University of British Columbia

2006 Greenhouse Gas Inventory Faculty-Specific Preliminary Analysis

SEEDS Sustainability Project

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Introduction

This report is a follow-up on the results of the 2006 University of British Columbia (UBC) Greenhouse Gas (GHG) Inventory Report, which comprehensively quantified the UBC greenhouse gas emissions in order to facilitate their management and minimization (Rouhany, 2009). Using emission factors applied in the inventory, the current report takes the emission inventory one step further by preliminarily allocating emissions by faculty. This has successfully been accomplished by other North American institutions, such as the University of Harvard in Massachusetts (Martin, 2008).

Currently, UBC does not bill individual faculties or departments for the energy they consume. This lack of accountability raises various challenges. In addition to difficulty in the financial management of UBC utilities, there are no incentives for energy conservation, nor are there penalties for utilities consumption on the departmental level. Thus, although UBC as a whole may be committed to sustainability initiatives, these may not be carried out on the smaller faculty or departmental scale. By helping to identify major faculties' approximate contributions to UBC's GHG emissions, this report aims to focus the efforts of the UBC Sustainability Office in applying its conservation and educational strategies to the largest GHG-contributing faculties. Additionally, this report provides the initial step towards accurately allocating and billing individual faculties and departments for their energy consumption.

The 2006 UBC Greenhouse Gas Inventory Report successfully identified UBC's GHG emissions based on 3 scopes in following with the World Resources Institute (WRI) guidelines (Rouhany, 2009). The results in Figure 1 confirmed the highly significant (~86%) contribution of natural gas, primarily from steam production, to UBC's GHG Scope 1 (direct) and 2 (indirect, electricity) emissions. Electricity was shown to also play a strong, albeit secondary, role (~8%) in contributing to Scope 1 and 2 emissions. Hence, this study has focused on the GHG emissions resulting from steam and electricity consumption.

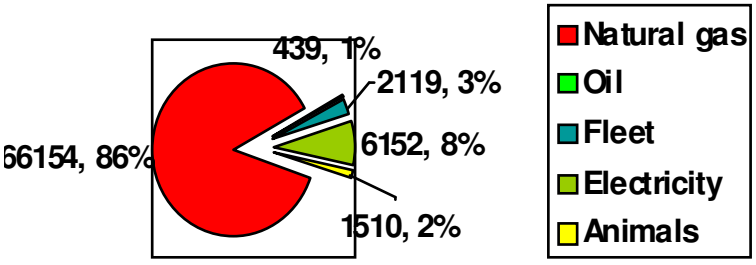

Figure 1. Summary of UBC Scopes 1 and 2 GHG emissions (Rouhany, 2009)

Scope and Methodologies

The following section describes the scope of the faculty-specific greenhouse gas analysis, as well as the corresponding methodologies.

I. Scope

The University of British Columbia (UBC) is composed of four campus locations: UBC Vancouver, Robson Square, UBC Okanagan, and the Great Northern Way campus (Rouhany, 2009). For simplicity, this report scrutinizes the division of greenhouse gas contributions from faculties on the main UBC Vancouver campus only. Robson Square provides numerous public lectures and UBC and community bookings that benefit various populations and would be difficult to attribute to specific faculties. UBC Okanagan has 7 faculties and services 5,325 students and 353 faculty members (UBC, 2008b). Although this population is small compared to UBC Vancouver's November 2007 count of 44,161 students, it is recommended that UBC Okanagan be included in the faculty analysis in future follow-up studies (UBC, 2008a).

Within the UBC Vancouver campus, the six largest faculties by student population have been targeted for analysis. These include, in order of decreasing size:

- the Faculty of Arts,
- the Faculty of Science,
- the Faculty of Applied Sciences,
- the Faculty of Education,
- the Faculty of Medicine, and
- the Sauder School of Business (commonly known as the Faculty of Commerce) (UBC, 2008c).

As previously mentioned, this analysis has been limited to the allocation by UBC faculty of Scope 1 and 2 emissions. Even more specifically, this preliminary report currently only examines the natural gas (from steam production) source in the direct GHG Scope 1 emissions and the indirect electricity Scope 2 emissions generated off-site and consumed at UBC. These scopes are further detailed in Table 1, which corresponds to the definitions provided in the 2006 UBC GHG Inventory Report.

