

Facilitating Carbon Footprint Awareness in the Ralph M. Medjuck Building

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Submitted: April 13, 2011

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Executive Summary

Research in any area that is working to reduce carbon dioxide is presently relevant, timely and urgently needed because climate change is occurring at an accelerated rate due to the carbon dioxide and greenhouse gas emissions associated with human activities (Speth, 2008). In a university setting, the largest contributor to carbon dioxide and greenhouse gas emissions are associated with heating and cooling buildings on campus and its water supplies (Dahle & Neumayer, 2001). Universities have also been shown to be the most effective medium of education to work towards a sustainable future. Dalhousie University has made many efforts and much progress towards greening the campus through building retrofits, energy efficiency, water conservation and more (Dalhousie Office of Sustainability, 2010). However, it remains underdeveloped in the principles of engaging individual students, faculty and staff. It must encourage energy efficiency to promote interest and awareness of the impacts of individual actions on energy efficiency (Dahle & Neumayer, 2001).

This research will examine how knowledgeable the students, faculty and staff who use the Dalhousie University Ralph M. Medjuck building are of the building's carbon footprint and Dalhousie University's carbon footprint. The research will examine how students, faculty and staff perceive the impact of individual behaviour upon the carbon footprint of the building. It will also seek effective approaches for engaging students, faculty and staff on energy efficiency issues in the university, the carbon footprint of the institution and the importance of behavioural change within these three subcultures. The Dalhousie University Eco-Efficiency Centre has commissioned this research in an effort to begin to improve the energy efficiency of its host institution in an individual building-scaled behavioural change approach. This research will be used to create an engaging presentation and handout for the students, faculty and staff of the Ralph M. Medjuck building. Presentations and handouts would encourage behavioural changes that these individuals can take to reduce the building's carbon footprint. This presentation and handout will be used by the Eco-Efficiency Centre as a template for future presentations in other buildings on campus.

A literature review, student surveys, faculty interviews and custodial staff interviews will be the primary method of gathering data for this research. A literature review was conducted to analyze past university campus' greening initiatives in an effort to determine successful approaches to changing individual behaviours in regards to energy consumption. Brown

University, Dalhousie University, Ball State University, and the University of South Carolina are used as case studies. The major themes presented by this literature review were that; students need to be educated in environmental issues to be able to be engaged in campus greening, faculty are best engaged through the incorporation of their research into the campus greening movement, and developing staff members to be carbon capable can be an effective way to engage them in the greening the campus movement. Student surveys suggested that student's lacked an understanding of how their individual behaviours could reduce the Ralph M. Medjuck building's carbon footprint. Faculty interviews identified the issue that the faculty perceive individual behaviours to be insignificant towards reducing energy consumption in the building in comparison to the infrastructural heat and energy waste of the building. Staff interviews identified many operational gaps that lead to energy inefficiencies.

The results of this research are a presentation and handout template that can be shown in a presentation to students, faculty and staff of academic buildings as a traditional method of approaching them to change their individual behaviours. Another result of this research is a series of recommendations for appropriate approaches to be taken to engage students, faculty and staff in the greening the campus movement and in energy efficiency. The research will also address specific ways forward for the Eco-Efficiency Centre in its mission to begin promoting eco-efficiency and energy-efficiency within the Dalhousie University's buildings. Recommendations include, but are not limited to; increase the centre's physical and visual connection with the campus; develop partnerships with the Office of Sustainability and other sustainability organizations on campus; provide incentives to changing behaviours; and use innovative and creative presentation techniques.

I. Introduction

1.1. Background & Rationale

Climate change is occurring at an accelerated rate due to the amounts of carbon dioxide and other greenhouse gas emissions that human activities release into the atmosphere (Speth, 2008). Greenhouse gases trap heat in the earth's atmosphere and without these naturally occurring gases our planet would be about 30 degrees Celsius cooler (Speth, 2008). While these gases are naturally occurring, since the industrial revolution humans have vastly increased the amount of greenhouse gases in the atmosphere, and it is causing the earth's glaciers to melt at a

faster rate than is natural through earth's ice age cycles (Speth, 2008). In his book, *The Bridge at the Edge of the World*, James G. Speth argues that more research in any area that works towards reducing carbon dioxide emissions is very relevant, timely and urgently needed (Speth, 2008).

In 1978 the United Nations Educational, Scientific, and Cultural Organization [UNESCO] and The United Nations Environmental Program [UNEP] developed the International Environmental Education Programme and the concept of sustainability as a part of higher educational institutions was introduced (Wright, 2004). This program was developed due to a recognition that universities serve the function of educating the population in all manners of knowledge, ethics, social responsibility and technological advances (Wright, 2004). With this purpose, the education that universities provide is the most effective medium for achieving a more sustainable future (Wright, 2004). Several declarations have been developed and ratified by various educational institutions, with the general purposes of creating sustainable operations, developing and promoting ecological literacy, encouraging interdisciplinary curricula, creating beneficial partnerships, conducting public outreach and funding research in the field of sustainability (Wright, 2004). Dalhousie University has responded to this call for sustainability in higher education by signing the 1990 Talloires Declaration, the 1991 Halifax Declaration, and the 1999 UNEP International Declaration on Cleaner Production (Dalhousie Office of Sustainability, 2010).

The Talloires Declaration was the first gathering of post secondary institutes to assess what role they could play in a sustainable future. Key outcomes of this declaration were that universities should be practicing what they taught by making their physical operations, research and curricula more sustainable. This is combined with an effort to engage students to help the institution reduce waste and pollution (Wright, 2004). A key outcome of the Halifax Declaration was an Action Plan that contained short and long term goals for universities to follow towards a sustainable future. The Action Plan put an emphasis on education, training, inter-disciplinary work, research and policy, and a general pro-active approach to sustainable development (Wright, 2004).

Dalhousie University has worked towards living up to the standards of the sustainability in higher education declarations it has signed and has developed a campus sustainability plan. This strategy focuses on upgrading existing infrastructure and processes, designing new infrastructure and processes with sustainability in mind, and measuring and monitoring energy,

water and electricity use on campus and educational campaigns (Dalhousie Office of Sustainability, 2010). A key aspect of the greening the campus movement that Dalhousie University is currently underdeveloped in is engaging individual students, faculty and staff to encourage individual energy efficiency. There is a fundamental lack of interest, and a lack of awareness of individual impacts, in energy consumption levels by students, faculty and staff (Dahle & Neumayer, 2001). It is important to remember, and to remind students, faculty and staff, that the largest environmental impact of a university is the heating and cooling of campus buildings and water supplies (Dahle & Neumayer, 2001). There is a great difference between the success of one project and a systematic transformation to a green, sustainable campus (Sharp, 2002). Declarations for Sustainable Higher Education are very good for offering goals, targets and guidelines for reaching sustainable higher education, however various forms of assessment tools are needed to operationalize these agreements (Shriberg, 2002). Dalhousie University has made use of various assessment tools, such as STARS, to monitor the university's progress as a whole towards sustainable higher education (Office of Sustainability, 2010), however Shriberg suggests that competition between various campuses can help engage students, faculty and staff in greening their campus (Shriberg, 2002) and this research will suggest that competition among faculties, schools, student organizations and academic buildings within Dalhousie University will effectively engage students, faculty and staff to green Dalhousie University.

The Dalhousie University Eco-Efficiency Centre was developed in 1998 by the Faculty of Management and Nova Scotia Power with a mandate to “foster sustainable competitiveness in business” (Eco-Efficiency Centre, 2011). The centre's founding philosophy of eco-efficiency is to strengthen the “financial performance by minimizing the resources necessary to produce, consume and dispose of a particular product or service” (Eco-Efficiency Centre, 2011). The centre works with businesses in the Atlantic Canada region to increase energy efficiency, water conservation, waste minimization, chemical reduction and employee engagement through individualized solutions, tools, and resources in an effort to promote better financial performance through environmental stewardship (Eco-Efficiency Centre, 2011). The Eco-Efficiency Centre has commissioned this research in an effort to develop presentations and fact sheets, similar in fashion to those the centre uses for its clients. The centre is looking to demonstrate to its clients that they are able to put their practices to work in their host institution. Further research is necessary to help the Eco-Efficiency Centre establish the best approach for engaging students,

faculty and staff members in the efforts to reduce energy consumption through behavioral everyday changes. Our research will work to establish the necessary conditions to develop a mental shift from a place of students, faculty and staff understanding little of the energy consumption impacts of their daily interactions with the university and its academic buildings to a place of understanding each person, interaction and building as a critical piece of the whole, Sharpe suggests that this mental shift is critical to the greening the campus movement (Sharp, 2002).

Research suggests that students and staff members do not care about campus energy reduction and that faculty members are too busy and uninterested to effectively address the issue (Dahle & Neumayer, 2001). While Dalhousie University, through its Sustainability Plan, has been fairly progressive with investing in energy efficiency or reduction programs and products (Office of Sustainability, 2010), these efforts will not be entirely effective unless students, faculty and staff are aware of the efforts, aware of how to effectively and properly use the programs and products, and are educated on the implications of the programs and products (Dahle & Neumayer, 2001).

1.2. Research Question

How knowledgeable are the students, faculty and staff of the Ralph M. Medjuck building regarding the building's carbon footprint, Dalhousie University's carbon footprint and the impacts their daily individual behaviours have upon the building's and university's carbon footprint? What are effective approaches to engaging the students, faculty and staff of a university in issues of energy efficiency, carbon footprint and the importance of behavioural change?

1.3. Project Definition

Our project will address issues surrounding energy efficiency within the structures of Dalhousie University, using the Ralph M. Medjuck building of Sexton Campus as a specific example. Our research will focus on how to make an effective presentation to students and faculty that can motivate them to help reduce the building's energy use and carbon footprint. The presentation will be based upon carbon footprint data for Dalhousie University, as well as the information gathered from users of the Ralph M. Medjuck building based on their knowledge and understanding of carbon footprints. This information will be analyzed and formed into a presentation for the students and faculty of the Ralph M. Medjuck Building.

The presentation will be developed using our research on approaches to motivate students, faculty and staff to engage in the greening the campus movement. The goal of the research will be to use these approaches to develop a presentation of the Ralph M. Medjuck building's energy use and ways that it could be reduced in a meaningful and engaging way, with specific recommendations for steps that can be taken by students, faculty and staff,

1.4. Goals & Objectives

This project is limited to developing an effective presentation about reducing the carbon footprint of the Ralph M. Medjuck building on Sexton campus. The Dalhousie University Eco-Efficiency Centre has already developed a set of presentations geared towards helping businesses improve eco-efficiency, energy efficiency, and their carbon footprint from a cost effective standpoint. The Eco-Efficiency Centre is looking to put its own teachings to work within its host university. However, it recognizes that the cost effective standpoint may not be optimal in motivating students and faculty to enact change. With this in mind, we will research approaches that will motivate members of the Dalhousie community to decrease their carbon footprint through energy efficiency. Our research will be specific to the role students, faculty and staff play in energy reduction, and our recommendations will be specific to what students, faculty and staff of the Ralph M. Medjuck can contribute to the building's energy reduction. Originally, we had hypothesized that students, faculty and staff would be more invested in their homes' carbon footprint, as they are responsible for the energy bill and are able to make the decisions to change practices. It was found that factors that have influence on individuals and their behaviors at organizations are different from those behaviors observed within household (Scherbaum *et al*, 2008). As our research focused only on behaviors at Dalhousie University, we found that our initial hypothesis was no longer relevant. Instead, we hypothesized that few students, staff and faculty would be aware of what a carbon footprint is and the impact Dalhousie University has, as well as the impact that they themselves have on the carbon footprint of the university. Our main objectives for this research include;

1. Assess the level of knowledge of students, faculty and staff regarding carbon footprint, the Ralph M. Medjuck building's carbon footprint and Dalhousie University's carbon footprint.
2. Assess the current issues surrounding energy efficiency in the Ralph M. Medjuck building.

