already located in the Financial Department or easily accessible from the Facilities Management Office. All the department had to do was to categorize the information and input it into the program. During the process, Mount Allison University realized that the framework is actually too

[9] See for example, Dalhousie (2009), where they have set up this type of loan system.
[10] See both policies at: http://www.mta.ca/administration/vp/policies/2101.htm.

extensive for their university to use; however, since no standardized framework is currently available it has become the accepted process. The base year has since been used as a benchmark to evaluate the progress attained through the measurement of data from both Scope One and Two, with plans to add Scope Three within the coming years (see Figure 1.0).

Reports indicate that heating, electricity, and transportation are the three major areas of emissions at Mount Allison. With the upgrades, creation of strategies and implementation of action plans, a dramatic reduction in the institution's carbon footprint is expected, especially with the planned conversion of bunker oil to natural gas in some of the central boilers (see Figure 1.1). Although there is no allocated budget for the GHG inventory processing or renovations, they have set up a Green Initiatives Fund where savings from previous projects are cycled back into further energy saving projects (see Figure 1.4).

University of Victoria

The British Columbia government has played a major role in integrating environmental sustainability into the province by enacting a Carbon Neutral Government Regulation in 2008. This requires all public sector organizations to measure, reduce, and offset GHG emissions from buildings, vehicle fleets and paper use. Further to this enactment, Bill 44 was developed to implement a legal requirement for all public sector institutions, including colleges and universities, to become carbon neutral in their operations by 2010. This regulatory policy instrument has made BC the first carbon neutral jurisdiction in North America.[11]

Based on this provincial policy, the University of Victoria has committed to advancing sustainability in all areas of its operations including reducing their carbon footprint. The university has developed a Sustainability Action Plan for Campus Operations[12] to encompass 2009-2014 which includes the following aggressive GHG emission reduction targets:

- Become Carbon Neutral by 2010
- Reduce campus electricity consumption by 20% by 2015
- Increase the renewable energy portfolio
- Reduce GHG emissions by 20% over 2007 baseline by 2015
- Quantify the risks to university resources and infrastructure associated with global climate change by 2015

Since a GHG inventory is now mandatory for all public sector organizations, the Government of British Columbia has developed and supplied a framework, called SMARTTool (see Figure 1.0) that the University of Victoria must follow. The Government of British Columbia also released a report called "Methodology for Reporting B.C. Public Sector Greenhouse Gas Emissions" in February 2011 describing the emission factors that will be used for reporting province-wide.[13] The SMARTTool structure looks at four different scopes:

- Buildings (energy and electricity consumptions)
- Fleet Vehicles (and non-standard fleet)
- Fugitive Emissions (refrigerants and anaesthesias)
- Paper Procurement (8 ½ X 11, 8 ½ X 14, and 11 X 17 paper)

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[11] See Waddell, T. & Aben, K. (2010) for more information about Bill 44.
[12] Find document at: http://web.uvic.ca/sustainability/documents/FinalACTIONPLAN.pdf.
[13] See http://www.livesmartbc.ca/government/carbon_neutral/cng_background.html.

Any emissions within these scopes will have to be reduced and offset at a value of twenty-five dollars per metric tonne to the Pacific Carbon Trust.[14] As a Crown corporation, Pacific Carbon Trust must ensure the environmental integrity of the offset, which as a general rule, translates into a higher priced offset. The government set this price as an internal transaction price to be paid to Pacific Carbon Trust by Public Sector Organizations (PSOs) for each tonne of GHG emissions offset and Pacific Carbon Trust has extended this price to all of its clients. In determining the price, it was important to define a benchmark for abatement projects, providing an incentive for reduction efforts.[15] The twenty-five dollars per metric tonne CO_2e price is competitive with other quality offsets.

According to the 2010 Carbon Neutral Action Report (University of Victoria, 2010), the University of Victoria has upgraded its metering system on all buildings on campus, done extensive renovations and upgrades on six of the oldest buildings on campus, and reduced temperature settings and shut down all unnecessary lighting and electrical equipment over the December break.[16] The institution has also created a revolving sustainability fund starting with $250,000 for future sustainability projects (see Figure 1.4), funded through the university's budget allocation. These are just a few of the ways in which the University is aiming to achieve their goal of a twenty percent reduction in emissions by 2015. See Figure 1.1 below for a summary of the inventory basics, and targets and outcomes of the case studies.