Table 1. GHG Emission Scope Definitions based on the World Resource Institute (WRI) and the World Business Council for Sustainable Development (Rouhany, 2009)

Definition of Scopes for GHG Emission Inventories	
Scope 1: Direct GHG Emissions	Direct GHG emissions occur from sources that are owned or controlled by the institution, including but not limited to emissions from combustion in stationary sources (fuel, oil, natural gas), campus transportation and fleet vehicles, emission from livestock, and refrigerants.
Scope 2: Electricity Indirect GHG Emissions	Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by the institution. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated.
Scope 3: Other indirect GHG emissions	Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the institution, but occur from sources not owned or controlled by the institution. Some examples of scope 3 activities are: • Transportation and commuting (public transit and commuter traffic) • Institutional air travel • Fertilizer application • Waste generation and disposal • Embodied energy found in new construction and existing buildings and infrastructure, • Use of purchased materials such as paper • GHG emissions associated with the production, transportation, consumption, and disposal of food sold on campus

II. Methodologies

The overall approach used to calculate the greenhouse gas emissions contributed per faculty at UBC involves the multiplication of building ground areas by certain approximate steam and electricity consumption factors. The results are then multiplied by emission factors used in the 2006 UBC GHG Inventory Report. Finally, in order to account apply a weighting factor to account for differences in number of students and faculty served per faculty, the annual greenhouse gas emission rates per faculty are divided by the corresponding population.

The consumption factors were provided by the University of British Columbia Sustainability Office. These factors are 16.4, 23.0, and 1.9 kWh/ft^2/year for electricity, steam, and natural gas consumption, respectively. In addition, the factor of 82.0 lbs of steam consumed per ft^2 per year was also used. Currently, it has been assumed that steam is used in all buildings, so the natural gas factor was not used. However, natural gas and oil are also used instead or in conjunction with steam in numerous buildings, which is recommended for inclusion in further analyses.

The emission factors taken or calculated from the 2006 UBC GHG Inventory Report are 0.000024 and 0.000179 tonnes of equivalent carbon dioxide (CO2e) per year per kWh associated with electricity and steam, respectively. Equivalent mass of carbon dioxide (CO_2) is used in order to account for the global warming potential of other harmful major greenhouse gases, such as methane (CH_4) and nitrogen oxides (NO_x).

Building Areas

The attribution of buildings to faculties is a complex issue, as multiple faculties may use the same building, which further changes depending on the time of year. Thus, generalizations were first made using the highly simplified Campus Zone Map provided by UBC Classroom Services. In this map, the North East zone is attributed to Arts, the Central Northeast zone is linked to Science, the South West zone represents Applied Sciences, the Central South West and South South East zones are Education, the South East zone is Medicine, and the Central North West zone is Commerce.

Although these zones are partly accurate, by contacting representatives from each faculty and by researching buildings individually, it was revealed that faculties tend to use buildings scattered around campus (UBC Library, 2008; UBC Classroom Services, 2009a). Buildings within the aforementioned zones are often used for more general UBC services, such as the Student Union Building (SUB) in the Arts zone. Such buildings shared by many faculties, including most libraries, were excluded from the

analysis, as they are assumed to be used equally by all faculties. It is recommended that the general services buildings are later incorporated into the analysis, with weighting factors based on the number of students or even actual student usage data, if available.

Some large buildings of note in which significant assumptions were made in the attribution to faculties include the Michael Smith Laboratories (Science), the War Memorial Gym (Education), the Life Sciences Centre (Medicine), the Koerner Hospital Pavilion (Medicine), and the Woodward Instructional Resource Centre (Medicine). Although these buildings are often used in great part by other faculties or even the public, in the case of the hospital, they have preliminarily been attributed to the aforementioned faculties as a starting point. This may be later subdivided with improved building use information. Furthermore, although some of these buildings are only used in small part by the faculty, such as the Acute Care Unit in the Koerner Pavilion, these facilities tend to be very energy-intensive. This is unaccounted for by the conversion factor and is expected to help offset the assumption of entire building usage by single faculties.

