UBC Social Ecological Economic Development Studies (SEEDS) Student Report

Evaluation of Energy Performance of UBC's Residential Buildings Using Actual Data

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CEEN 596 PROJECT

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It would not have been possible to finish this project without the support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.

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I would also thank those who showed their interest in this study. I hope that the findings from this study can be a guide to students in the Clean Energy Program at UBC who are interested in studying building energy performance in the future.

EXECUTIVE SUMMARY

The Canadian residential sector consumes 20 per cent of Canada's total secondary energy as shown in Figure 1 and there are many residential buildings that are currently being built on UBC campus. All the residential buildings on campus have to be constructed according to UBC's own building rating system, the Residential Environmental Assessment Program (REAP), to ensure lower consumption of water, energy and other resources and higher-quality indoor environment than buildings that are built without any rating systems. However, REAP is applied during planning and construction phases and hence, it does not always guarantee lower energy consumption in the post-occupancy phase.

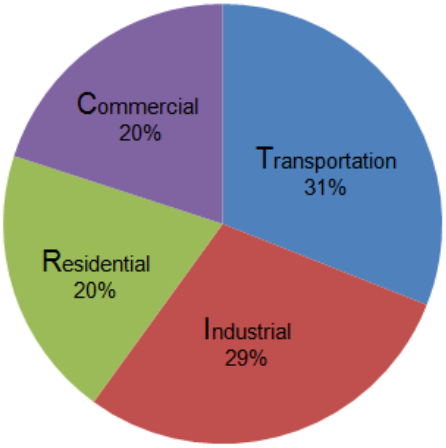

Figure 1. Canada's Energy Consumption by Sector in 2008 (CBEEDAC, 2010)

This project was undertaken to assess the energy performance of UBC's residential buildings using actual energy consumption data. The primary objective of this study is to analyze electricity and gas consumption of three of UBC's Faculty and Staff Housing buildings. The main sources for this project are electricity and gas consumption data provided by UBC Utilities, building floor plans from UBC Infrastructure Development, and weather data. The average total energy intensity for the three buildings was found to be 165.4 kWh/m^2/yr. For a more detailed break-down of energy analysis, individual suite metering for domestic hot water heating and gas fireplaces would be required.

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1 INTRODUCTION

According to BC's Energy Plan, approximately 13 per cent of all the energy consumed in the province is for residential buildings, making them significant contributors to our carbon footprint. One way to respond to the increasing carbon footprint and energy demand is to make communities implement strategies for energy efficiency and conservation. These days, high quality housing is becoming synonymous with energy efficiency. With recent developments in energy efficiency technology, it has become possible to significantly reduce the energy consumption of buildings, decrease emissions to the environment and save money in the long-term.

UBC is one of the 10 largest electricity consumers in BC and uses a significant amount of natural gas as well. UBC has been trying to reduce its energy consumption and greenhouse gas emissions by investing in energy management programs and being actively involved in energy management activities such as having a strong partnership with BC Hydro, thus committing to strategic energy conservation.

UBC has tried to provide a lively, vital, sustainable and eco-friendly environment and community to its residents. Currently, UBC has developed U-Town by constructing residential buildings over two million square feet to accommodate students, faculty, staff and people who want to reside on campus and enjoy a community-oriented university life that is close to all activities. One way of providing ecological and environment-friendly housing to people was to establish UBC's own building rating system, the Residential Environmental Assessment Program (REAP), to ensure a higher quality and

lower environmental impact than residential buildings built without a rating system or those built using the Leadership in Energy and Environmental Design (LEED) and or Built Green residential building rating systems.

1.1 OBJECTIVES

The original purpose of the project was to evaluate the energy performance of UBC's REAP (the Residential Environmental Assessment Program) certified buildings of more than six stories. Their energy performances were to be evaluated according to building energy use and other assessment categories in the REAP checklist. Then, the energy performances were to be compared among the buildings in the same REAP certification levels and between different levels, and factors that differentiate the performance levels of the buildings were to be studied. However, since many residential buildings on campus were low-rises (approximately 70% of all the residential buildings completed, that were found in the UBC Properties Trust website, including student rentals, Faculty and Staff rentals, market rentals, and market housing, are low-rises) and due to the absence of data which was the main reason, the objectives of the project had to be changed. The primary objective of this project was changed to report and discuss the use of electricity and natural gas by UBC's three Faculty and Staff Housing buildings. More detailed secondary objectives are:

1) To describe processes involved in building energy assessment,
2) To describe requirements associated with obtaining data and effectively analyzing building energy use including data requirements, privacy issues,

processes for obtaining data, technical issues with sampling of the data, and challenges in building energy assessment, and

3) To discuss potential causes of variations in energy consumption and potential interventions to reduce energy use.