		Dalhousie University	**Mount Allison University**	**University of Victoria**
Inventory Basics	**Inventory start date**	• 2009 (Released annually)	• 2009 (Released annually)	• 2006 (Released annually)
	What is counted in the inventory	• Scope 1,2 • Scope 3 (limited)	• Scope 1 & 2 • Scope 3 added soon	• Scope 1, 2, & 3
	Technology: software	• ISO standard framework	• Clean Air – Cool Planet: Campus Calculator	• SMARTTool
Outcomes	**Targets**	Reduce GHGs below '08-'09 baseline year: • 15% by 2013; 20% by 2016; 50% by 2020 • carbon neutral in 2050 • Power lines	• No set targets • Goals of minimizing energy consumption, reduce emissions and reduce consumption of fossil fuels	• Increase renewable energy portfolio • Quantify risks to university resources and infrastructure associated with global climate change by 2015. • Become carbon neutral by 2010 (Achieved) • Reduce campus electricity consumption by 20% by 2015 (In Progress) • Reduce GHG emissions by 20% over

[14] For more information see: http://sustainability.royalroads.ca/smarttool.
[15] See Sustainability Prosperity (2011) for articles on both Managing Carbon Revenue: Institutional Needs and Models, & Carbon Pricing and Fairness.
[16] See more about outcomes and actions at University of Victoria see University of Victoria (2010).

		buried and independent and secure energy sources by 2020	and other non-renewable energy sources	2007 baseline by 2015 (In Progress) • Reduce number of fleet vehicles that consume fossil fuels to 40% of total vehicle fleet (In Progress. 25%) • 100% of all new buildings constructed and certified LEED Gold facilities (Achieved) • Waste diversion rate of 75% by 2012 (In Progress. 64%)[17]
	Results	• On-track with C.C. plan • Set up a university internal loan with payback from savings on project	• Converted some central boilers from bunker oil to natural gas. • Established Green initiatives fund where savings are cycled back into energy savings projects	• On-track with Energy Master Plan • Set up a revolving sustainability fund ($250, 000)

Figure 1.1: Case Study Analysis – Basics & Outcomes

Case Analysis: Isolating Conditions for Successful Inventories

Based on the case studies above, and drawing on literature reviews and personal interviews, I isolated six conditions or key indicators which have emerged as trends that created the opportunities for action at the three universities examined. These include: Proactive University Community, Existing Policy on GHG Reduction, Knowledge about Inventory Benefits, Selection of Inventory Framework and Process, Access to Accurate Data, and Available Budget. Although organized in this sequence, this is not a ranking of temporal structure or of importance, but more an attempt to show how each component builds upon the next. The first three conditions typically transpire parallel to one another, providing an interwoven foundation for the inventory process and eventual environmental action to occur.

Required Conditions:
1. Proactive University Community
2. Existing Policy on GHG Reduction
3. Knowledge about Inventory Benefits
4. Selection of Inventory Framework & Process
5. Access to Accurate Data

Not Required, But Helpful:
6. Available Budget

Figure 1.2: Key trends

[17] University of Victoria has many detailed targets because of the required reporting by regulatory policy.

1. Proactive University Community

Of primary importance to initiating any action, and of special significance to Mount Allison University, is a proactive university community for environmental protection.[18] If the university population shows its interest in taking a stance for conservation and sustainability, the executives of the university will listen and give support; without support from the university population, there will be no change. The representatives of Mount Allison University I interviewed (from the financial services office and facilities management) drove home this point by saying that "the trigger [of sustainability action was] a ground-swell interest in it, [the students] developed a policy about it, and the university administration supported it...we've got buy-in all around the university community and we have tremendous pressure from our students" (personal communications, February 3, 2012).

Two out of the three universities examined had students as the initiators of the sustainability movement, while the University of Victoria began their GHG inventory a year before the government implemented the mandatory reporting due to pressure from the campus' Institute for Integrated Energy Systems and the Office of Campus Planning and Sustainability (See Figure 1.3). Even though the students were not the key initiators, the proactive action still came from the university community and attained support from the rest of the university in a bottom-up type of movement.[19] Following one year of the voluntary inventory process, the government of B.C. stepped in with regulatory policy instruments requiring all PSOs to measure and report their emissions. However, as mentioned before, governments (excluding B.C.) have continuously failed to produce emissions reductions across Canada. There must be support from executives and the higher levels to fully implement extensive changes. Support from the higher administration ensures two key things. First, that the school as a whole is committed to sustainability (i.e. sustainability is seen as a key goal) and it has coherency in every aspect of university life. Second, that there is Human Resources commitment and possibility of budget allocation for sustainability initiatives. Nonetheless, the ground-swell movement that Mount Allison University experienced has emerged as a key trend in sustainability action establishment and adoption, and was eventually supported by administration and governments. While action can start from grass-roots movements, institutions and organizations that are structured with a top-down hierarchy, such as a university, must have support and policy established from the top to make change.

[18] See M'Gonigle & Starke (2006) for more information of importance on bottom up sustainability movements.
[19] See Clean-Air Cool Planet (2008) for more information on bringing people together to have a proactive campus.