3. Assess appropriate approaches to addressing energy use reduction to students, faculty and staff of the Ralph M. Medjuck building.
4. Determine appropriate recommendations for reducing the Ralph M. Medjuck building's carbon footprint, geared specifically towards students, faculty and staff.

1.5. Literature Review

1.5.1. Approaches to Promoting Behavioural Changes

“Building Awareness: Cultivating a campus culture that rewards sustainability efforts and promotes environmentally conscious activities—efforts might include better educating students, faculty, and staff about the impact of their daily activities; providing incentives for “doing the right thing”; and offering real strategies to help individuals reduce their own consumption.”

(Page et al, 2009, 8).

The above quote is from a white paper publication and it describes the importance of building an awareness of issues on campus to foster a campus culture of sustainability. It is important to try to enact change through local actions, rather than global symbolism, and to recognize the value of changing behaviour in an individuals daily life compared to simply infusing passion in an individual to support a major environmental movement, saving the polar bears for example (Blum, 2008). Through efforts of building awareness of environmental activities it is important to dispel myths; of infinite natural resources on earth, by emphasizing that we are living past earth's carrying capacity; of effective means to dispose of waste materials without environmental consequences, by reminding individuals that earth systems are interconnected and waste cannot simply be locked away; and of the lack of power an individual holds to cause change within large or complex systems, by demonstrating various means through which individuals can enact meaningful change in large or complex systems (Sharp, 2002).

The United States of America Federal Energy Management Program Guide suggests that it is a mistake to assume that simply educating people on energy efficiency, the need for energy conservation and changes that they can make will actually result in the individual changing their energy consumption behaviours (FEMP, 2011). Rather than relying upon one-way education methods to promote energy efficiency, barriers to change must be addressed and behavioural changes must be presented as convenient, relevant and desirable (FEMP, 2011). Some key components of this program include:

- Making your contacts personal and interactive through maximizing face to face interaction and personalizing information presented to specific situations.
- Office visits can result in specific, implementable and effective suggestions.
- Use competition among small groups and provide small incentives over a period of time to encourage active and continual involvement.
- Promote social interaction to foster the exchange of information and ideas.
- Promote energy efficient behavioural change at home as well as work to promote a change of culture.
- Provide feedback that helps to visualize energy efficiency results and successes.

1.5.2. Approaches to Promoting Student Behavioural Changes

Research suggests that students learn principles of energy conservation, and greening the campus as a whole, best through what is done by the university on campus (Blum, 2008). Students have been shown to learn best through taking responsibility for their own education, otherwise known as active learning (Mulder, 2009). It is important to allow students to make educated judgments of values and norms rather than have faculty members trying to simply implement the values and norms of the established belief system, and equally important to stimulate thought processes in regards to the established belief system rather than just reproducing it (Mulder, 2009). Students can be engaged in changing energy consumption behaviours if they are made to understand their actual capacity to influence a consequential and systematic change (Sharp, 2002). Finally, establishing meaningful partnerships with students allows for talented and committed students to integrate relevant research projects into university systems (Sharp, 2002).

1.5.3. Approaches to Promoting Faculty Behavioural Changes

Throughout time faculty members have become more disengaged with campus operations as they have focused more on academic priorities and have had staff hired to run the campus (Sharp, 2002). It is important to remember that faculty members experience ongoing pressure to access competitive research funding, facilitate the success of students and meet long-term requirements to secure tenure (Sharp, 2002). The easiest way to specifically engage faculty members in greening the campus and improving energy efficiency is to demonstrate how their efforts can be used as practical experimentation and research (Sharp, 2002).

1.5.4. Approaches to Promoting Staff Behavioural Changes

Research shows that systems of providing feedback, commitment from upper level managers and organizational attributes can help facilitate staff engagement in reducing energy consumption in the work place (Scherbaum et al, 2008). Similarly, research suggests that endorsement from university administration could affirm the importance of greening the campus and reducing energy consumption and help to engage staff members in the process (Sharp, 2002). Staff could also be engaged through establishing meaningful partnerships with faculty or students to help facilitate research of the university's current operations and for the identification of potential problems (Sharp, 2002). It is important to note that staff behavioural change and support is often crucial for the success of structural, operational and organizational changes within the university (Scherbaum et al, 2008). Research shows that idea-generating contests are effective means for getting staff engaged in changing behaviours in the workplace alongside systematic training programs in carbon emission reduction strategies (Denton, 1999). Finally, research has shown that encouraging staff to participate in energy efficiency retrofits and energy audits at home is an effective means for changing their behaviours in the workplace (Romm, 1999).

1.5.5. Carbon Capability

Carbon capability is defined as “the contextual meanings associated with carbon and individuals ability and motivations to reduce emissions within the broader institutional and social context” (Whitmarsh *et al*, 2009). It is important for individuals to understand what can be accomplished through individual action and through becoming a low carbon employee (Whitmarsh *et al*, 2009). A low carbon employee is an agent of change through their vision and work towards the company's low carbon future (Whitmarsh *et al*, 2009). The knowledge that a carbon capable employee would have can be broken into seven categories described below (Whitmarsh *et al*, 2009):

1. The causes of carbon emissions and associated consequences.
2. The role that individuals and their daily activities play in producing carbon emissions.
3. A broad understanding of the benefits associated with adopting a low-carbon lifestyle.
4. The opportunities for change through individual actions.
5. An understanding of the carbon-reduction activities requiring collective action or some form of change in company infrastructure.

6. Various sources of information regarding carbon capability, as well as the reliability of this information.
7. Opportunities for and the structural limits to sustainable consumption.

2. Methods

Our research question will be addressed using a variety of methods including background literary research, a comprehensive student survey and personal faculty and staff interviews. There is both quantitative and qualitative data that will be collected and analyzed. Temporally, the methods will be employed in two stages. In the preliminary stage, the intent of the methods used will be to aid in the development of a presentation for students and faculty of the Ralph M. Medjuck building. The second stage will be geared towards the creation of the presentation based on the results of the first stage.

Four main methods will be used to develop the ideal presentation for students and faculty of the Medjuck building:

1. Literary research concerning the most effective elements of presentation to motivate behavioural change.
2. Student survey on awareness about carbon footprinting and energy efficiency, current energy-saving behaviours and opinions on motivators for behavioural change.
3. Personal interviews with professors on awareness about carbon footprinting and energy efficiency, current energy-saving behaviours and opinions on motivators for behavioural change.
4. Personal interviews with custodial staff on current energy-saving behaviours and suggestions for improvement.

The primary purpose of the four methods is to establish the best avenues to pursue when developing our presentation. The literary research is also important in order to avoid redundancy. As researchers, it is vital to situate our study within the context of the larger academic community (“Week 5” 2011, 7-8). By looking at prevailing views on the most effective means of presentation to enact behavioural change, we can build a presentation that evaluates only the most promising elements. The student survey, faculty survey and staff interviews will provide information from primary sources. For example, if students and faculty suggest success stories as good motivators, and this is backed up by our literary research, this would be a good element to

include in our presentation. A secondary purpose of the last three methods is to establish baseline data on the current behaviours of students and faculty. This is important since telling students and faculty to turn off the lights when leaving a room would be redundant if that activity is already common within the building.

In addition, Dalhousie University's Office of Sustainability's university-wide carbon footprint analysis needs to shift their analysis from more general, abstract data to information that can be synthesized and internalized by the students, faculty and staff. The carbon footprint analysis represents a wealth of useful information about our energy consumption on campus, but needs to be related back to the individuals who can make a difference. Making the information specific to the audience that will view the presentation is one way that the literature indicates motivates behavioural change. Specific statistics that will provide insight on the activities that students and faculty affect through their behaviours will be sought after in particular (this was also emphasized by our client).

The administration of the student survey will be conducted orally within the population of the Ralph M. Medjuck building. There will be homogeneous and heterogeneous characteristics of the population as they will all be users of the Ralph M. Medjuck building, but may vary in the frequency and type of usage of the building ("Week 3" 2011, slide 14). The survey will be conducted over the course of one day during class time hours and will involve asking passerby potential participants if they would be willing to answer questions. The administration of the survey will occur inside the main door of the building.

One hundred surveys will be conducted. This amount should be more than sufficient to achieve representativeness. In-person administration was chosen to ensure maximum participation, as it has been shown that this type of survey has higher participation rates than other techniques (Palys and Atchinson, 2008, 154). Unfortunately, in-person administration also introduces problems regarding truthfulness of responses. For example, a respondent might be compelled to claim that they know more about a subject than they actually do in order to impress or please the survey conductor. This issue will have to be addressed during the analysis of the data. The student survey is included in Appendix A. Questions are mainly quantitative in order to keep the time required for survey completion to a minimum. This survey will be key in garnering the data necessary to gain a baseline understanding of attitudes and knowledge levels of how people understand their connections with the Ralph M. Medjuck building's carbon footprint. We

oriented the questions in this survey to focus on students that use this building on a regular basis. Within the development of the survey our group came across assumptions that could be made concerning carbon footprint knowledge. We will assume that most respondents to the survey will consider themselves very knowledgeable due to the integration of environmentally oriented subjects into the curriculum of architecture (Canada Green Building Council, 2010).

It was determined to be appropriate to administer a specifically designed survey in an interview style to faculty members who lecture or have offices within the Ralph M. Medjuck building as a means of gathering data for the faculty members. This was decided because we believe that they may have more informed opinions, and might be more eager to discuss them. In particular, faculty responses will be useful for “generating hypotheses based on informants’ insights”, as laid out by Palys and Atchinson (Palys & Atchinson 2008, 159). It will put emphasis on qualitative data. The faculty survey is included in Appendix B.

The personal interviews of custodial staff will be informally conducted in the Ralph M. Medjuck building by approaching staff during their working hours and asking about current energy-saving behaviours in the building. The student survey will be used as a reference point for questions asked of the custodial staff, however these interactions will also largely follow an interview format as we believe custodial staff may be eager to discuss their responses. This will help to establish baseline data about current behaviours in the building and opportunities for change.

The analysis of the data in the preliminary stage will involve merging the results of the carbon footprint analysis and literary research with the data that was collected through the surveys and interviews. As much of the results as possible will be arranged in graph, chart and table format using Microsoft Excel, which can then be directly used in the presentation for visual aids. The second stage of our research will have involve the creation of the presentation for students and faculty and modification of the presentation based on recommendations from our client.

The creation of the presentation for students and faculty will involve the synthesis of the data collected from the first stage of our research into a 30-45 minute presentation. The presentation will establish opportunities for increasing energy efficiency in the Ralph M. Medjuck building and explain motivations for changing current behaviour. It will be very specifically geared towards the students and faculty of the Ralph M. Medjuck building.

Depending on the results of the first stage, it may include a variety of different elements such as case studies, statistics from the carbon footprint analysis, video, PowerPoint, a group or individual activity or a factsheet handout. The content of the presentation may also be reflective of the results from our first stage. For example, we may find that people are more motivated by economic factors than environmental ones (or vice versa). As a result, we would include information about how powering down laptop computers would result in economic savings for the university, which in turn may trickle down to the students and faculty. Since the presentation is the main deliverable to the client, it is important that it completely reflects the elements that were found to be the most effective at enacting positive environmental change.