1.2 BACKGROUND

In the mid 1980s, UBC Properties Trust was formed in order to develop UBC lands for residential development and since 1991, UBC has built 2,200 apartments and townhouses on campus. The building of new residences has continued actively. Hampton Place was established as the first multi-family residential neighbourhood on UBC campus. With the success of the project, generating $80 million of endowment principal, in the early 1990s, UBC Properties Trust developed Faculty and Staff Housing to accommodate an increasing number of faculty and staff and completed five projects in the Hawthorn Place Neighbourhood. The Faculty and Staff Housing buildings provide 269 rental units on campus under the direction of UBC Housing & Conferences who own and manage the housing. After the initial development, UBC Properties Trust leased an additional portion of land from UBC to further serve the growing need for Faculty and Staff Housing. The UBC Comprehensive Community Plan (CCP), which was adopted to provide guidance for campus development, required a minimum of 30% of the housing to be rental units and Phase I of Faculty and Staff Rental Housing was constructed in 2001 following this requirement. Phase I includes two buildings which are Azalea House and Sumac House located in Mid Campus, where the neighbourhood is now referred to as Hawthorn Place. Azalea House consists of 11 two and three bedroom townhomes of

two levels, and Sumac House has 42 units that are combinations of 18 two-level townhomes and 24 apartment units. Cascara House (Phase II) was completed in 2002, providing additional 36 apartment units. The UBC Faculty and Staff Housing buildings are available for rent on a yearly basis and are managed by Village Gate Homes, founded in 2002. All three buildings are located in the Hawthorn Place neighbourhood and have electric baseboards for space heating where the charges for electricity are the responsibility of the tenant. Natural gas for fireplaces and hot water heating is included in the rent.

1.3 LITERATURE REVIEW

For this project, literature reviews have been conducted on similar project work in order to gain a better understanding of the methods used to analyze energy performance data and to compare the energy intensity results for this project to that of the others.

Statistics Canada conducts the Survey of household Energy Use (SHEU) on behalf of the Office of Energy Efficiency of Natural Resources Canada. The data collected for the 2007 survey intended to represent 12.9 million households across Canada. However, the data was estimated from a sample of only about 10,000 households. Of the 12.9 million households, 1.74 million households were in British Columbia (approximately 1,200 sample dwellings in BC). The survey included single detached houses, double/row houses (duplexes), mobile homes, low-rise apartments, and high-rise apartments. In BC, approximately 20.2% of residential buildings are low-rise apartments and 7.7% of the total residential buildings across Canada were built between 2000 and

2007. Unfortunately, the construction date of the low-rise apartments in each province was not indicated. Hence, it was not known for sure exactly when these apartment buildings in BC were built. In BC, electricity (31.6%) and natural gas (48.9%) were the two main energy sources used for heating. The other sources included heating oil, wood and other types of sources. Energy intensity of the buildings was broken down by region and housing type within Canada. The average energy intensity of general households in BC found from the 2007 survey is 0.68 GJ/m^2/yr (189 kWh/m^2/yr). Apartment buildings of less than five storeys in Canada have an average energy intensity of 0.54 GJ/m^2/yr (150 kWh/m^2/yr).

RDH Building Engineering's 2009 study on energy consumption in residential buildings found that there was a significant difference in the energy consumption in the low-rise residential buildings depending on who paid the energy bills. When occupants were responsible for all their energy usage, the average energy intensity was 0.68 GJ/m^2 (189 kWh/m^2/yr) compared to 1.62 GJ/m^2 (450 kWh/m^2/yr) when occupants paid for at least one of the energy sources.