		Dalhousie University	Mount Allison University	University of Victoria
People Involved	**Initiators: who?**	Students pushed for a Sustainability Office.	Students pushed for sustainability initiatives	• Institute for Integrated Energy Systems & Office of Campus Planning & Sustainability.
	Student Involvement in Implementation phase?	• Yes	• Yes	• No
	Student involvement in running inventory?	• Student Staff	• Student intern • Environmental Auditor students	• No student involvement, quite well set up so it is able to be handled by the dept.
	Support from university admin.?	• Yes	• Yes	• Yes
	Community partner?	• Municipality • Environment Canada • NGOs • Ecology Action Centre	• Energy Consulting firm	• Government • Pacific Carbon Credits
	Linked to academic department?	Science Department	Geography and Environment Dept.	Sustainability, Environment Dept.

Figure 1.3: Case Study Analysis – People Involved

2. Existing Policy on GHG Reduction

Once support for environmental protection is attained from the university community, development of a policy on GHG reduction is the second major requirement, based on the case study, towards enacting an effective GHG emissions inventory. Policy can be enacted at either the university level, as a voluntary policy, or the governmental level, as a regulatory policy. At all three universities examined, sustainability policies had been released to show the executive support for climate change mitigation actions.

University of Victoria's policy originates from the governmental level as a regulatory policy instrument requiring all PSOs to measure and report their GHG emissions. The government has provided a standardized framework, and technical support to help build a knowledge base concerning the GHG emissions inventory process. Although the initiative has now been transferred to a regulatory instrument, the key point is that there was initial support from both the government and the citizens of British Columbia for the policy to be enacted. On the other hand, both Dalhousie University and Mount Allison University have enacted voluntary policy instruments.

Once a policy was established, each university devised an action plan to outline how change towards sustainability would occur. Without an action plan there are no pre-determined methods

to ensure progress.[20] Action plans outline goals and targets with corresponding strategies to achieve them. They are extremely beneficial in guiding an institution to an internalization of externalities and, as a result, emissions. The Mount Allison University interviewees indicated that the university has developed its action plan on the basis of precisely outlining details of each action, assigning who will do each task, and monitoring to ensure completion of the task (Personal communications, February 3, 2012).

Action plans are unique to individual schools, depending upon the organizational and operational boundaries of the institution. However, universities of British Columbia must address key aspects in their action plan according to the regulatory policy of Bill 44. During the interview process, all three universities were asked their opinion of Bill 44 and whether it should be implemented on a Canada-wide basis. All three were in agreement that Canada should have a standardized reporting framework for measuring GHG emissions and have incentives to drive change. However, one university cautioned that although there are definite benefits in environmental and economic terms to having a regulatory policy employed at a federal level, there are some concerns (i.e. drawbacks) that need to be addressed first. The government of B.C. has not provided financial support for the universities to conduct their GHG inventories and offset their emissions. Due to this lack of support, there is less money for research, for work in the classroom, and for faculty, *or* universities have to increase tuition. The question was raised of whether this is the intended consequence. Should students have to pay for the change? The second concern voiced was the fact that universities who had been proactive prior to the Bill did not see as significant of a reduction in emissions as those who had not been practicing sustainability previously. This could cause reputational damage which could result students enrolling in other institutions. The interviewees did indicate that, although these are problems that need to be addressed, a balance can be achieved in the end and it is a policy worth considering for the rest of Canada. Not only should Newfoundland and Labrador follow B.C.'s lead and implement a strong provincial regulatory policy, but Canada as a whole should become a carbon neutral country, starting with institutions, such as universities and colleges, which will teach society how to reduce and offset GHG emissions. As mentioned in the first required condition, support from the university community is an essential link to initiating action and developing policy. However, to gather the support, there must be common knowledge about why an inventory should be conducted, which leads to the third required condition.

3. Knowledge about Inventory Benefits

Knowledge of the inventory benefits typically occurs at a parallel with the development of the GHG emissions policy and action plan to set the foundation for measuring, analyzing and reporting. Based on the findings from the case study analysis, I identified that a university must have knowledge about the benefits of conducting an inventory before executives will acknowledge the necessity of incorporation into the action plan. If the benefits are unknown, financial support for funding projects, purchasing energy meters, and paying for employees to gather related data is unlikely.

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[20] See Filho (2011) for more information on reasons why universities develop a policy, but no action plan to actually implement changes.

A representative from the Office of Campus Planning and Sustainability at the University of Victoria clearly indicated that this was a required condition when he stated that "[people] don't necessarily know the benefits of doing an inventory" (personal communication, February 1, 2012). Mount Allison University representatives agreed by indicating that the "important thing in a mission-based organization is that people need to want to do it. Either because they have to do it because it's part of a policy or they actually have a genuine interest because it meets the mission of the university. There needs to be the buy-in and the interest" (personal communications, February 3, 2012). To the executives, if the inventory does not align with the university's mission, provide an economic savings or promote the university to new students, then, unfortunately, it is not on their list of budget requirements. Not only is there a need for knowledge about the benefits of the inventory, there must also be someone with knowledge about the inventory process for sustainability projects to begin on campus.