Limitations that will be faced during this project might include a small sample size of students to survey, as the building we are analyzing is not on the main campus of Dalhousie University. As well, it may be difficult to connect and gather information from staff, since the janitorial staff rotates between different buildings on campus. In addition, the information we are looking to obtain to analyze the carbon footprint of the Ralph M. Medjuck building might not be as current as we would like or accessible. The main delimitation that we will be facing with this project will be talking to and surveying only students, faculty and staff that use the Ralph M. Medjuck building as opposed to opening the survey to the entire Dalhousie University student, faculty and staff population.

3. Results

3.1. Literary research results

3.1.1. Brown University: Student, Faculty & Staff Engagment

The “Brown Is Green” program was founded through student research efforts attempting to determine how the university could conserve energy, increase recycling and overall change the culture of university students, faculty and staff (Starik *et al*, 2002). Brown University became very good at holding regular meetings, conferences and seminars on environmental issues to educate the university community, as well as providing new students, faculty and staff with resources about “Brown is Green” and other environmental initiatives (Starik *et al*, 2002). Brown University provides a model for engaging the entire university community of students, faculty and staff into environmental initiatives.

3.1.2. Dalhousie University: Promoting Sustainable Behavioural Change Through Educational Competition

Dalhousie University has initiated the Rethink program in efforts to introduce a culture of sustainability on campus through education, participatory actions and competition among rethink teams, individuals, departments and residences (Dalhousie Office of Sustainability, 2011). The program seeks to reduce ecological, health and economic impacts of the campus operations while developing leaders of sustainability on campus (Dalhousie Office of Sustainability, 2011). The goal of this program is to enact change within daily behaviours of teams of students, staff and faculty by offering education, competition and awards.

3.1.3. Ball State University: Engaging Students, Faculty & Staff in Environmental Education

Ball State University established an environmental council, with representation from every administrative and academic area on campus, to help integrate principles of greening the campus into the university's strategic plan (Koester *et al*, 2006). The council emphasized the importance of promoting successes around campus and maintaining participation throughout the entire university (Koester *et al*, 2006). Ball State University successfully engaged faculty in this movement through the development of a two week paid summer workshop coined as "Green for Green" that introduced faculty to basic concepts of environmental science, sustainability and society interactions with environmental sustainability. Faculty were encouraged to use knowledge gained from this workshop to develop environment related material for their courses and department processes (Koester *et al*, 2006). A final relevant achievement of this program was the importance given to the success, and its promotion, of individual singular principles of action (Koester *et al*, 2006).

3.1.4. University of South Carolina: Education for a Sustainable Lifestyle

The University of South Carolina provides a good study for how a university can develop a culture of a sustainable lifestyle through environmental education on campus. USC was eager to promote environmental educational opportunities for students, faculty and staff through formal and informal means, partnerships and cooperation and through leading by example (Starik *et al*, 2002). Collaboration was promoted through the establishment of a twenty-five seat Environmental Advisory Committee with students faculty and staff members from various departments, functions and areas of campus in an effort to get representation from every aspect of the university (Starik *et al*, 2002). USC was eager to lead by example through greening

university operations, and to share information in an effort to engage students, faculty and staff (Starik *et al*, 2002). The goal of reducing the USC's carbon footprint was attempted through university support for a diverse range of smaller scale projects. Efforts were made to get faculty to collaborate with students, administrators, and operations managers in their research and teachings to ensure that these various sectors of the campus were working together to achieve a more sustainable lifestyle at USC (Starik *et al*, 2002).

3.2. Student survey results

The researchers received a total of 88 student survey responses. Overall, the surveys were conducted very thoughtfully and there were only a few questions that received some non-response. Since the surveys were relatively extensive, the results listed below are the findings that yielded relevant and/or interesting information. The following thematic results were found:

3.2.1 Students' perceived knowledge of carbon footprints

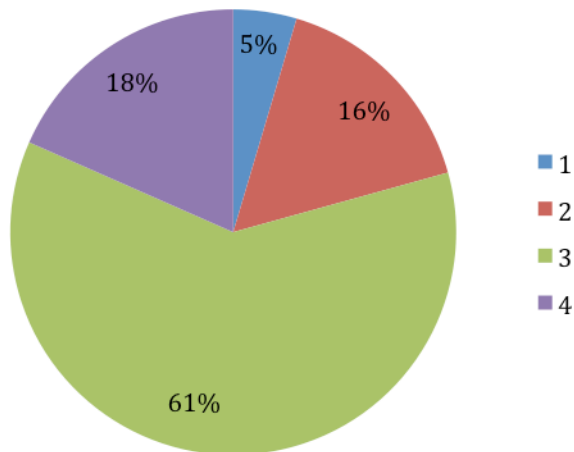


Figure 1: "On a scale of 1-4, with 1 being not knowledgeable and 4 being very knowledgeable, how knowledgeable are you about the term carbon footprint?"

Figure 1 shows that most people are relatively knowledgeable about the term carbon footprint, but that few are fully knowledgeable. Analysis of the responses against other questions produced other interesting results.

Of the students who rated their knowledge of carbon footprints as 4 out of 4, none said the importance of reducing Dalhousie's carbon footprint was 1 out of 4, and only 6% rated the importance as 2 out of 4. Of the students who rated their knowledge of carbon footprints as 1 or

2 out of 4, 11% said the importance of reducing Dalhousie’s carbon footprint was 1 out of 4, and 33% rated the importance as 2 out of 4.

Of the students who rated their knowledge of carbon footprints as 4 out of 4, 37.5% were aware of at least one Dalhousie effort to reduce carbon footprints on campus. Of the students who rated their knowledge of carbon footprints as 1 or 2 out of 4, only 11% were aware of any of Dalhousie’s efforts.

3.2.2 Student’s perceived importance of carbon footprints

Overall, students ranked the importance of reducing Dal’s carbon footprint as relatively high, with 82% of all students surveyed rating the importance as either 3 or 4 out of 4 (Figure 2).

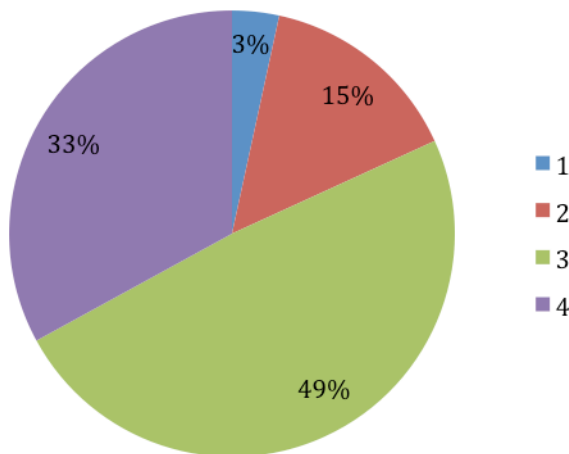


Figure 2: "On a scale of 1 to 4, with 1 being unimportant and 4 being extremely important, how important is reducing Dal’s carbon footprint to you?"

3.2.3. Student awareness of Dalhousie’s reduction efforts

It appears that not many students know about Dalhousie’s reduction efforts. Only 22% of surveyed student population had heard of any efforts at Dalhousie to reduce its carbon footprint. In addition, 32% of those who had heard of efforts at Dalhousie only knew about efforts related to transportation (bus passes and bikes). This leaves only 15% of the surveyed student population who were aware of any other types of efforts at Dalhousie.

Only 2 students mentioned any sustainability organizations on campus (one mentioned the “new sustainability office” and one mentioned “department of sustainability”). Only 1 student out of the total 88 surveyed had heard of Dalhousie’s carbon footprint analysis.

Most of the responses to the various questions had little variability between different levels of education, as determined by the listed year of study and whether they were studying at the undergraduate or graduate level. In particular, this was true of perceived knowledge of carbon footprints and perceived importance of carbon footprints. This relates to the above data since a lack of awareness of carbon footprint reduction efforts on campus would translate to upper year students not gaining knowledge about carbon footprints in general.

3.2.4 Student's perceived barriers to reduction

Many students perceive cost as a problem associated with Dalhousie's footprint reduction, with 38% of the surveyed student population citing it as a barrier on the surveys. In addition, 13% of the surveyed student population thought that lack of awareness and knowledge was a barrier for Dalhousie to reduce its carbon footprint, 19% thought it was a lack of support and initiative, and 6% thought it was a lack of control over individual behaviours.

Students overwhelmingly thought that infrastructure problems were the Ralph M. Medjuck's biggest problem in reducing its footprint, but were reluctant to blame their own actions. 61% of students listed heating/lighting as major contributors to Ralph M. Medjuck's carbon footprint, and 22% mentioned insulation/glass. (This is probably since they're architecture and planning students). Only 13% of students gave responses involving direct human activity as major contributors to Ralph M. Medjuck's carbon footprint, such as wasteful printing.

The highest response for student's perceived barriers to reducing their own carbon footprints at the Ralph M. Medjuck was limitations due to the inefficiency of the building. However, a number of student had interesting responses that could potentially be dealt with through working on changing behaviours (see Figure 3). For example, 7 students of the 88 total responded that laziness was a factor in reducing their carbon footprint.

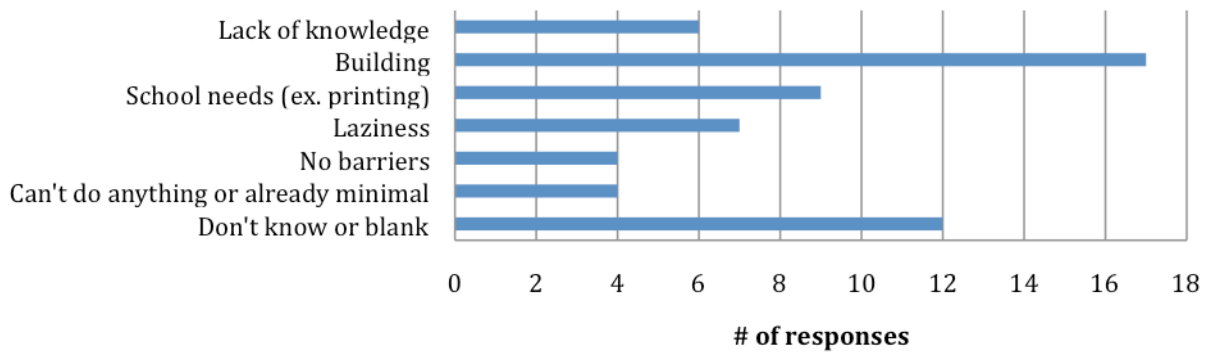


Figure 3: “What are some of the barriers to reducing your carbon footprint on campus?”

3.2.5. Recommended motivators for student behavioural change

Students generated many great ideas for motivating them to change behaviour. One common response was cookies (probably since cookies were given out to motivate students to take the survey), which was placed under the incentives category in Figure 4.