On a similar note, it is emphasized that the area-based method of calculating energy and steam consumption does not at all take energy intensiveness into account. Laboratories and clinics, such as the Acute Care Unit, are expected to require significantly more energy than typical classrooms (UBC Classroom Services, 2009b). It is suggested that this is later taken into account using an average factor, or better yet, implementing actual metered consumption data. Similarly, key factors such as building height (size of facility vertically, as opposed to only horizontally) and conversation habits of building users, such as turning off lights and computers after hours, will not be reflected by this analysis. Metered data is strongly recommended in order to improve accuracy and to better reflect the effectiveness of energy conservation efforts.

The faculties to which buildings were attributed include the Faculty of Arts, the Faculty of Science, the Faculty of Applied Sciences, the Faculty of Education, the Faculty of Medicine, and the Sauder School of Business. These includes various departments, such as Human Kinetics (Education) and Nursing (Applied Sciences), with a more detailed list of UBC faculties and departments available online (UBC, 2009). Other relatively large faculties not accounted for, but recommended for further analysis, include the Faculty of Law, the Faculty of Land and Food Systems, the Faculty of Pharmaceutical Sciences, the Faculty of Forestry, and the Faculty of Dentistry. The latter, for instance, is suspected to be relatively energy-intensive because of the high frequency of clinic use.

Student and Faculty Populations

The number of students and faculty associated with each faculty was calculated from 2007 data provided by the UBC Office of Planning and Institutional Research (UBC, 2008c).

For students, undergraduates and graduates were included. Differences in part-time and full-time studies throughout the seasons were accounted for by taking the full-time equivalent (FTE) number of students based on a 30-credit course load for undergraduates and annualized over three terms (summer, winter term one, and winter term two) (UBC, 2008c).

For faculty members, those qualifying as "full-time" and reported to Statistics Canada in October were taken into account (UBC, 2007). Other staff members were not included in this analysis.

Results and Discussion

The main objective of attributing UBC campus buildings to different faculties of determining corresponding electricity and steam consumption values is detailed in the Appendix. This list is a preliminary attempt at generalizing the use of buildings by faculties. Changes will have to be made to split usage of certain buildings between multiple faculties, such as the Life Sciences Centre (Medicine, Dentistry, Science, and others), the Koerner Pavilion (Medicine, Dentistry, Applied Sciences, and others), and the Institute for Computing (Science and the Faculty of Applied Sciences).

The total Scope 1 emissions for all 6 faculties assessed are 23,079 tonnes of carbon dioxide equivalent (CO2e) per year, which represents only 48.8% of the actual Scope 1 emissions quantified in the 2006 UBC Greenhouse Gas Inventory Report. This discrepancy may be accounted for in great part due to the exclusion of shared service buildings (such as most libraries, recreational facilities, and UBC Plant Operations and Utilities) and buildings used by smaller faculties. Moreover, this analysis has not accounted for oil and natural gas combustion, livestock emissions, and refrigerants.

The Scope 2 emissions for all 6 faculties analyzed amount to 2,206 tonnes CO2e/yr, which represents a high 78.9% of Scope 2 emissions. This closer correspondence between the current analysis and the 2006 UBC Greenhouse Gas Inventory Report results may be due to a more representative emission factor. Additionally, Scope 2 emissions are solely attributable to a single source: electricity. It should be noted, as in the inventory report, that using the current BC Hydro emissions factor of 24 tonnes CO2e/GWh instead of 84 tonnes CO2e/GWh would reduce the Scope 2 emissions by over 70%. However, the emission factor of 84 tonnes CO2e/GWh was used in order to better account for the higher greenhouse gas intensity associated with the importation of electricity (Rouhany, 2009).

The results from the analysis of the information in the Appendix are summarized in Table 2. As shown in Figure 2, the top three greatest GHG-contributing faculties are Medicine, Science, and Applied Sciences at similar values of 26.4%, 24.3%, and 22.3%, respectively. These results are anticipated, as these faculties typically require the most laboratories, which require large areas, steam demand, and electricity requirements. For Medicine, the high contribution calculated may be attributed to the large areas of buildings such as the Life Sciences Centre and the Koerner Pavilion. However, clinical and laboratory activities in such buildings would be expected to be energy-intensive, which may partially offset the

simplification of attributing the entire buildings to the Faculty of Medicine. Similarly, for the Applied Sciences, the simplification of the Forest Science Centre allocation as an Applied Science building may be offset by the energy-intensive activities unaccounted for in such facilities as the Civil & Mechanical Engineering (CEME) Laboratories and the Chemical and Biological Engineering (CHBE) buildings.