4. Selection of Inventory Framework & Process

The fourth condition is an important component to be addressed during the development of the action plan, as the process of conducting the inventory can be quite complicated. Currently, no standardized framework[21] is accepted as the best one for conducting the inventory process. Therefore, choosing a program is a challenging enterprise—there are many to choose from and each has benefits and drawbacks.

There are a few initial choices: what framework of inventory is best, what operational and organizational boundaries are going to be set, and how will information be obtained? These can result in complex decisions.[22] Susan and I (2012) found that "the challenge throughout …ha[d] been deciding which options would be simple enough to input the data and understand the process, yet reliable enough to accurately process the data" (p. 6).

When initiating change for sustainable development, there is typically a feeling of personal burnout experienced by campus leaders who are striving to change the processes within the university structure.[23] This tends to be a result of institutional inertia. By employing someone, such as a sustainability coordinator, who has had hands-on experience working with a GHG inventory, the institution can save time spent compiling and analyzing data, miscalculations of data, money spent paying employees, and frustration of all those involved. A sustainability coordinator not only has the knowledge, but holds a position with real Human Resources capacity that can address the creation of new processes and procedures within the institution which "will allow a new organizational rationality to take shape" (M'Gonigle & Starke, 2006, p. 154). A person with expertise has the ability to not only guide the institution towards sustainable development, but as mentioned before, expertise can be economically beneficial and alleviate the sense of personal burnout.

Knowledge of inventory frameworks and processes allows for a collaboration of efforts from university communities to succeed in fulfilling the GHG emissions reduction policies where insufficient knowledge and fragmentation of departments had previously impeded success. Even so, there is a fifth required condition that is integral to ensuring positive change occurs.

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[21] See Walton (1997) for more on innovative frameworks of environmental reporting.

[22] See Barlett (2007) for valuable accounts and narratives from many different colleges and universities who have a sustainability movement unfolding on campus.

[23] See page 142 of M'Gonigle and Starke (2006) for more information on ways to mitigate personal burnout.

5. Accurate Data

The gathering of data is, as indicated above by Rappaport and Creighton (2007), an initial starting point for weight loss (negative externality reductions). The measurement of the initial baseline, however, is often times extremely difficult to determine and is not always accurate. Accuracy of this measurement is imperative because the actions that occur to lower emissions are based on the numbers displayed by the inventory. If the calculations are skewed, non-critical actions could be mistaken for ones of utmost importance. For example, if the inventory showed that building B emitted the most CO_2e instead of the substantially larger emission source from building A, the university could spend time, money and resources upgrading a building which is not of primary importance. If, as in most cases, there are not meters on individual buildings, the origin of electricity emissions cannot be correctly determined.

All three case studied universities faced the problem of accurate data and finding ways to measure all sources. British Columbia's University of Victoria has many off-campus buildings that are rented out by students, faculty and staff. Issues regarding privacy were encountered when attempting to gather data concerning these buildings. As indicated in the interview with a representative from this campus, eventually, data was estimated based on average carbon intensity per square foot of each building type (personal communication, February 1, 2012). The Office of Sustainability at Dalhousie University also outlined some of the pitfalls of assembling accurate data. During the initial stages and subsequent years, there was a struggle to develop precise methods of data collection. They chose the ISO standard framework because Dalhousie University "wanted to make sure [they] had the most accurate data and transparent methodology" (personal communication, February 10, 2012) (see Figure 1.0). For the initial baseline inventory, Dalhousie University hired Stantec, a consulting firm with a climate change office, to review the report and make changes to produce a more accurate result. During the following inventories, Dalhousie University found that accessing readily available data was also a problem. GPS units are not present in all fleet vehicles, therefore they have to request miles or gas bills and do calculations which may not be entirely accurate.

Mount Allison indicated similar problems with achieving accurate data with inconsistent and incomplete natural gas calculations. In their case, the Clean Air-Cool Planet calculator, which was used to analyze data had the incorrect carbon dioxide equivalency. The university has since exhaustively analyzed all calculations to reduce the possibility of inaccurate data.

The accuracy of the GHG emissions inventory is essential because it indicates the problem areas which are creating the biggest impact. If the data is incorrect, it does not give an accurate representation of the negative externalities occurring within all the scopes. In turn, this affects the way in which the action plan is drawn up and alters all other steps along the way to reducing emissions for achievement of sustainable development. Inaccurate inventory data can cause the institution to spend valuable resources on non-priority areas and can be economically detrimental instead of bringing the intended long-term benefits. Therefore, a common concern is the short-term costs versus the long-term benefits and the budget which could substantially aid in reducing GHG emissions.