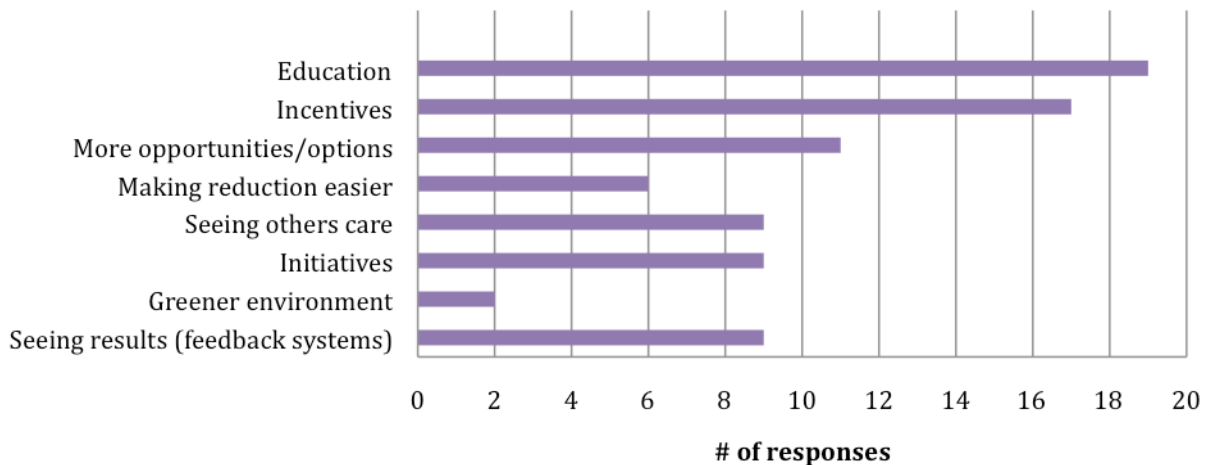


Figure 4: “What would motivate you to reduce your carbon footprint on campus?”

Since this question was open ended, it also generated some specific interesting responses. For example, one student stated that they would be motivated “if Dal threatened to raise tuition even more”. Another student stated that “There’s so much out there about environmental issues that I tend to zone it out. It would have to be well-marketed”.

3.2.6. General student recommendations

Students gave a variety of general recommendations about how to address carbon footprints on campus. As mentioned above, many of these were operational recommendations as opposed to ways that behaviours could be modified. Many students thought that the retrofitting of heating, lighting, insulation and windows was needed. More generally, they also cited old buildings and infrastructure, Dalhousie's sources of energy and insufficient support of low carbon transportation as problems that needed resolution.

It is important to note that a few behavioural changes were recommended. For example, 17% of students thought that 24-hour usage of the building was a major contributor to energy use, and suggested that this could be reduced by not constantly leaving the lights on. In addition, student waste, and in particular printing waste, was mentioned several times.

3.3. Faculty interview results

Six faculty interviews were conducted. The following thematic results emerged:

3.3.1. Faculty's perceived knowledge about carbon footprints

Faculty generally reported themselves as being more knowledgeable about carbon footprints than students did. 50% of faculty rated their knowledge of carbon footprints as 4 out of 4 and the remaining faculty rated their knowledge as 2 out of 4 (Figure 5). 100% of faculty were aware that they contribute to Medjuck's carbon footprint.

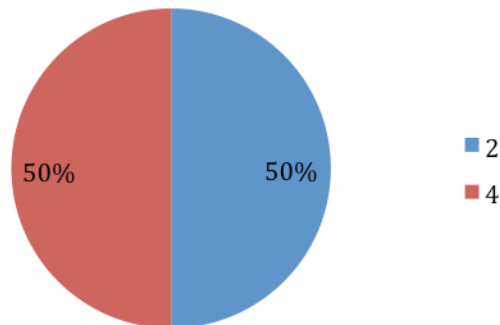


Figure 5: How knowledgeable are you about the term “carbon footprint”?

3.3.2. Faculty's awareness of Dalhousie's reduction efforts

The faculty also appeared to be much more aware of Dalhousie's sustainability organizations. 83% of faculty were aware of at least one sustainability organization on campus,

with 50% mentioning the Office of Sustainability, 50% mentioning the College of Sustainability and 1 faculty member mentioning the Eco-Efficiency Centre.

3.3.3. Faculty's current practices

Although faculty have both more perceived knowledge of carbon footprints and higher awareness than their student counterparts, their current practices do not completely reflect this. For example, all of the faculty reported having power bars, but only 17% (1 person) turned off their power bar when not in use. Some reasons that were stated for this issue included the power bar being hard to get to and that items are normally charging overnight.

When faculty leave their computer for a long time during the day, 66% leave it on, 17% put it to sleep and 17% turn it off. When they leave their computer overnight, 17% leave it on, 50% put it to sleep and 33% turn it off. Of the two people that report being able to control heating in their office, 50% would be willing to reduce their heat and wear warmer clothing. When they pass by a classroom, 50% of them would turn off the lights or data projector in an empty room.

3.3.4. Recommended motivators for faculty behavioural change

When asked whether educational presentations and focus groups would motivate them to change behaviours to reduce the Ralph M. Medjuck's carbon footprint, faculty gave mixed responses (Figure 6). Positive responses indicated that it would further their education about carbon footprints and how to reduce them – for example, one faculty member said that through an educational presentation they would “probably learn new ways to reduce usage”. However, negative responses implied that they believed behavioural changes were not very important in the large scheme of things, so educational presentations would have a limited impact on their behaviours.

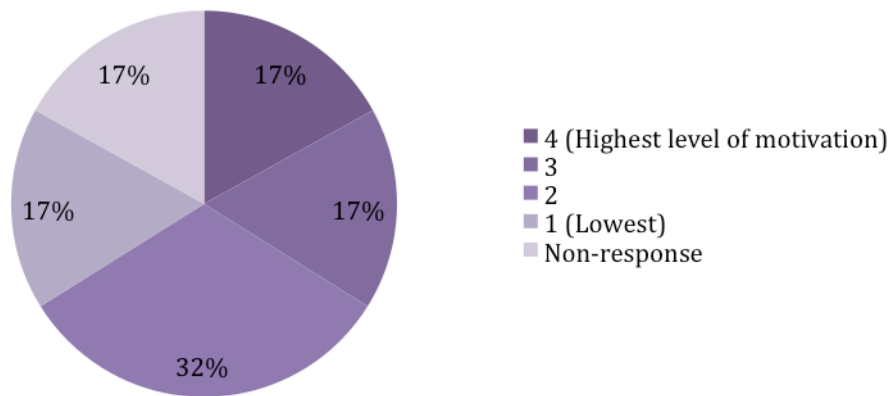


Figure 6. “Do you feel that educational presentations and focus groups would motivate you to change behaviours to reduce the Medjuck building’s carbon footprint?”

3.3.5. General faculty recommendations

100% of faculty said that they notice sources of wasted energy around the building. Specific areas mentioned included paper, poorly handled waste, windows, the heating and controlling system, projectors being left on and the way the studio space is set up. Suggestions and recommendations about how to remedy these problems included automatic timers for lights, turning down the heat, window alterations, designing better waste management systems and installing efficient lighting.

3.4. Staff Interview Results

Two interviews were conducted with staff members. The Sexton Campus Custodial Services Supervisor was interviewed, as well as a custodial staff member of the Ralph M. Medjuck building. The following thematic results were identified:

3.4.1. Staff’s perceived knowledge about carbon footprints

The Custodial Services Supervisor was not knowledgeable about what a carbon footprint was, and was informed of the basics from the interviewer prior to conducting the rest of the survey. She was also not aware of Dalhousie University’s Carbon Footprint analysis but saw great value in reducing carbon footprints. The custodial staff member was not aware of what a carbon footprint was but saw great value in reducing Dalhousie’s carbon footprint when the term was related back to energy use.

3.4.2. Staff's current practices

Dalhousie University Security Staff are responsible for turning lights on and off at the start and end of the day within the Ralph M. Medjuck building. No one is in charge of turning lights off throughout the day, lights on Sexton Campus are left on unless someone turns them off. Staff may turn lights off in hallways where natural lighting is sufficient, but they are often turned back on by someone. The custodial member believes that reducing energy comes down to individuals turning lights off as they see them. She cannot think of signs being used around campus to reduce carbon use.

The custodial member also mentioned that data projector machines were not turned off after their use, but that she was not allowed to turn them off. She pointed out study rooms where lights were left on for days at a time, but were locked so she was unable to turn the lights off. She said that there were not any energy reducing policies currently in place within the building, and said that people working in the building 24/7 is its biggest challenge. Architecture students are really good with turning their lights and computers off, however, when they are not in use. She said that there currently is not any signage being used around the building. She said that sometimes hot water is left on in the bathroom instead of being turned down all the way, and fans were left on over night which was pointless.

3.4.3. General staff recommendations

The two staff members interviewed both recommended signs, email updates and ad campaigns as good motivators to remind students, faculty and other staff members to reduce energy consumption. A second recommendation was to change some operating procedures that would allow custodial staff to turn lights or other electronic devices off when they came across them during the day. Finally, staff recommended that policies should be implemented to promote energy reduction within the building.

4. Discussion

The purpose of our research was to assess the baseline knowledge on how people view their connections to a building on the Dalhousie campus and its impact on Dalhousie's carbon footprint. In addition, to gain an understanding of what students, faculty and staff see as current issues in regards to energy efficiency, as well as energy reduction approaches that they feel are effective. With the information gathered, a presentation was made for the Eco-Efficiency Centre

as a way to motivate students, faculty and staff to reduce their carbon footprint at Dalhousie University.

4.1. Literary Research Discussion

Research suggests that students, faculty and staff can be effectively engaged in greening the campus through partnerships, environmental clubs and various individual projects (Fernandez, 2010). Environmental committees can also be extremely effective as they bring students, faculty and staff representatives together to discuss campus specific issues and solutions through meetings, hands-on projects and educational seminars. Being elected to or invited to join a committee can be a prestigious honour that can invoke dedicated work (Fernandez, 2010). The above mentioned universities have developed programs to accomplish this however there seems to be a fundamental lack of research and program development in the area of finding out how to effectively address students, faculty and staff to invoke individual behavioural changes through individual actions.

4.2. Student Survey's Discussion

Based on the finding of the student surveys, those students who said they were knowledgeable or very knowledgeable about what a carbon footprint is were also the students who thought that reducing Dalhousie's carbon footprint was either important or extremely important. In addition, the students who rated their knowledge of what a carbon footprint is as either not knowledgeable or somewhat knowledgeable also stated that the importance of reducing Dalhousie's carbon footprint was either not important or somewhat important. Getting students motivated to help reduce Dalhousie's carbon footprint, as well as spreading awareness to other students, is a plausible idea, as 82% of students surveyed said that reducing Dalhousie's carbon footprint was either important or extremely important. Dalhousie University could follow the examples of Brown University and the University of South Carolina. Brown University founded the "Brown Is Green" program as a way to promote and provide education to students through meetings, conferences and seminars on environmental issues on campus. They also used this program as a way to promote the environmental initiatives taking place on campus that students may have been unaware of (Starik *et al*, 2002). The University of South Carolina used environmental education to promote a sustainable lifestyle for the university's community (Starik *et al*, 2002).

The surveys showed that what was holding students' back is a lack of information, as only 22% of students had heard of Dalhousie's efforts to reduce their carbon footprint, with only 2 of these students stating that they were aware of sustainable organizations on campus. In addition, only 1 student surveyed had heard that Dalhousie had done a carbon footprint analysis.