Table 2. Summary of Estimated Greenhouse Gas Emissions and Capita Intensity for Major UBC Faculties

Faculty	Total GHG Emissions (tonnes CO2e/yr)	Number of FTE Students and FT Faculty (UBC, 2008c)	Greenhouse Gas Emissions per Capita (kg CO2e/yr/capita)	Total Building Area (ft^2)	Faculty Contribution to Total GHG Emissions
Arts	3,193	13,393	238	707,841	12.6%
Science	6,144	8,370	734	1,361,914	24.3%
Applied Sciences	5,638	4,328	1,303	1,249,701	22.3%
Education	2,285	3,686	620	506,520	9.0%
Medicine	6,667	3,700	1,802	1,477,941	26.4%
Commerce	1,357	2,893	469	300,813	5.4%
Total	25,284	36,370		5,604,731	100%

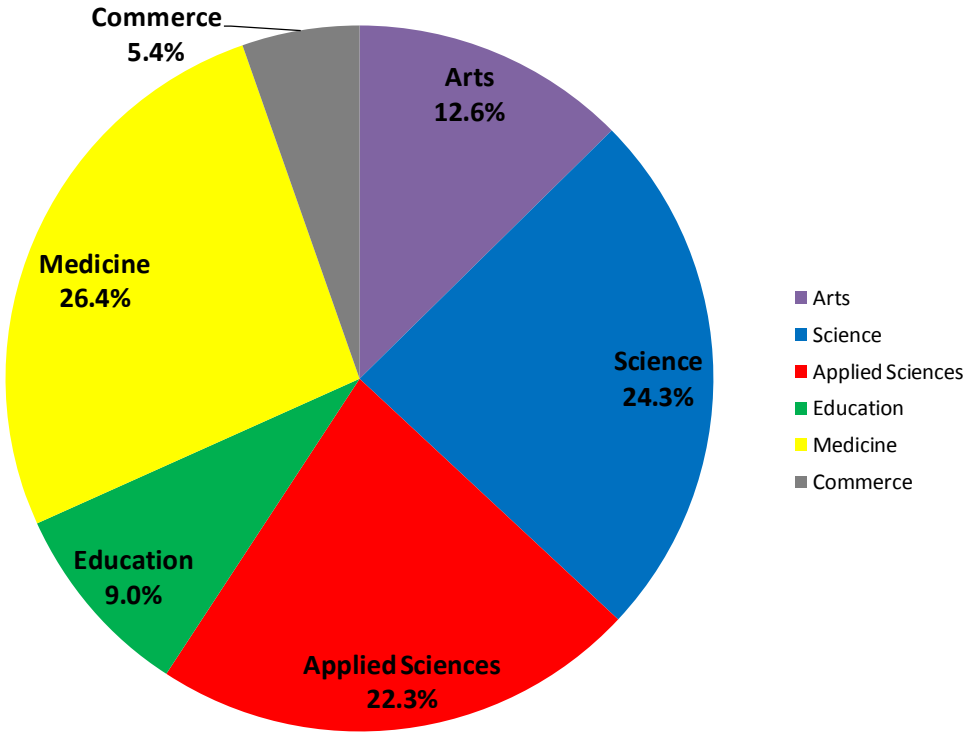

Figure 2. Faculties' Estimated Relative Contribution Percentages to UBC Greenhouse Gas Emissions

The Faculty of Arts is the fourth major contributor at 12.5%, notably greater than Education at 9.0% and the Sauder School of Business (Commerce) with 5.4%. This relative ranking is expected, based on the student and faculty populations summarized in Table 1, in which Arts has over 13,000 people, Education accounts for roughly 3,700, and Commerce makes up under 2,900. Additionally, Commerce is expected to have a very low contribution, especially in this area-based analysis, as their classes are almost exclusively conducted in the Henry Angus Building, with some offices more recently in the Donald Rix Building.