6. Costs and Budget

Although not mandatory, costs and budget were identified as a key factor that makes the implementation of a GHG inventory and emissions reduction action plan easier. Two out of the

three universities had a designated budget for their inventory (see Figure 1.5). Mount Allison University has not assigned a budget to the GHG emissions inventory project, however, the cost of paying the employees for their time does factor in and, therefore, the obstacle was identified on this basis. One of the representatives from Mount Allison was adamant about the fact that although money may help, it does not mean that something will get done. It was stated blatantly that not having money should never be a reason for not doing anything (personal communication, February 3, 2012). The University of Victoria is a somewhat special case because they are under a regulatory policy to conduct their inventory; however, there is no financial support for the process. The administration of the inventory costs the university approximately $15 to 20,000, not including the cost of paying employees for about a fifth of their time. Furthermore, the government of British Columbia requires the offsetting of all emissions which costs the university another $435,000 approximately (personal communication with University of Victoria representative, February 1, 2012). However, the contact at University of Victoria declared that although the upfront capital costs are somewhat steep, the long-term savings are substantial enough for payback plus some. The costs of setting up the systems to conduct the inventory are what contribute the most to the up-front costs (Personal communications, February 1, 2012).

		Dalhousie University	**Mount Allison University**	**University of Victoria**
Resources	**Resources: budget?**	• Budget allocated through inter-institution loans	• No budget allocated	• Done on own budget, no subsidizations.

Figure 1.4: Case Study Analysis – Resources

To summarize the above section, there were six conditions discovered from the case studies of the three universities. These conditions were broken into two groups: required and not required, but helpful. The first two required conditions (a proactive university community and an existing policy on GHG reductions) allowed the institution to educate the community about lowering emissions and about the benefits of conducting an inventory (knowledge of inventory benefits). Once support for action and knowledge about the benefits pushed executives to policy development, an inventory could be initiated. However, without an expert, such as a sustainability coordinator, to conduct the inventory there is often inefficiencies and personal burnout as a result. Therefore, it is crucial to consult or hire someone with a background of working with GHG inventories. Once the measurement of emissions begins, accuracy of data is essential. Without an accurate inventory, resources can be focused in areas which are not priority. Finally, although not isolated as a required condition, available budget is a helpful component when conducting an inventory.

Having analyzed each of the three case studies and discussed the required conditions above, this paper now moves to the application of these findings to Memorial University's Grenfell Campus.

Application: Implementing a Carbon Inventory on Grenfell Campus

On October 6th, 2009 Memorial University officially signed The Sustainability Declaration, embracing the vision of Memorial as a "sustainable and progressive university in all areas of operation, education, research and outreach providing leadership for today and future generations" (Memorial University, 2009). The mission of the university, according to the Declaration, delineates how the vision will be attained by minimizing environmental impacts and providing a clear report of activities and their corresponding effects. Further, Memorial has agreed to "develop a comprehensive and collaborative action plan with measurable outcomes" (Memorial University, 2009). The goals that the university has identified in order to implement this mandate are as follows:

- "to measure and assess the university's environmental impacts and establish specific targets to reduce them
- to integrate sustainable policies and systems into university governance and operations
- to encourage academic curriculum, research and outreach on sustainability
- to create sustainable working and living environments across all campuses" (Memorial University, 2009)

Grenfell Campus, Memorial University, (hereafter called Grenfell Campus) has taken the first steps in the movement for a sustainable campus; however, a GHG reduction policy (either voluntary or regulatory) and a corresponding action plan, as outlined in the Sustainability Declaration, is yet to be established. The Declaration was a major obstacle overcome as it laid the foundation for further environmentally sustainable initiatives to be built upon. Enterprises such as building a campus community garden, purchasing an industrial composter for all food waste on campus, student-led environmental clubs and societies, and supporting research in environmental areas primarily through the Environmental Policy Institute (EPI)[24] all show the current support the campus has for action. Yet, it is fragmented and lacks the structure needed to unify a proactive university community. It is as M'Gonigle and Starke (2006) describe: "this institutional architecture — management from the top, fragmentation from below — is inherently conflictual and impedes the university's ability to work collectively" (p. 150). Nonetheless, as this paper analyzes above, there are methods of mending the fragmentation and instigating action. With strong leadership from the top joined with a proactive community which is educated about the benefits, the fragmented departments can be gathered into unity. An integrated approach can be taken, involving students, faculty and staff to develop a comprehensive and collaborative policy which will fulfill the commitment of the Sustainability Declaration and require further action.