According to RDH's 2011 study on energy consumption in multi-unit residential buildings (MURBs), high-rise apartment buildings use more energy than low-rise apartment buildings. This is mainly due to more energy used in common areas. The study was based on 39 mid and high-rise residential buildings (34 in Metro Vancouver and five in Victoria) with five to 33 storeys that were built around 1990s. The average energy intensity for MURBs in Vancouver was 220 kWh/m^2/yr and on average, 37% of the energy was used for space heating including ventilation, with 69% of the space heating

provided by gas burning equipment. The study was based on 39 mid and high-rise residential buildings that were built around 1990s. However, the study was conducted only on electrically heated apartments without data for natural gas and electricity used for common areas. The average area of SFDs (Single Family Dwellings) that were electrically heated within BC Hydro's service territory was 2,266 ft^2 with 19,530 kWh/yr of electricity used over a one year period from April 2009 to March 2010 whereas the average area of the high-rise condominiums that RDH studied was 1,117 ft^2 with an average of 21,926 kWh/yr of electricity used. It should be noted that there might be some deficiencies in the data of the buildings used in the study since not all the energy sources were considered and not all buildings were studied.

The suites in the low-rise apartment buildings were found to use about the same amount of electricity as those in the high-rise apartment buildings and the common areas in the low-rise apartment buildings used a lot less electricity. It should be noted that suites-to-commons ratio is uncertain due to the lack of data and uncertainty that buildings that were classified as low-rise apartments might include low houses and other types of buildings such as basement suites and units over stores. Another problem was that some buildings had a mix of apartments, rows and SFDs. RDH categorized the apartments into two different types according to the ownership: rentals that had a single building owner and all the suites were rented out and condominiums that had individual owners for each suite. When the apartments were classified according to their heating types, two types were identified, electrically heated and non-electrically heated. All high-rise apartment buildings in BC use natural gas for hot water heating and makeup air and of those buildings that were studied by RDH, 52% of the energy used in the buildings

came from natural gas. In addition, most of the energy was used for space heating followed by water heating. Energy use for common areas took up a significant 21%.

RDH also studied the effects of some variables, such as apartment size, building, heating and ownership types, and building age, on building energy consumption. Since utility bills did not show suite square footage, it was not possible for RDH to find correlations between energy consumption and size of the suites. It was, however, assumed that larger sized apartment suites usually consumed more energy than smaller ones.

According to RDH's apartment buildings summary, each suite in high-rise apartments used an average of 4,575 kWh/yr with an average common area use of 3,734 kWh/yr per suite, giving a total of 8,309 kWh/yr per suite of energy consumption. Suites in low-rise apartments used 4,596 kWh/yr on an average with 2,014 kWh/yr of common area energy use per suite. This gives 6,610 kWh/yr of energy use allotted for each suite.

RDH's study shows that electrically heated high-rise rental suites used less electricity on average whereas common areas in high-rise buildings used more electricity on average than low-rise rentals. However, the average consumption calculation was based on sample buildings that were built from the 1970s to the 2000s and hence, more precise calculation and hence conclusions, would be needed for the evaluation of buildings that were built in the 2000s. The other factor that affects energy consumption includes location of the buildings. Suites that face to the south and are located on a middle floor would have more heat energy from the walls and make-up air coming through doorways

and hence, use less energy for space heating. Suites that are located on the north and top floor would require more electricity for space heating due to lower heat gain.

Another study by Ronggui (2007) evaluated energy consumption and energy efficiency of low-rise (4-6 storeys), mid-rise (7-20 storeys), and high-rise (above 20 storeys) residential buildings in Canada using a database for 81 buildings provided by the Canada Mortgage and Housing Corporation (CMHC). The buildings were classified by several factors such as location, age and residential type. The study found that older buildings use less energy per suite than newer buildings even though the older buildings are less energy efficient. He referred to CMHC's research and stated that MURBs consume three times more energy per unit of floor area than SFDs. When the buildings are classified into regions, the average Canadian energy intensity for low-rise residential buildings is 0.87 GJ/m^2/yr (241.7 kWh/m^2/yr) whereas that in the West Coast is 1.29 GJ/m^2/yr (358.4 kWh/m^2/yr). It should be noted though that only one building of 62 suites out of 15 low-rise residential (total of 1102 suites) buildings in the database was located on the West Coast and as a result, the energy intensity result may not be representative. Ronggui's study also shows the relationship between energy demand and heating-degree days (HDDs) and confirms that more energy would be consumed as the number of HDDs increases due to increased energy demand for space heating. In his study, he found that buildings in British Columbia have one of the lowest energy intensity statistics due to the lowest number of heating degree days since it has a less colder and shorter heating season compared to the other areas in Canada. A comparison was also made for different types of residential houses and this was conducted by using the data from the Energy Efficiency Trends Analysis Tables from the Natural Resource Canada