The results from Table 2 and Figure 2 suggest that utilities conservation initiatives should be focused on the Faculties of Medicine, Science, and Applied Sciences. Because of the large building areas associated with these faculties, steam heating method optimization would be expected to be very beneficial. Additionally, technological sustainability initiatives ranging from lighting to computers to laboratory equipment are anticipated to have a larger impact on these faculties than on others, assuming that the current level of potential for energy utilization improvement in all faculties is similar. This analysis suggests that equal billing among faculties would not be representative of energy consumption.

Further examining the number of students and faculty tallied in Table 2, the total of 36,370 full-time equivalent (FTE) students and FT faculty corresponds to a high value of approximately 96% of UBC Vancouver's total 2007 FTE students and FT faculty of 37,904, summed from data provided by the UBC Office of Planning and Institutional Research (UBC, 2008c). Overall, Arts and Science, constituting 13,393 and 8,370 people, respectively, account for a significantly larger number of faculty and students than the other faculties. The remaining faculties ranged relatively narrowly in number from 2,893 to 4,328 students and faculty.

Because of this large difference between student populations in Arts, Science, and the other faculties, the contributions have been weighted per capita in Figure 3. Examining this greenhouse gas emission intensity per capita, the significant contributions from Medicine becomes more pronounced at 35% due to the faculty's relatively few students and faculty. While the Applied Sciences increases its contribution slightly to 25%, the high population of Science brings its contribution down to 14%. Thus, Science is comparable to Education (12%) and even approaching Commerce (9%). Finally, because of the Faculty of Arts' substantial number of students and faculty, it has the lowest contribution to greenhouse gas emissions per capita of 5%.

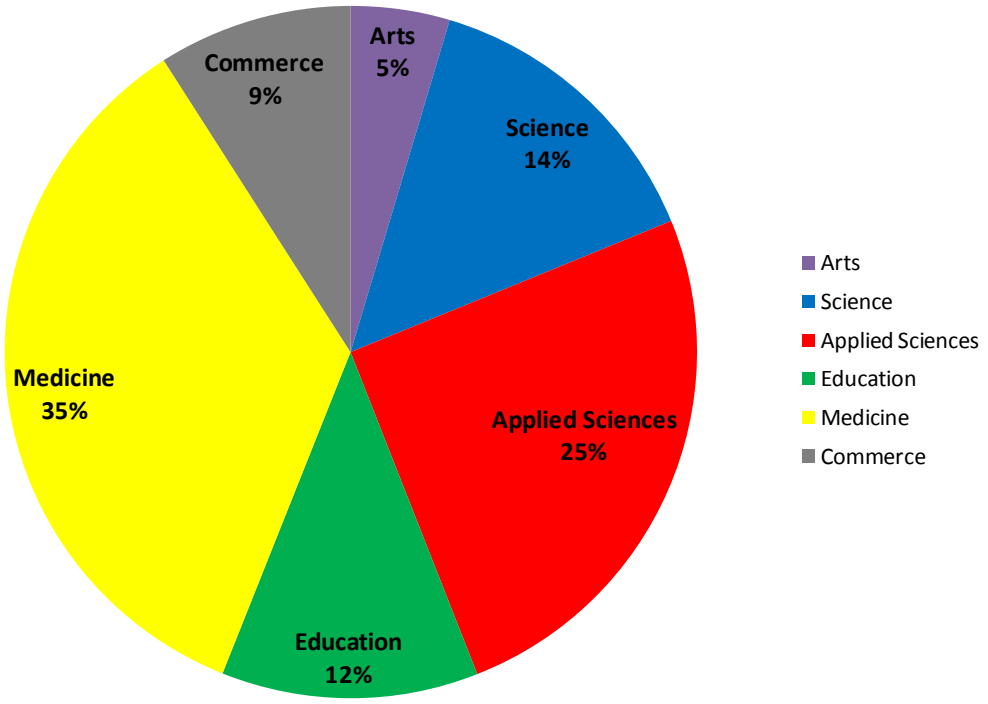

Figure 3. Faculties' Estimated Relative Contribution Percentages to UBC Greenhouse Gas Emissions on a "per capita" Basis for each Faculty

Similar results are provided more quantitatively in Figure 4. These results show that approximately 1,800 kg of CO2e are emitted per capita per year in Medicine, compared to only roughly 240 kg CO2e/capita/yr for the Faculty of Arts. Then again, these values do not yet include shared UBC services, which would be anticipated to increase the values for all faculties significantly if incorporated into the analysis.