From the above case study analysis and exploring the application of the required conditions, the next steps are clear. Grenfell Campus, and Memorial University as a whole, must follow the path which has been laid by other institutions to avoid needless wallowing in the pitfalls of implementation development. Below a step-by-step guide, and a tentative action plan with a

[24] For more information on what the EPI is doing with their research and at Grenfell Campus see: http://www.swgc.mun.ca/epi/Pages/default.aspx.

timeline for implementation of the required conditions at Grenfell Campus shows that the processes learned from other universities can realistically be applied to our campus.

Step 1: Gather Support

With disconnected projects initiated by many different groups across campus, there is a proactive university community which is ready for the movement. They are just lacking unity through the fragmented institutional hierarchy which has impeded collective action. The initial step is to gather the individual groups to form a committee from all interested and administratively important departments. This gathering will lead to the second step of allowing an education campaign to be organized campus-wide to teach the university community about the benefits of institutionalizing sustainability and how to get involved in the sustainability action.

Step 2: Teach about Benefits of Institutionalizing Sustainability

Although most of the university is aware of climate change and the concerns surrounding GHG emissions, Grenfell Campus, having expressed their mission to promote a community committed to sustainability within and beyond the university, should educate each member about lowering their emissions. Educating the importance of turning off lights, heat, and computers when not in use, and promoting walking or biking instead of driving is essential.[25] The Environmental Affairs Committee, run by students, has taken on projects to educate, but there is only so much they can do without institutional support.

In other research I have done,[26] the student body at Grenfell Campus has indicated that they fully support institutionalization of sustainability, however, there is not a link between switching off the light and lowering emissions; there is no knowledge of the benefits. Through projects initiated by the Environmental Policy Institute, the faculty has voiced their concerns for a more integrative and collaborative approach to environmental sustainability projects and programming in general (i.e. need to get over silos of Environmental Science, Environmental Studies, and Sustainable Resource Management programs). Through education and creation of a committee, as mentioned in step one, a policy which will require integrative management of GHG emissions and sustainability on campus can be proposed to the executives for enactment.

Step 3: Develop a Policy

With the signing of the Sustainability Declaration, the path is clear for an actual policy concerning GHG emissions. Building upon the first few steps, including groundwork that Susan and I (2012) have done, the next step is to develop a policy. Even though there has been some acknowledgement from Grenfell's higher administration that the mission encompasses a sustainability movement, there has been no further policy enacted to determine how to initiate change and layout an implementation plan (see Figure 1.5). Grenfell Campus is presently under no legal obligations to measure or reduce their emissions; therefore it must be done under voluntary actions. These actions can include methods such as information brochures, advertising, awards, demonstration projects, labeling, workshops and more. Grenfell Campus must come

[25] For more information on educating society about individual environmental action see Orr (2010).
[26] Independent project for Geography 3222 – Statistical Geography.

together to detail a policy, in the strategic plan of Grenfell, that includes an action plan to ensure inertia does not continue. Once a policy is written and accepted, action must be started. Yet, as previously stated, to initiate action, there must be a grounded knowledge in the inventory process; which leads to the fourth step, bringing in an expert.

Step 4: Bring in Expertise

Not only is there limited knowledge about the benefits of lowering emissions, Grenfell Campus is lacking the knowledge about the GHG emissions inventory process. This has been one of the key struggles found during the research done by Susan and me (2012). As previously indicated, there are many different frameworks to structure a GHG inventory. Susan and I investigated many options to figure out which would be best. Although the software was not as multifaceted as some of the other programs that were available, we decided to use CarbonCounted to complete the carbon footprint analysis within the time frame and budget allocated (Pottle & Reagan, 2012, p. 15). Without the hands-on experience of working with a GHG inventory, we spent extra time compiling and analyzing data, dealing with miscalculations, and experienced frustration from lack of knowledge and support from the university. In fact, very few from the community are even aware that an inventory has been compiled.[27] If there had been increased knowledge about the inventory process, economic inefficiencies and frustrations could have been avoided. Yet, above all else, the accuracy of data may have been increased had there been more expertise.

To address this issue, Grenfell Campus can bring in experts, such as a sustainability coordinator, who can and should be consulted to ensure the inventory process is the most transparent, thorough, accurate, and easy framework to represent the negative externalities that Grenfell Campus is emitting. Memorial University has one sustainability coordinator who oversees the entire institution (including St. Johns, Grenfell, Marine Institute, and Bonne Bay campuses). However, the job of a sustainability coordinator is too large for one person to actually accomplish anything, especially over so many different locations. As mentioned above, many campus leaders experience a personal burnout, especially when spread too thin, which results in limited accomplishments. While facilitating a focus group with students from Grenfell Campus, the idea of creating a sustainability coordinator position came up as a key aspect of developing sustainability at Grenfell Campus. To further emphasize the importance of having an expert involved, M'Gonigle and Starke (2006) wrote that "sustainability coordinators make operations more efficient, marginally constraining damage to the environment and perhaps sav[e] money in the process" (p.168). Another way to gain knowledge is by talking to institutions that have already completed the inventory. By interviewing faculty at three different universities, information has been gathered for this project that can now be applied to make the measurement and reporting of future inventories much simpler.