There were many barriers identified that were associated with Dalhousie by the survey participants, which included cost, knowledge and awareness, lack of support and initiative, and inability to control behaviour. Cost was identified as the biggest barrier by 38% of students, however, a lack of awareness of Dalhousie's carbon footprint reduction efforts could account for the fact that many students thought Dalhousie does not have enough funding to reduce carbon emissions. As only 6% of students identified a lack of control over behaviours as a barrier, it could be shown to students that ways of promoting behavioural changes, such as presentations and fact sheets, are inexpensive and effective. Students identified that the biggest barrier they face as students to reduce their carbon footprint at Dalhousie, and specifically at the Ralph M. Medjuck building, are due to the building being antiquated and inefficient. Few students were willing to blame themselves as a barrier to reducing their carbon footprint on campus, with only 7 students identified a lack of willingness or "laziness" on their behalf. At Dalhousie University, there is no formal environmental council or advisory committee like there is at Ball State University and University of South Carolina, respectively. Forming a council that includes faculty, staff and students would help give a broad spectrum of insights and opinions, and the council would be used as a tool for promotion of efforts. If students were more aware of the organizations and efforts occurring on the Dalhousie campus, they may be able to overcome some of their perceived barriers in the reduction of Dalhousie's carbon footprint.

If energy use were decreased then the amount of money Dalhousie University would have to spend on energy use per year would also decrease. This could lead to reduced operational costs, which in turn could allow for more retrofitting of buildings on campus, which would result in a decrease in energy use and therefore reduce costs even more. Students could see the benefits of a decrease in energy costs too if operational costs were reduced, Dalhousie University may have the ability to reduce tuition costs as well purchase or upgrade more equipment.

Dalhousie University may not be giving its students an increased knowledge about carbon footprints as student progress through their degree, as there was little variability seen

between participants at different levels of education. In the case of undergraduate versus graduate students, this implies that the undergraduate experience in general is not impacting opinions about carbon footprint significantly. By increasing awareness and education, Dalhousie students would be more knowledgeable about sustainable organizations on campus, which in turn could lead to an increased knowledge about carbon footprints and the importance of the reduction of Dalhousie's carbon footprint.

Students listed many different ideas for ways to motivate them to change their behaviours, but when listing general recommendations on ways to address carbon footprints on campus, few were suggestions on ways that behaviours could be modified. With our findings from the survey used in our formulation of our presentation, as well as the information found in our literary review, we hope that the presentation is an effective tool to motivate behavioural changes in students

4.3. Faculty Interview's Discussion

Based on the interviews with faculty that use the Ralph M. Medjuck building, it was found that faculty members consider themselves either somewhat knowledgeable or very knowledgeable about what a carbon footprint is, and all were aware that their actions on campus contributed to the carbon footprint of the building and of Dalhousie University. Faculty perceive that they have a good understanding of carbon footprints and Dalhousie's efforts in its reduction, however, their practices show that they don't view carbon footprint reduction as important. More than half of the faculty members interviewed either leave their computer on or put it to sleep when gone from their computer during the day and at night. Faculty members also only identified operational changes, such as automatic lights and reducing heat use by fixing windows and turning down the heat, as recommendations on ways to address carbon footprints on campus. Their responses showed that they did not think behavioural changes would be effective or they were not willing to make the behavioural changes necessary to reduce their carbon footprint on campus.

One way of encouraging certain faculty members to change the behaviours to support the reduction of the university's carbon footprint is to put their carbon reduction efforts in the context of research and experimentation related to their fields of study (Sharp, 2002). As well, environmental and sustainable themed contests among employees are a useful way of engaging employees in new sustainable behaviours (Denton, 1999); and as Dalhousie University already

has the Rethink! Program, used to spread awareness and encourage participation, this could lead to faculty becoming more willing to make necessary behavioural changes. In addition, if Dalhousie University were to promote and support faculty members to perform energy audits, carbon footprint analyses and eventually energy retrofits at home, they could be more likely to change their behaviours at work afterwards (Romm, 1999). Ball State implemented a “Green for Green” paid summer workshop. This workshop would allow faculty members to gain an increased understanding of environmental and sustainable practices, that they could then implement into their course materials and encourage other faculty members to engage in sustainable practices.

Our survey results were only based on the perceptions of participants. We were unable to determine any of the participants’ actual knowledge about carbon footprints and Dalhousie’s carbon footprint, as our questions were done on a self-rating scale. What one individual may perceive as very knowledgeable may not be the same perception as other individuals.

4.4. Staff Interview’s Discussion

From an interview with a Ralph M. Medjuck building custodial staff member it was apparent that knowledge of what a carbon footprint was, that there are many areas of improvement that front line staff can identify in the building, and there were area’s where staff could reduce energy use, but did not have the authority to do so. Also, an interview with the Sexton Campus Custodial Services Supervisor showed that Dalhousie has done little to internally market its energy efficiency plan to custodial staff, who play a key role in the use of energy in the building.

Literature on low-carbon employees indicate that highly carbon capable employees are desirable for reducing carbon use in organizations (Whitmarsh *et al*, 2009). Results from surveys show that Ralph M. Medjuck custodial staff are not carbon capable for the following reasons; they do not know the causes of carbon emissions and its associated consequences, they are unaware of the extent the role that individuals and their daily activities play in producing carbon emissions, they do not have a broad understanding of the benefits associated with adopting a low-carbon lifestyle, there are few opportunities for change through individual actions, there is little or no interest in understanding of the energy reduction activities requiring collective action or some form of change in company infrastructure (Whitmarsh *et al*, 2009). From these surveys

it seems that there is little or nothing done by Dalhousie to empower staff to become carbon capable through educational programs.

5. Conclusion

Research indicates that the current rate of carbon dioxide and other greenhouse gas emissions associated with human activities is causing climate change to occur at an accelerated rate (Speth, 2008). Dalhousie University is responding to a need to green the campus and reduce the carbon footprint of the campus; it is upgrading and retrofitting campus infrastructure and processes, designing new infrastructure and processes sustainably, implementing monitoring systems of energy, water and electricity use on campus and through educational campaigns regarding their efforts (Dalhousie Office of Sustainability, 2010). This research seeks to address the current lack of individual student, faculty and staff engagement and interest in the greening the campus movement, and more specifically in their own energy consumption levels as well as those of their academic buildings. The research was limited to students, faculty and staff of the Ralph M. Medjuck building, serving the Faculty of Architecture and Planning of Dalhousie University.

The purpose of this research is to provide useful research and tools to the Dalhousie University Eco-Efficiency centre to help them bring their mandate of “foster(ing) sustainable competitiveness in business” (Eco-Efficiency Centre, 2011) back to the students, faculty and staff of Dalhousie University. The Eco-Efficiency centre is an outreach program for eco-efficiency in small businesses. We sought to understand and assess how people view their interactions and impacts upon buildings within Dalhousie University in a context of affecting the carbon footprint of the entire institution. Another goal of this research was to establish effective approaches students, faculty and staff can implement to reduce energy use in the Ralph M. Medjuck building, and appropriate ways to present these findings.

5.1. Recommendations for addressing energy consumption behavioural changes in students

Our survey results indicated that the more perceived knowledge a student had regarding the term “carbon footprint”, the more likely they would find it important to reduce Dalhousie University’s carbon footprint overall. Overall, many student survey respondents said it was important to reduce Dalhousie University’s carbon footprint, however they also had very little knowledge of Dalhousie’s current efforts. Students saw cost, lack of knowledge and awareness,

lack of support and initiative, and a lack of control over individual behaviours as major challenges to addressing issues of heating and lighting energy waste in the Ralph Medjuck Building. One student responded “there’s so much out there about environmental issues that I tend to zone it out. It would have to be well-marketed” when asked what would motivate them to reduce their carbon footprint on campus. Creative marketing plans are crucial in addressing the student market because they are bombarded every day with marketing messages from all fronts. To address energy consumption behavioural changes in students, we recommend;

1. Educate students on the importance of energy reduction.
2. Educate students on initiatives taking place at Dalhousie University and how they can get involved with these initiatives.
3. Educate students on the impacts that specific behavioural changes could have on a specific building’s energy reduction [i.e. the impact of turning off a light bulb in the Ralph M. Medjuck].
4. Use creative methods when raising awareness and educating students. Guerrilla marketing ideas that are explosive, high-energy and most importantly fun could be used to effectively engage students. For example, three people in green morph suits running around the Medjuck building screaming “Turn off monitors and lights, help Dalhousie use energy right,” would make the message memorable. Another example would be making a rap to keep audiences intrigued when presenting, an example of how we presented our research findings. The text of the rap is included in Appendix F.

5.2. Recommendations for addressing energy consumption behavioural changes in faculty

Our research indicates that faculty members of the Ralph M. Medjuck building see little value in behavioural changes as a means to reduce the building’s energy consumption. In general faculty considered university infrastructural changes, as well as addressing current sources of waste [i.e. large heat inefficient windows] to be much more effective than behavioural changes in terms of energy reduction. Many faculty members were found to leave their computers on, or in sleep mode, while they are away from the office. All but one responded that they did not turn their power bars off when electronics were not in use. To address behavioural changes in faculty’s energy consumption, we recommend;

1. Educate faculty on the importance of energy reduction, and demonstrate how they can incorporate energy-efficiency into research or experimental projects.

2. Educate faculty on initiatives taking place at Dalhousie University and how they can get involved with these initiatives.
3. Educate faculty on the impacts that specific behavioural changes could have on a specific building's energy reduction [i.e. the impact of turning off a light bulb in the Ralph M. Medjuck].
4. It is important to emphasize to faculty members that as persons of authority in the University, it is crucial that they show leadership in changing their behavioural changes to promote energy consumption reduction.

5.3. Recommendations for addressing energy consumption behavioural changes staff

Our research and survey results indicated that while staff may not have a high level of comprehension regarding carbon footprints, they are very knowledgeable of the buildings they interact with daily. Staff were able to identify many different forms of energy inefficiencies around the Ralph M. Medjuck building, however there were not any channels for them to communicate these problems through, nor anyone to offer solutions to. It appears as though staff, and the role they play, have been largely ignored in the greening the campus movement, yet they have the potential to offer vital knowledge and support to energy efficiency programs. To address energy consumption behavioural changes in staff, we recommend;

1. Educate staff on the importance of energy reduction.
2. Educate staff on initiatives taking place at Dalhousie University and how they can get involved with these initiatives through and outside of their daily working tasks.
3. Educate staff on the impacts that specific behavioural changes could have on a specific building's energy reduction [i.e. the impact of turning off a light bulb in the Ralph M. Medjuck].
4. Empower staff to be able to enact changes within buildings. This may mean working with the Sexton Campus Custodial Services Supervisor, or a higher member of the Facilities Management administration, to provide means [i.e. permission or relevant keys] for staff to turn off data projectors or lights behind locked doors when they see that they are left on.
5. Recognize and inform staff on how vital of a role their energy efficiency behavioural change is in supporting the success of any structural, operational and organizational changes enacted within the Ralph M. Medjuck building.

6. Develop channels of communication that staff can use to report energy inefficiencies, as well as a feedback system to report back the positive result associated with reporting the energy inefficiency.