The results from Figures 3 and 4 indicate that, although there may be more students in the Faculties of Arts and Science, the greenhouse gas emissions per capita for the Faculties of Medicine and Applied Sciences are more significant. Thus, it is recommended that sustainability awareness and education endeavours may be more effective in Medicine and Applied Sciences.

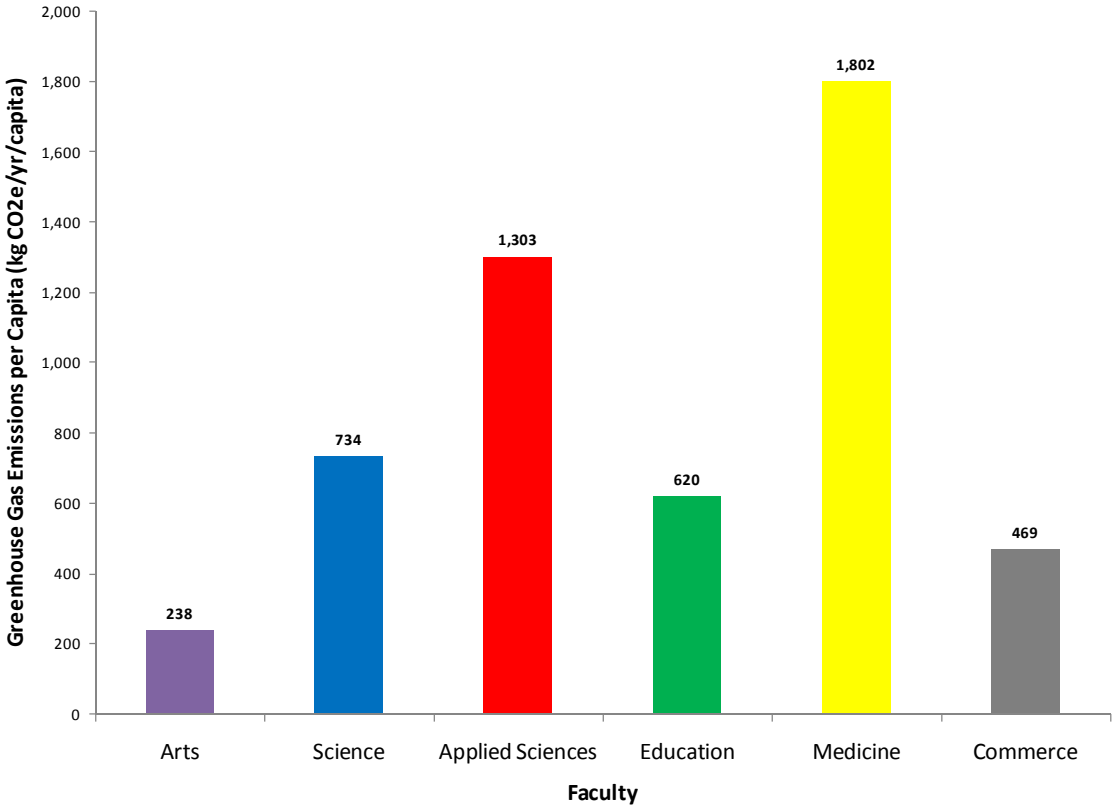

Figure 4. Faculties' Estimated UBC Greenhouse Gas Emissions Contributions on a "per capita" Basis for each Faculty

Conclusions and Recommendations

The objective of determining the approximate UBC greenhouse gas emission contributions of the six largest faculties at the Vancouver campus was successfully accomplished. The accuracy of the results are limited due to the methodology of converting building areas into energy consumption and then into equivalent corresponding emissions. Furthermore, the validity of the results are limited by the difficulty and complexity related to allocating buildings to specific faculties. However, the results show a rough relationship between the relative contributions of the major faculties, upon which future studies may build to increase the accuracy of the results.