Summary: A Path Forward for Grenfell Campus

By institutionalizing GHG emissions counting and monitoring at Grenfell Campus we can continue to integrate sustainability into our facilities, our programs, and the lives of faculty, staff and students. This will not only benefit the climate change initiative goal of lowering GHG

[27] This may change with the publication of Grenfell Campus' inventory within the coming months.

emissions and reducing our negative externalities, but will make the facilities more functional and efficient, thereby reducing economic costs to the institution. All university representatives interviewed for the case study agreed that lowering emissions "makes good financial sense." Through the enterprises mentioned above, Grenfell Campus has taken steps towards these goals. Yet, universities across Canada have already established university policies on GHG reduction, developed action plans, created GHG inventories and baselines, and achieved emission reduction goals and targets. New students are looking at a university's 'green' initiatives and how 'sustainable' campuses are when choosing where to study. There is a unique opportunity to partner with other universities to learn from their experiences and, more importantly, to join initiatives with Memorial University's other campuses. Grenfell Campus is falling behind and needs to push to keep up as a leading sustainable university in Canada.

Required Actions	Lead Person/Group	Timeline
Educating the university community (including students, faculty & staff) **(Required Condition 3: Knowledge of Benefits)**	Environmental Affairs Committee (E.A.C.) & Environmental Policy Institute (E.P.I.)	*Ongoing*
Push for sustainability action at Grenfell Campus **(Required Condition 1: Proactive University Community)**	Student body to lobby VP	*Ongoing*
Form committee (called V.P.A.C.S.) which will: Motivate, build bridges across depts. and disciplines, & foster a mindset of collaboration for looking broadly at campus environmental challenges in general and GHG reduction solutions in particular **(Required Condition 1: Proactive University Community)**	Composed of: • Sustainability directors, top admin. leaders and trustees, faculty, students, key professional staff • need stakeholders from all aspects of the university Consider external partners (e.g. Margaret McKeon)	*April 5th-October 1st, 2012*
Budget request **(Beneficial Condition: Available Budget)**	Budget proposed by Subcommittee of V.P.A.C.S. to Finance and Admin. Office	Begin Draft: *October 1st-Dec 1st, 2012* Submit Draft: *December 1st, 2012* Receive allocation: *July 2013*
Design proposal for a Sustainability Coordinator position	Subcommittee of V.P.A.C.S.	*October 1st-December 1st, 2012*
Sustainability Coordinator position established **(Required Condition 4: Knowledge about the Inventory Process & Required Condition 5: Accurate Data)**	Draft by Subcommittee of V.P.A.C.S. for submission to V.P. and Finance	Submitted, Amended & Revised: *End of June 2013*
Post Sustainability Coordinator job opening	Administration and Finance	*July 1st-August 1st, '13*

Hire Sustainability Coordinator (with renewable contract) **(Required Condition 4: Knowledge about the Inventory Process & Required Condition 5: Accurate Data)**	E.P.I. & Administration and Finance	Interviews: *August 1st-August 8th, '13* Hire: *August 15th, '13* Position Start: *August 20th, '13*
Overarching GHG Policy development with Action Plan & Timeline Targets **(Required Condition 2: Existing Policy on GHG Reduction)**	Draft by Sustainability Coordinator & V.P.A.C.S. for submission to V.P. and Finance	Begin Draft: *August 20th, '13* 1st Draft due: *October 1st, '13*
GHG Policy amendments and changes after review by VP	Sustainability Coordinator, V.P.A.C.S. & Administration and Finance	Revise: *November 1st-December 1st, '13* Resubmitted to VP: *December 1st, '13*
Official signing of GHG Policy	V.P.	*January 15th, 2014*
Conduct GHG Emissions Inventory	Sustainability Coordinator	*Ongoing*
Action Plan (Green Initiatives)	Sustainability Coordinator, E.A.C., E.P.I., V.P.A.C.S., all students, faculty, and staff	Begin initiating: *ASAP* Monitor: *Ongoing* Audit: *Once a year*

Figure 1.5: Implementation Plan

During the final weeks of my undergraduate degree I am gathering support for further work with the implementation plan outlined above. Currently there is support for these sustainability initiatives from numerous faculty members and the Grenfell Campus Student Union (GCSU) executives, namely Gabriela Sabau (Chair of Environmental Studies), Glen Keeling (GCSU Vice-President External), and Robert Leamon (GCSU President). As a continuation of this paper, I am planning on expanding on this research at the Masters level in the Environment and Resource Studies program at the University of Waterloo, Ontario.