5.4. Recommendations for the Eco-Efficiency Centre

Our research indicated that sustainability related organizations within Dalhousie University are not well known of by students, faculty and staff. Only one respondent, a faculty member, had knowledge of The Eco-Efficiency Centre. If the Eco-Efficiency Centre is beginning to look at reducing carbon footprint and promoting energy and eco-efficiency within its home institution, Dalhousie University, it must begin to make itself better known around campus. Our recommendations for how the Eco-Efficiency Centre should promote energy efficiency on campus include;

1. Develop a higher profile within the Dalhousie University community through outreach programs, educational presentations, increasing physical and visual connection with the Campus and partnering with other sustainability initiatives on campus such as the Office of Sustainability and the Dalhousie Student Union Office of Sustainability.
2. Use educational materials, such as the presentation, handouts and signs included as Appendix C and D, and E respectively, to educate students, faculty and staff on the University on carbon footprints, energy efficiency, Dalhousie University's carbon footprint and specific details of the energy use of specific buildings [i.e. information on the Ralph M. Medjuck building for the students, faculty and staff making use of that building].
3. Make use of creative or otherwise innovative ways to try to enact behavioural changes in the energy efficiency of students, faculty and staff. These could include; flash mobs, social media [facebook, twitter, blogs], and energy tours of specific buildings [with the purpose of discussing and identifying specific changes that could be done in specific buildings with interested students, faculty and staff].
4. Provide individual recommendations for students, faculty and staff as research has shown that they will have different knowledge bases, interactions with the buildings, ideas and motivators to change.
5. Provide incentives to get people to change their energy efficiency behaviours. This could be modeled similarly too, or run alongside, the Dalhousie University Rethink!

program. Focus upon small incentives, such as plaques or symbolic awards, periodically given over a long period of time to transformational leaders would ensure continued engagement in the program. Long-term engagement can also be accomplished through fostering a spirit of competition, such as with the Rethink! team competitions program.

5.5 Concluding Remarks

Our research has demonstrated that the students, faculty and staff who use the Ralph M. Medjuck Building are in need of additional education on the concept of carbon footprinting, energy efficiency and why it is important to reduce energy consumption in a university setting. There is a general feeling within this building that the individual behavioural changes of students, faculty and staff are not important to reducing the carbon footprint and energy consumption of the Ralph M. Medjuck building. While Dalhousie University, through organizations such as the Office of Sustainability and Dalhousie Student Union Office of Sustainability, is beginning to promote a green culture on campus, this is mostly being done through infrastructural, operational and process changes at the university level. Our research demonstrates that the engagement and support of the students, faculty and staff of an individual building are essential tools to promote the success of these university level changes.

The Dalhousie Eco-Efficiency Centre is well positioned through its experiences working with small-medium sized businesses to begin assessing the carbon footprint of individual buildings on campus. With this knowledge the Eco-Efficiency Centre can develop presentations, educational materials and other creative information dissemination methods to encourage students, faculty and staff of individual buildings to lower their building's carbon footprint through individual behavioural changes. Included in this research in Appendices C,D,E,F are templates of a presentation, a informational hand out, an educational sign and a creative rap form of information dissemination, respectively, that can be used to promote behavioural changes. The Eco-Efficiency Centre can use this research, alongside the aforementioned templates, to systematically facilitate, support and monitor individual behavioural changes within individual buildings by students, faculty and staff to reduce each building's carbon footprint and the Dalhousie University carbon footprint as a whole.

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Appendix A. Student survey questions

1. Are you a graduate or undergraduate student?
2. What year of study are you in?
3. On a scale of 1-4, with 1 being not knowledgeable and 4 being very knowledgeable, how knowledgeable are you about the term “carbon footprint”?
4. In your own words, tell me what you know about carbon footprints. A carbon footprint is defined as the total amount of greenhouse gases produced directly and indirectly to support human activities usually expressed in equivalent tons of carbon dioxide.
5. On a scale of 1 to 4, with 1 being unimportant and 4 being extremely important, how important is reducing Dal’s carbon footprint to you?
6. What do you think are Dalhousie’s barriers in reducing its carbon footprint?
7. Are you aware of any efforts at Dalhousie to reduce the university’s carbon footprint? If yes, what efforts are you aware of?
8. Do you know if Dalhousie has a campus wide Carbon Footprint Analysis?
9. In your own words, tell me what you know about the Dalhousie Carbon Footprint Analysis.
10. What do you think are the major contributors to the Medjuck building’s Carbon Footprint?
11. To what extent do you feel that you contribute to Medjuck’s carbon footprint?
12. What are some of the barriers to reducing your carbon footprint on campus?
13. What would motivate you to reduce your carbon footprint on campus?

Appendix B. Faculty interview questions

1. How long have you been working in the Medjuck building?
2. How knowledgeable are you about the term “carbon footprint”?
3. Are you aware of the Medjuck’s contributions to Dal’s carbon footprint?
4. Do you feel you contribute to the Medjuck’s carbon footprint?
5. Are you aware of any of Dal’s sustainability organizations? Please list them.
6. Do you have a computer at work?
7. Do you have a power bar in your workspace?
8. If yes, do you turn off your power bar when the electronics plugged into it are not in use? Why or why not?
9. When you leave your office for a long time during the day, what do you do with your computer?
10. When you leave your office for the day, what do you do with your computer?
11. Can you control the heating in your office?
12. Would you be willing to turn your heat down and adjust your clothing accordingly in an effort to conserve energy?
13. When you leave a classroom or office, what do you turn off?
14. When you pass by a classroom or office, what do you turn off?
15. Are educational materials related to sustainability, carbon footprint or energy efficiency present in the Medjuck building?

16. Do you feel that educational presentations and focus groups would motivate you to change behaviours to reduce the Medjuck building's carbon footprint?
17. Would you be willing to participate in a focus group on your own time to brainstorm ways to reduce the Medjuck carbon footprint?
18. Do you notice specific sources of wasted energy around the building?
19. Do you have any suggestions for how energy can be saved around the Medjuck building?



ENERGY CONSUMPTION AT DALHOUSIE



Individual Contributions and Assumptions

What is the Eco Efficiency Centre

Effective resource use that lowers the environmental footprint

Efficient processes and practices that deliver world-class productivity and quality

Efficient products and services that drive sustainable consumption

Efficient by-product management that eliminates waste and lowers cost

Presentation Goals

- To increase awareness about Dalhousie's Carbon Footprint
- To inform about Dalhousie's efforts to reduce its Carbon Footprint
- To involve people at the individual level about how they can help reduce Dalhousie's Carbon Footprint

Introduction to CO₂ at Dalhousie

- In 2008-2009 Dalhousie's CO₂ output was 109,510 metric tons
- Equivalent to 19,480 cars on the road for a year
- Dalhousie would have to plant 527,604 trees a year to offset its Carbon output

More CO₂ at Dalhousie

- 6.18 tons of CO₂ per person on campus
- Canadians on average directly produce 5 tons of CO₂ year
- Attending Dalhousie University indirectly doubles a persons Carbon Footprint
- Dalhousie has one of the highest per student carbon footprints in Canada

Even more CO₂ at Dalhousie

- Emissions intensity (Grams CO_{2e}/kWh)
 - Alberta 930 g/kWh
 - Nova Scotia 841
 - New Brunswick 366
- 49% of Dalhousie's CO₂ is from electricity use
- Here in Nova Scotia, Dalhousie is at a disadvantage due to emission intensity

The cost of CO₂ at Dalhousie

- Dalhousie spent \$11.8 million on energy in 2008-09
- 1.8% of total operating budget (66.8 million)
- Dalhousie spends \$666.66 on energy per person on campus
- It would be cost efficient to reduce Dalhousie's Carbon Footprint

So what?

- Green House Gases = Climate Change
- Climate Change drastically affects billions of people's lives
- Energy prices will go ↑ and remain there
- \$Money\$ could be used elsewhere on campus
(Dalhousie has recognized all of these issues)

Dalhousie's Commitments

Within the last 20 years Dalhousie has signed three major environmental declarations

- Halifax Declaration
- Talloires Declaration
- United Nations Environmental Programs
International Declaration of Cleaner Production

These commitments have resulted in a number of large changes on campus.

More Commitments

Creation of the Dalhousie Office of Sustainability

Revising and creating new policies on

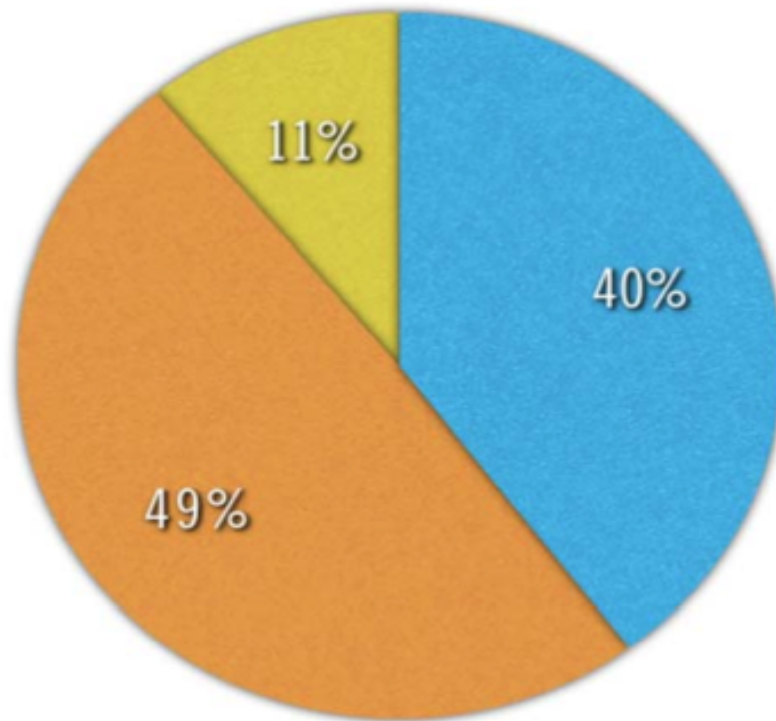
- Buildings
- Energy
- Transportation
- Waste
- Purchasing




Dalhousie's Plan

- Commitments resulted in a 2008-2009 Green House Gas Inventory Report
- Report gave direction and goals to University
- Formulation of CO₂ Reduction Strategies Plan
- Major steps to improve energy efficiency