The relative percentage contributions to the UBC greenhouse gas emissions for the Faculties of Medicine, Science, Applied Sciences, Arts, Education, and Commerce were 26.4%, 24.3%, 22.3%, 12.6%, 9.0%, and 5.4%, respectively. Dividing the emissions by the student and faculty populations for each faculty, the results are shifted. The relative percentage contributions to the UBC greenhouse gas emissions intensity (per capita) for the Faculties in the same order of Medicine, Science, Applied Sciences, Arts, Education, and Commerce become 35%, 14%, 25%, 5%, 12%, and 9%, respectively.

These sets of results show that the Faculties of Medicine, Science, and Applied Sciences should represent the focal point of energy and utilities conservation and optimization efforts. Furthermore, these results suggest that the UBC and the UBC Sustainability Office may benefit most from focusing on the education of the Faculties of Medicine and Applied Sciences regarding sustainability and "green" initiatives and habits. It is evident from the results that faculties should not be billed equally for energy consumption, but equitable billing allocation would require increased accuracy in the results.

For future studies, it is recommended that buildings be sub-divided into multiple faculties, depending on their usage. This should be ascertained in consultation with each faculty. Additionally, it is recommended that shared services and buildings that are not faculty-specific be included in subsequent studies in order to obtain more accurate absolute intensity results. Data from the 80 currently metered buildings on campus should be incorporated as much as possible into the methodology to confirm and improve the accuracy of the results. For buildings lacking specific metered data, a factor for energy intensiveness is suggested to account for higher laboratory and clinical energy demands.

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Appendix 1: Building Areas and Consumption