Conclusion

Universities foster the values and practices of the next generation—university campuses are formative places during a formative time in the lives of many students. The values and practices cultivated during university years can influence students' small decisions, such as everyday energy usage choices and the importance of engaged citizenship. But time at university can enable us to understand the broader need for major change to confront the global environmental problems such as climate change. It is a unique moment when we can start to develop an historical awareness of the origins of our current debates and gain insight into the often environmentally disappointing outcome of the interactions between governments, industry, and society. It is a unique time to question the *status quo* of consumerism, suburbia, and energy use. Universities provide a special setting where the local actions of each individual can be placed in a broader global framework—and students can learn what change is needed and become part of that change. In this way, the university not only has the unique position of educating society, it also shoulders the responsibility of teaching high valuation of reducing negative externalities and pursuit of sustainable development in our future generation.

The government and industrial corporations of Canada continue to fail to take leadership on the sustainability movement, allowing Canada to develop an international reputation for lacking environmental initiative and even blocking international policy development, most recent at Durban after which it became the only nation to sign, ratify, and withdraw from the Kyoto Protocol. There has been limited prescriptive policy development in Canada, except for policies implemented by British Columbia to require the reduction of GHGs. There remains no Canadian standardization of GHG inventory for measuring, analyzing and reporting emissions.

To fill this gap, universities can take a leadership role in the sustainability movement and fulfill their commitment and societal mandate. One obvious method for universities to address their role in climate change is to implement a carbon inventory, as explored in detail in this paper. As exemplified by the three universities studied here, some campuses have been very successful in implemented these effective measures and have seen emissions reductions in response. Unfortunately, many universities in Canada have not developed an action-based policy on GHG reductions and many do not publish climate action reports. Most Canadian universities have prominent environmental programs where they teach students about climate change yet they take no institutional action. In response to this situation, David Orr (1992), a well-known environmental studies and politics educator, scholar and activist, wrote:

> The product of a university degree is a population trained in hypocrisy. 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. Four years of consciousness-raising proceeds without connection to those remedies close at hand (p. 104).

This statement is very fitting for Grenfell Campus because although the issues of climate change mitigation and sustainability are taught in the classroom, they are not practiced on campus. The institution is not setting an example of sustainability leadership. The university community is an ever-changing population as each new generation of students replaces the ones graduating. There must be a plan to develop a broad sustainability culture, one with real Human Resources capacity to ensure sustainability is not just a brief trend. The climate hypocrisy needs to end and climate leadership must emerge as the replacement.

By gathering the existing fragmented environmental groups of Grenfell Campus into a unified community to raise awareness of institutionalizing sustainability, by developing policies that require action and the fulfillment of targets, by employing a sustainability coordinator with the knowledge to step by step develop a transparent and accurate GHG inventory, and, finally, by allocating a budget specifically towards sustainable development, this campus can make excellent progress on emissions reductions.

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Appendix 1: Interview Questions

1. How did the university come to a decision to conduct a GHG inventory? Did it occur before the enactment of Bill-44 (Only asked at UVic)?
2. Who pushed for the environmental action? Was it a single person (student/faculty/staff/community member, etc), a group, a department, the government etc?
3. Is there a department which handles all of the inventory processes?
4. Are students involved in the process?
5. Is there support and involvement from the president's office, the executives, the board members or any other "higher up's"?
6. Are there any external community organizations that are stakeholders or are partnered in support of the university's GHG emissions inventory?
7. British Columbia's Bill-44 regulations have obviously played a distinct role in the implementation of reporting GHG emissions. How does the university feel about the government involvement and do you personally think it has sped up the lower of emissions (Only asked at UVic)? Should the government, in your opinion, be taking a stance and implementing something alike to Bill-44 across the country?
8. What framework/design was used for the inventory? How was the inventory designed or framework chosen? Was it the easiest to work with? Had you seen case studies where other places had used the same one?
9. The knowledge for developing inventory comes from?
10. Did completing the inventory require a large budget? Do you think that this is a factor of why other universities have not done an inventory?
11. What are some of the pitfalls the inventory has encountered over the years?
12. Has there been any progressive environmental action since the inventory occurred? Do you think it was b/c of the hard numbers the inventory showed?
13. There is typically resistance to change, was there any during the implementation of lowering GHG emissions or during the first couple years of the inventory process? What are some of the ways in which the university has overcome this to introduce sustainable action?
14. What if any barriers or challenges do you see preventing the university from engaging in sustainability initiatives in the future? (budget, lack of awareness regarding the issue of sustainability, resistance to change from individuals within the university, etc.)
15. What made the implementation of the inventory at Mt. Allison University possible and the execution go smoothly at the time it was introduced? (isolate a key thing…e.g. timing of implementation, people at the university, etc.)
16. Is there anything else that you think is pertinent to this topic that I have not touched upon?
17. Are there any inventories up online?