GHG Inventory

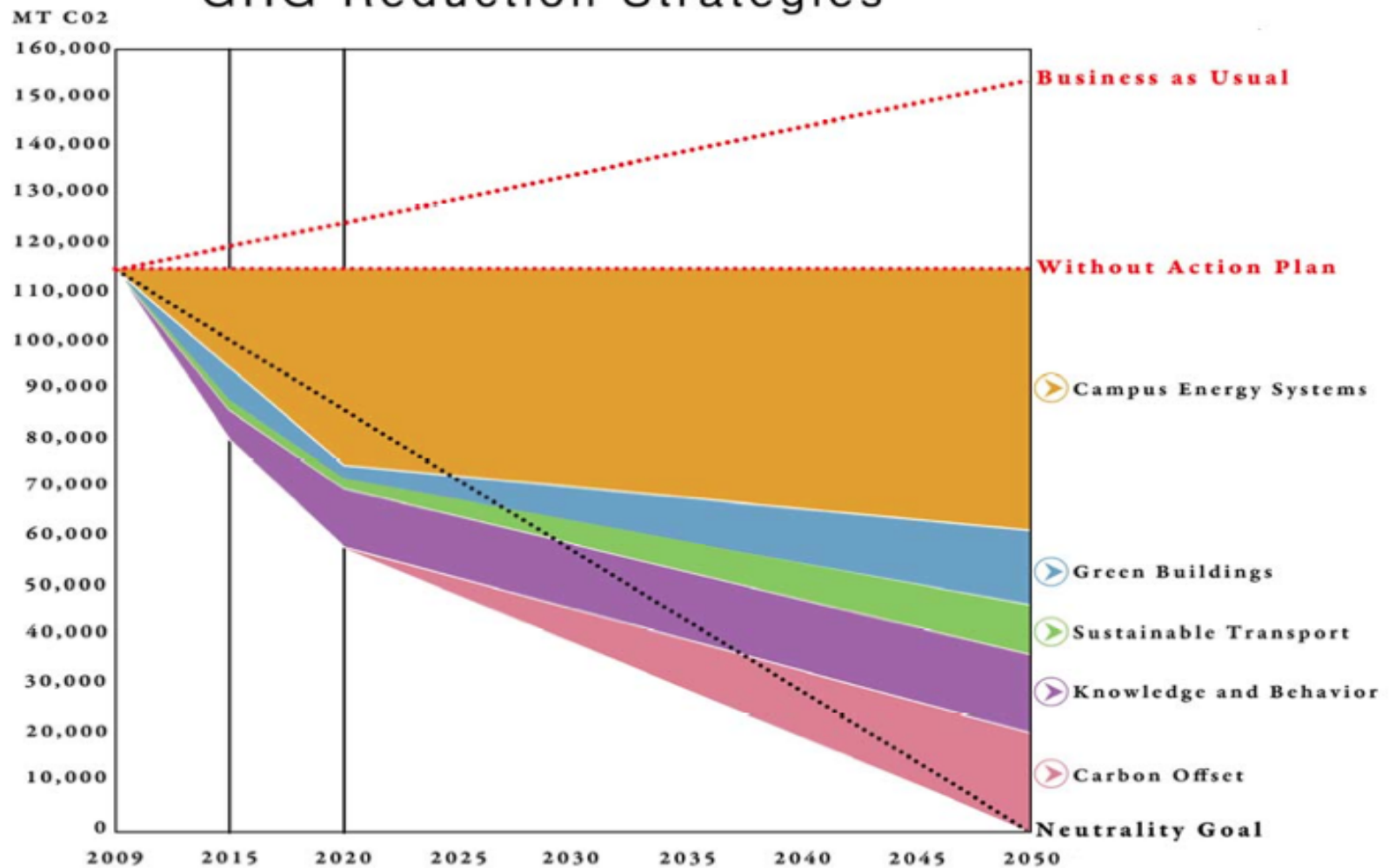
109,510 Co₂e Emissions 2008–2009



-  Scope 1: Heating/Cooling & Fleet (Stationery and Mobile Combustion) 43,477 Co₂e
-  Scope 2: Electricity (54,043 Co₂e)
-  Scope 3: Commuting Travel (11,990 Co₂e)

Commitment Plan

GHG Reduction Strategies



What the Plan Means

- All new buildings will be built to LEED Gold Standards
- Energy retrofiting has occurred in a number of older buildings (LSC)
- Dalhousie has taken large steps to reduce its energy costs
- Future options for renewable energy on campus

So Far So Good

Large changes have been made to technical aspects and high level policies affecting carbon out put on campus

BUT! We still have a long way to go to achieve a carbon neutral campus

What does this mean to me?

Individuals on campus have the collective power to reduce Dalhousie's carbon foot by 15,000 tons, an average of one ton per Dalhousie student.

Who can change what?

Staff, students and faculty all have different roles to play when it comes to reducing energy use and GHG emissions

Change in behavior and habits can have immediate and lasting effects on reducing emissions on campus and beyond

STUDENTS

Students have the collective power to induce widespread change at all levels of the university

Student Power OMG!!

Really?

Yes really. Individual students and student can affect wide spread change in a number of ways

- Joining student groups (over 250)
- Hosting events
- Pestering professors
- Raising Hell about an issue
- Bring it up to the DSU

But First

If you are concerned about sustainability take the time to calculate your carbon footprint

at www.safeclimate.net

Understanding how you create GHG emissions is the first step in being able to reduce them

Personal Reductions

These simple things can reduce carbon footprints drastically if everyone does them

- Turn off computer monitors when not in use
- Turn off lights in study areas with natural light
- Put on a sweater and turn down the heat
- Put up signage to encourage other students

On a Higher level

- Volunteer or join an environmental group on campus
- Flash Mob a department and turn off all the lights
- Petition for the university to adopt a new policy
- Don't ever forget that as students you are the future of change and making people realize this is key

Avenues of Change

There are several organizations and offices that are working towards reducing energy use.

Making contact with these organization is a great way to bring up issues on a personal level.

Personal contact has been proven to get more results then other contact methods.

Who's on Campus

Office of Sustainability

College of Sustainability

Eco-Efficiency Centre

Elizabeth May Chair in Sustainability and Environmental Health

Dalhousie Student Union Sustainability Office

SustainDal Student Society

Presidents Advisory Council on Sustainability

Resources

office.sustainability.dal.ca

sustainability.dal.ca

eco-efficiency.management.dal.ca

emaychair.dal.ca

dsusustainabilityoffice.ca

safeclimate.net

efficiencyns.ca

clean.ns.ca

blogs.dal.ca/sustainabilitynews/

Faculty

Faculty have many ways to affect energy use at Dalhousie

As educators you have influence on how students learn and what they take away from their university experience

Including sustainability related material in class no matter what subject is being taught can have long lasting effects

How to start change

Concerned about energy use?

Know of problem areas?

Want to be involved?

There are a number of ways to get involved and implement change throughout the campus

But first...

Change Starts at Home

Become aware of energy use at home

Online resources like www.energycns.ca and www.safeclimate.net can help you understand and calculate your carbon footprint

Make the connection between home and work

In Class

- Turn off the lights when you leave a classroom or office
- Favor natural light over electric light whenever possible
- Turn off the projector when it's not in use
- Encourage student to turn off lights
- Turn the thermostat down to 20°C

Out of Class

- Turning off your computer for just one hour a day, every day, will reduce your carbon emissions by 0.0512 ton of CO₂ annually
- Put up signage in staff lounges encouraging people to think sustainably
- Put electronics on a power bar to stop phantom energy use and turn off the power bar when the electronics aren't in use!

Avenues of Change

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safeclimate.net

efficiencyns.ca

clean.ns.ca

blogs.dal.ca/sustainabilitynews/

Custodial Staff

Custodial staff should be considered the vanguard in energy use because...

Custodial staff have the greatest potential to reduce GHGs on campus.

This means you have the ability to save more power than most people on campus

How to start change

Concerned about energy use?

Know of problem areas?

Want to be involved?

There are a number of ways to get involved and implement change throughout the campus

Change Starts at Home

Become aware of energy use at home

Online resources like www.energycns.ca and www.safeclimate.net can help you understand and calculate your carbon footprint

Make the connection between home and work

Saving Energy on Campus

- Turn off lights in unused classrooms
- Turn lights off In hallways where natural lighting is bright enough
- Make sure thermostats are turned down to 20°C
- Check with security and computer lab staff to see if you can turn off lights and computers.
- Remind co-workers about energy saving tips

Broad Change

- Form a committee
- Open discussion groups
- Formal complaints
- Participating in events
- Signage

These things can have large impacts!

Avenues of Change

There are several organizations and offices that are working towards reducing energy use.

Making contact with these organization is a great way to bring up issues on a personal level.

Personal contact has been proven to get more results then other contact methods.

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safeclimate.net

efficiencyns.ca

clean.ns.ca

blogs.dal.ca/sustainabilitynews/

Dalhousie University

Dalhousie University has been working on environmental and sustainability issues regarding the university for over 20 years, and recently formed the University Office of Sustainability to focus on changes in university operations. The Eco-Efficiency Centre, a non-profit environmental management centre, works with businesses to help enhance productivity and optimize environmental performance and operational efficiency.



Climate change is the alteration of the global atmosphere composition over time as either a direct or indirect result of human activity.

A **carbon footprint** is a way to measure how human activity affects the environment, and is measured by the amount of **greenhouse gases** produced in tones of carbon dioxide equivalent.

Dalhousie aims to reduce 15% by 2013 and 50% by 2020!

Did You Know?

- 🌍 Dalhousie produced 109,510 tonnes of CO₂e in 2008-09
- 🌍 49% of those carbon emissions were due electricity
- 🌍 The total carbon emissions equal the gas emissions from 19,480 vehicles
- 🌍 The carbon emissions from electricity on campus are equal to the electricity use of 5,950 homes for one year, more than the whole town of Wolfville Nova Scotia!

Simple Actions Can Make All The Difference

- 🌍 Turn off the light when you leave a room
- 🌍 Keep the blinds open during day instead of using electric lighting
- 🌍 Turn off your computer AND power bar when not in use
- 🌍 By turning of your computer and monitor for 1 hour a day, you can reduce your carbon emissions by 0.0512 tonnes of CO₂e annually



**DALHOUSIE
UNIVERSITY**

**ECO EFFICIENCY
CENTRE**



Appendix F. Example of a creative educational presentation: Pecha Kecha Rap

Hi my name is Nina Nedic, And I am representing the carbon footprint team.
Something some thing WONDERFUL
Was created, by Dalhousie and Nova Scotia power
It was a not for profit organization,
Which helps businesses in atlantic Canada become sustainable by offering guidance and
education, as well as GHG management services to help businesses measure and manage
their carbon footprint.
They believed in the eco efficiency management philosophy
Where the financial performance of businesses is strengthened by minimizing resources
The eco efficiency center is so great
Has been helping businesses since 1998,
To foster sustainable competitiveness,
through resource efficiency and effectiveness
Last year it put the school to a test, it did an carbon audit
You could guess the rest
Yea how can dal reduce,
its overconsumption, and energy misuse,
Here we came in, the carbon foot print team,
Nina, chris, hannah, ashley and rob mcneish,
To help the EEC connect,
With staff, students, the faculty it effects,
Cus to make a change, we gotta ignight
A campus wide movement starting tonight
Well actually, this teams journey started a few months ago
Sit backhere we gooo

Our deliverable is a presentation that would delight,
EEC program manager Penny slight
Similar to one she offers to companies,
With a customized approach staff students and faculty
we could not only use fiscal reasons to go green,
cus this isn't a businesses, but a universities,
and unlike a business where people are persuaded,
by the dollar sign, at school they aint payin
so viewing resource uses as a direct cost,
as a tangible purchase is often lost,
and there is a lower perceived ability,
to make these choices outside of your residency,

We narrowed our research to the Medjuck Building
on sexton, for architecture and planning,
and asked, is the Dal community aware,
Of a campus wide carbon footprint, why they should care?
Do staff and custodians realize?
How dal wastes energy, could they provide advice?
On carbon reduction techniques,
how about students? How outht they be reached?