Faculty	Building Code	Building Name	Area (ft^2)	Energy Consumption (kWh/yr)	Scope 1 Emissions (Steam) (tonnes CO2e/yr)	Steam Consumption (thousands of lbs steam/yr)	Scope 2 Emissions (Electricity) (tonnes CO2e/yr)	Total Scope 1 and 2 emissions (tonnes CO2e/yr)
Arts	ACEN	Asian Centre	52,680	2,075,591	217	4,320	21	238
	ANSO	Anthropology & Sociology	61,539	2,424,637	253	5,046	24	278
	ARTS	Arts One	10,155	400,107	42	833	4	46
	AUDI	the Auditorium	26,415	1,040,749	109	2,166	10	119
	AUDX	Auditorium Annex	27,093	1,067,463	112	2,222	11	122
	BINN	B.C. Binnings Studio	5,509	217,053	23	452	2	25
	BUCH A/B/C	Buchanan	169,214	6,667,021	697	13,876	67	763
	BUCH E	Buchanan E Block	21,958	865,160	90	1,801	9	99
	BUTO	Buchanan Tower	110,782	4,364,792	456	9,084	44	500
	TTWOM	Centre for Women's Studies & Gender Relations	3,213	126,593	13	263	1	14
	BRKX	Brock Hall Annex	22,917	902,930	94	1,879	9	103
	FRWO	Frederick Wood Theatre	21,404	843,319	88	1,755	8	97
	GEOG	Geography	63,774	2,512,696	263	5,229	25	288
	HM22	Hut M-22	3,634	143,180	15	298	1	16
	MUSC	Music	76,021	2,995,239	313	6,234	30	343
	SOWK	Social Work (Jack Bell)	31,533	1,242,412	130	2,586	12	142
	TOTAL		707,841	27,888,944	**2,915**	58,043	**279**	**3,193**
Science	BIOL	Biological Sciences	272,386	10,732,005	1,122	22,336	107	1,229
	CHEM	Chemistry	206,301	8,128,242	849	16,917	81	931
	CHPH	Chemistry Physics	85,326	3,361,825	351	6,997	34	385
	COPP	D.H. Copp	68,242	2,688,735	281	5,596	27	308
	HEBB	Hebb	71,949	2,834,782	296	5,900	28	325
	HENN	Hennings	120,885	4,762,867	498	9,913	48	545
	EOSE	Earth & Ocean Science-East	34,350	1,353,382	141	2,817	14	155
	EOSS	Earth & Ocean Science-South	16,850	663,892	69	1,382	7	76
	EOSM	Earth & Ocean Science-Main	97,389	3,837,142	401	7,986	38	439
	ICCS	Institute for Computing (ICICS/CS)	108,350	4,268,971	446	8,885	43	489
	LSK	Leonard S. Klinck (CSCI)	121,248	4,777,172	499	9,942	48	547
	MSL	Michael Smith Laboratories	91,984	3,624,164	379	7,543	36	415
	MATH	Mathematics	35,168	1,385,617	145	2,884	14	159
	MATX	Mathematics Annex	19,283	759,750	79	1,581	8	87
	MSRC	Math/Stats Resource Centre	3,456	136,165	14	283	1	16
	ALSC	Abdul Ladha Science Student Centre	8,749	344,715	36	717	3	39
	TOTAL		1,361,914	53,659,428	**5,608**	111,677	**536**	**6,144**
Applied Sciences	CEME	Civil & Mechanical Engineering	111,164	4,379,856	458	9,115	44	501
	CHBE	Chemical & Biological Enginering	155,732	6,135,851	641	12,770	61	703
	DMP	Hugh Dempster Pavilion	16,559	652,409	68	1,358	7	75
	FSC	Forest Science Centre	244,534	9,634,635	1,007	20,052	96	1,103
	MCLD	MacLeod	79,007	3,112,876	325	6,479	31	356
	MCML	MacMillan	156,477	6,165,198	644	12,831	62	706
	AMPEL	Brimacombe Building	92,038	3,626,301	379	7,547	36	415
	PULPR	Pulp & Paper Research	40,611	1,600,075	167	3,330	16	183
	KAIS	Fred Kaiser	136,303	5,370,354	561	11,177	54	615
	FORW	Frank Forward	87,459	3,445,886	360	7,172	34	395
	CFEUS	Cheeze	2,508	98,832	10	206	1	11
	CEMER	CEME Labs	47,874	1,886,253	197	3,926	19	216
	LASR	Frederic Lasserre	50,687	1,997,078	209	4,156	20	229
	LARC	Landscape Architecture Annex	5,721	225,408	24	469	2	26
	WMAX	West Mall Annex	23,026	907,226	95	1,888	9	104
	TOTAL		1,249,701	49,238,238	**5,146**	102,476	**492**	**5,638**
Education	SCRF	Neville Scarfe	214,691	8,458,810	884	17,605	85	969
	OSBO	Robert F. Osborne	62,046	2,444,612	255	5,088	24	280
	KENN	Douglas Kenny	104,119	4,102,288	429	8,538	41	470
	MGYM	War Memorial Gymnasium	91,474	3,604,074	377	7,501	36	413
	PONE	Ponderosa Annex E	11,128	438,462	46	913	4	50
	PONF	Ponderosa Annex F	9,230	363,668	38	757	4	42
	PONG	Ponderosa Annex G	7,007	276,075	29	575	3	32
	PONH	Ponderosa Annex H	6,825	268,904	28	560	3	31
	TOTAL		506,520	19,956,893	**2,086**	41,535	**199**	**2,285**
Medicine	WESB	Wesbrook	98,701	3,888,810	406	8,093	39	445
	LSC	Life Sciences Centre	580,347	22,865,672	2,390	47,588	228	2,618
	ACU	Koerner Pavilion	419,808	16,540,435	1,729	34,424	165	1,894
	MEDC	Medical Sciences Block C	43,448	1,711,851	179	3,563	17	196
	MTHR	James Mather	25,991	1,024,044	107	2,131	10	117
	WESB	Wesbrook	98,701	3,888,810	406	8,093	39	445
	WOOD	Woodward (Instructional Resource Centre - IRC)	125,793	4,956,243	518	10,315	50	567
	TTAS	Audiology and Speech Sciences Classroom Trailer	2,116	83,368	9	174	1	10
	WLIB	Woodward Biomedical Library	83,036	3,271,633	342	6,809	33	375
	TOTAL		1,477,941	58,230,865	**6,086**	121,191	**582**	**6,667**
Commerce	ANGU	Henry Angus	201,440	7,936,754	829	16,518	79	909
		Donald Rix	54,735	2,156,576	225	4,488	22	247
	DLAM	David Lam Library	44,637	1,758,701	184	3,660	18	201
	TOTAL		300,813	11,852,031	**1,239**	24,667	**118**	**1,357**
Total		67 Buildings Total	5,604,731	220,826,399	**23,078**	**459,588**	**2,206**	**25,284**
Actual 2006 GHG Emission Inventory Total					**47,719**		**2,796**	50,515
% of Actual 2006 GHG Emissions					48.4%		78.9%	50.1%