Interviews with custodial staff were able to provide
General direction and great insight
They said the students did pretty well,
They turned off their monitors, unlike the staff they did tell,
so we began to survey students and faculty
and in exchange for their survey they received a home baked cookie
the sample was both heterogenous and homogenous
very representative,
response was very positive

out of 88 surveyed the user type varied in frequency
like how they often used building, what year they're in and what faculty,
we found that awareness was low,
that of all the students surveyed only one did know,
that dal did a cabon footprint analysis
infact a few did not even know what this term is,
18% they were knowledgeable with the term,
rated it 4/4 with little more to learn,
of the group rating it 4/4,
they valued reducing dals Footprint a lot more
overall, 82% of students agreed
that outta 4, reducing dals footprint was at least a 3

6 faculty surveyed better connected,
the medjuck buildings footprint, and how they affect it,
unfortunately only 17 %
turned off their power bars, which needs improvement
also they did not admit,
to leaving on data projectors not one bit,
my sources from custodial staff would disagree,

but fibbing is a known phenomena from doing surveys personally,

We asked faculty to identify area's of waste,
They said paper, windows, and the strange set up for studio-space,
infrastructure was most students perceived barrier,
to reducing their carbon footprint and what couldn't be scarier,
is that results seem to show,
the impact of behavioral change, they did not know,
faculty said that education and presentations,
would be a big motivation,
and students believed that incentives and education,
would motivate them to change in relation,
to other options provided, like a greener surrounding environment,
all this shows where the EEC's money should be spent,
yes the carbon footprint team agrees,
that there is a huge gap educationally,
they should internally market to custodial staff
They already told us areas where waste is bad
present to them their ideas, a bottom up approach,
create feedback systems, designate leaders to coach,
new employees, integrate it into training,
every staff needs to know dal is now saving,
so the next time they do their rounds,
they'll turn off any unused light that they found
when it comes to presenting to faculty
find creative ways to connect them to electricity
how the schools short on money provincial operational funding has decreased,
how they might conserve at home so why at work should it cease?
that in order to push dal into the future
we need to become sustainable it couldn't be sooner
because environmentalism is not a trend,
and is it not the duty of the educated to send,
the right message, through teaching and leading,
and create a culture amongst the faculty feeding,
into a status quo of conservation
present this situation:
did they know a computer monitor,
consumes as much as a light bulb does per hour,
and 60 Watts may not seem like much,
unless I took all the profs in the medjuck and added em up,

and students- oh so fresh and so clean clean,
need to realize their impact, keep turning off their screens,
to call out teachers who waste frivolously,
implement a way so that feedback occurs continuously,
Overall, this experience was awesome,
Our research explored tons of option
That the eco efficiency centre can present
To reduce dalhousies carbon footprint
Thank you Penny slight, John, Tara and Rochelle

Appendix G. Ethics Form

Revised October 2010

ENVIRONMENTAL SCIENCE PROGRAM FACULTY OF SCIENCE DALHOUSIE UNIVERSITY

APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS

GENERAL INFORMATION

1. **Title of Project:** Facilitating carbon footprint awareness in the Ralph M. Medjuck building
2. **Faculty Supervisor(s)** John Choptiany **Department:** School for Resource and Environmental Studies **e-mail:** jchoptiany@gmail.com
3. **Student Investigator(s)**
Ashley Watson, Faculty of Science- Biology, as861407@dal.ca, 902-293-3194
Rob MacNeish, International Development Studies and Sustainability, robdmacneish@gmail.com, 902-422-4097
Hannah van Hemmen, Environmental Science and Economics, hannah@vanhemmen.org, 902-441-9939
Christopher Demaine, Faculty of Planning, demainec@dal.ca
Nina Nedic, Faculty of Management, nn841217@dal.ca
4. **Level of Project:**
Non-thesis Course Project [X]
Undergraduate []
Graduate []

Specify course and number: Environmental Science 3502
5.
 - a. **Indicate the anticipated commencement date for this project:** February 1st, 2011
 - b. **Indicate the anticipated completion date for this project:** April 13th, 2011

SUMMARY OF PROPOSED RESEARCH

1. **Purpose and Rationale for Proposed Research**
Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated.

The purpose of this research project is to address issues surrounding energy efficiency and carbon footprints within the Dalhousie University campus, using the Ralph M. Medjuck building on the Sexton campus as a specific example. Dalhousie is motivated in reduce its carbon footprint and promote awareness of this issue because as a result we could help prevent and increase in climate change and global warming. Our research will focus on how to make an effective presentation to students and faculty that can motivate them to help reduce the

building's carbon footprint. Through a presentation based on the carbon footprint data collected, we seek to understand how the university community understands what a carbon footprint is and provide ways to improve our footprint. We are also looking to assess their willingness to change their environmental practices and work and school, and compare this with their behaviors at home. We hypothesize that faculty, staff and students fell fore invested in their homes' carbon footprint, as it is easier for them to make changes to reduce their energy use and therefore reduce their carbon footprint. We are looking to collect information on how we can present information about carbon footprinting to motivate faculty, staff and students to reduce the carbon footprint at Dalhousie University.

2. Methodology/Procedures

a. *Which of the following procedures will be used? Provide a copy of all materials to be used in this study..*

- Survey(s) or questionnaire(s) (mail-back)
- Survey(s) or questionnaire(s) (in person)
- Computer-administered task(s) or survey(s)]
- Interview(s) (in person)
- Interview(s) (by telephone)
- Focus group(s)
- Audio taping
- Videotaping
- Analysis of secondary data (no involvement with human participants)
- Unobtrusive observations
- Other, specify _____

b. *Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.*

- Step 1: Calculate and manipulate data for the university-wide Dalhousie carbon footprint analysis
- Step 2: Review literary research about the most effective elements of presentations that can motivate behavioral change
- Step 3: Perform a student survey on current energy-saving behaviors and opinions on effective elements of presentation delivery
- Step 4: Conduct a focus group with professors on current energy-saving behaviors and opinions on effective elements of presentation delivery
- Step 5: Perform personal interviews with custodial staff on current energy-saving behaviors
- Step 6: Create a presentation for students and faculty on ways to reduce their carbon footprint at school
- Step 7: Administer the presentation to students and faculty
- Step 8: Do a survey of the audience about their response to various elements of the presentation
- Step 9: Modify the presentation based on the final survey results

3. Participants Involved in the Study

a. Indicate who will be recruited as potential participants in this study.

- Dalhousie Participants: Undergraduate students
 Graduate students
 Faculty and/or staff
- Non-Dal Participants: Adolescents
 Adults
 Seniors
 Vulnerable population* (e.g. Nursing Homes, Correctional Facilities)

** Applicant will be required to submit ethics application to appropriate Dalhousie Research Ethics Board*

b. Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.

The potential participants in this study will be students, faculty and staff that regularly use the Ralph M. Medjuck building on Dalhousie University's Sexton campus. There is no specific age, gender, group affiliation or other special characteristics that we are targeting.

c. How many participants are expected to be involved in this study? 100

4. Recruitment Process and Study Location

a. From what source(s) will the potential participants be recruited?

- Dalhousie University undergraduate and/or graduate classes
 Other Dalhousie sources (specify) general population that uses the Ralph M. Medjuck building on Dalhousie University's Sexton Campus
 Local School Boards*
 Halifax Community
 Agencies
 Businesses, Industries, Professions
 Health care settings*
 Other, specify (e.g. mailing lists) _____

** Applicant may also require ethics approval from relevant authority, e.g. school board, hospital administration, etc.*

b. Identify who will recruit potential participants and describe the recruitment process.

Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts).

The members of this research project will be recruiting potential participants by randomly sampling every third Dalhousie student that walks into the Ralph M. Medjuck building. Faculty and staff will be selected based on those who use the Ralph M. Medjuck building

5. Compensation of Participants

Will participants receive compensation (financial or otherwise) for participation?

Yes No

If Yes, provide details:

6. Feedback to Participants

Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used. Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement.

Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

After we survey the students and interview the faculty and staff, we will be inviting them to the presentation we will be giving based on our survey findings on how the Dalhousie community can reduce their carbon footprint.

POTENTIAL BENEFITS FROM THE STUDY

1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.

The anticipated benefits to the participants from their involvement in this project will be an increase in awareness of the carbon footprint at Dalhousie University and the knowledge of ways that they can help reduce it.

2. Identify and describe any known or anticipated benefits to society from this study.

The anticipated benefits to society from this study could lead to a reduction in the carbon footprint at Dalhousie University, which can help our environment.

POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY

1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors and burdens

No known or anticipated risks

Explain why no risks are anticipated: No risks are anticipated because we are only performing a listen-based survey and the participants are only required to provide verbal responses.

Minimal risk *

Description of risks:

Greater than minimal risk**

Description of risks:

* *This is the level of risk associated with everyday life*

** *This level of risk will require ethics review by appropriate Dalhousie Research Ethics Board*

- 2. Describe the procedures or safeguards in place to protect the physical and psychological health of the participants in light of the risks/stresses identified in Question 1.**

We are going to get consent before participants are selected for the survey, and we are not asking any questions that require an educational background for a response

INFORMED CONSENT PROCESS

Refer to: <http://pre.ethics.gc.ca/english/policystatement/section2.cfm>

- 1. What process will be used to inform the potential participants about the study details and to obtain their consent for participation?**

Information letter with written consent form; provide a copy

Information letter with verbal consent; provide a copy

Information/cover letter; provide a copy

Other (specify) verbal consent

- 2. If written consent cannot be obtained from the potential participants, provide a justification.**

The survey we are conducting is a short survey and providing an information letter with written consent may deter the number of students willing to participate

ANONYMITY OF PARTICIPANTS AND CONFIDENTIALITY OF DATA

- 1. Explain the procedures to be used to ensure anonymity of participants and confidentiality of data both during the research and in the release of the findings.**

During the random sampling for the survey no names will be given, and no names will be recorded or provided in our final report.

- 2. Describe the procedures for securing written records, questionnaires, video/audio tapes and electronic data, etc.**

Surveys and questionnaires will be given verbally so that no participant will be providing written records

- 3. Indicate how long the data will be securely stored as well as the storage location over the duration of the study. Also indicate the method to be used for final disposition of the data.**

- Paper Records
 Confidential shredding after _____
 Data will be retained until completion of specific course.

- Audio/Video Recordings
 Erasing of audio/video tapes after _____
 Data will be retained until completion of specific course.

- Electronic Data
 Erasing of electronic data after _____
 Data will be retained until completion of specific course.

- Other _____
(Provide details on type, retention period and final disposition, if applicable)

Specify storage location: 6082 Cunard Street, Halifax, Nova Scotia

ATTACHMENTS

Please **check** below all appendices that are attached as part of your application package:

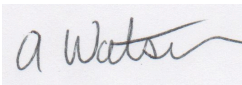
Recruitment Materials: A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.

Information Letter and Consent Form(s). Used in studies involving interaction with participants (e.g. interviews, testing, etc.)

Information/Cover Letter(s). Used in studies involving surveys or questionnaires.

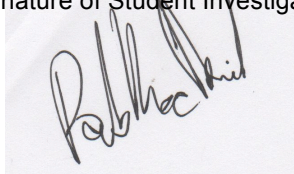
Materials: A copy of all survey(s), questionnaire(s), interview questions, interview themes/sample questions for open-ended interviews, focus group questions, or any standardized tests used to collect data.

SIGNATURES OF RESEARCHERS



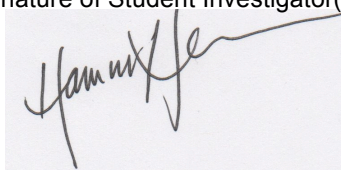
Mar 2 2011

Signature of Student Investigator(s) Date



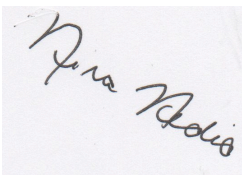
Mar 1 2011

Signature of Student Investigator(s) Date



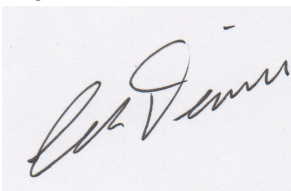
Mar 1 2011

Signature of Student Investigator(s) Date



Mar 1 2011

Signature of Student Investigator(s) Date



Mar 1 2011

Signature of Student Investigator(s) Date

FOR ENVIRONMENTAL SCIENCE PROGRAM USE ONLY:

Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

Signature Date

Signature Date