website for the period from 1995 to 2004. From the comparison, it was found that apartments were the most energy efficient housing type with an uncertainty whether MURBs over four storeys were included in the database or not. However, the result does not show that MURBs are the best energy efficient because, based on the statistics for 81 MURBs from the CMHC's database, energy intensity for low-rise buildings was 0.87 GJ/m^2/yr (241.7 kWh/m^2/yr) and that for mid-rise buildings was 1.00 GJ/m^2/yr (277.8 kWh/m^2/yr) which fell within the average of the residential building energy intensity. High-rise MURBs were found to be less energy efficient even when compared to commercial buildings due to their poor building envelope, poor space heating and air conditioning control, and poor lighting and appliances. The study recommended that more data and further investigation would be required for more accurate analysis and consistent conclusion.

2 DATA SOURCES and METHODOLOGY

2.1 PROCESSES for OBTAINING DATA

In the early stages of this project, ideas on how to gather data were discussed and energy consumption data collection was started afterwards. Since this project is about analyzing energy consumption of MURBs, data should cover both common areas and individual suites. Data for common areas could be obtained from Property Managers or with permission from Strata Councils for the case of privately owned apartments. Data for individual suites could be obtained from residents who would volunteer their data. However, due to confidentiality issues with energy data, apartments that are managed

by Village Gate were assumed to be the best target since UBC is the owner of the properties and the energy is provided by UBC Utilities. A draft request was sent to Strata Councils as well as to Village Gate, Wesbrook Properties, and BC Hydro. Then, a formal letter was sent to each residential building. Meetings with rental companies were scheduled as well. Strata councils and managers of properties were contacted for participation in the study. A letter asking for resident volunteers was posted in some buildings. UBC Utilities agreed to compile electricity and gas data for the Faculty and Staff Housing buildings for a minimum of 12 months. For comparison purposes, 10 anonymous addresses in Vancouver were selected and monthly energy consumption data was requested to BC Hydro and FortisBC.

2.2 DATA SOURCES

Data must be complete and accurate in order for it to be usable for analysis. When collecting energy usage data, the level and scope of data collected needs to be determined first; for example, collecting data from sub-meters on individual processes or looking at utility bills. Meter readings and other data and information are then assembled. The energy data is acquired by contacting the appropriate utilities or energy service providers. Other data can be obtained from building owners or management or architectural companies with the authorization of the owners. For utility usage data, at least two years of monthly data needs to be gathered for comparison.

For the purpose of this project, no site measurements were required. The square footage of each unit and common areas was obtained from records drawings and

original modelling files (such as project summary and statistics data), mechanical drawings and floor plans that were provided by Ms. Heidi Hunchak (Records Technician at UBC Infrastructure Development). The square footage information is rather important as it allows one to calculate the energy consumption per unit area (i.e. energy intensity) which will make it easier to compare energy intensities among buildings. Other necessary data, including building age and the number of storeys, was obtained from the UBC Properties Trust and Village Gate websites.

Detailed energy consumption data for the three Faculty and Staff Housing buildings was provided by UBC Utilities. The consumption data for the three buildings managed by Village Gate was requested and provided by Ms. Erin Kastner, a Geospatial Information Manager at UBC Utilities. This data was later on analyzed to find the individual contributions of natural gas and electricity to the overall energy consumption of the building. The energy consumption data provided was for the period starting from May 2008 to August 2011. Mr. Kyle Reese who is a Community Energy Manager at UBC Sustainability Office also provided electricity and natural gas consumption data for UBC Properties Trust owned residences for the year of 2010. Natural gas is metered on a single meter for the entire building and hence, the data obtained covers the entire building's gas consumption. It should be noted that natural gas is included in the rent for all of the three Faculty and Staff Housing buildings. Natural gas was used primarily for fireplaces and domestic hot water heating. Azalea House has its own gas meter for hot water and a separate gas meter for fireplaces. Sumac House and Cascara House share a common gas meter.

Most of the data was available from private sources. Data sources summarized in this report and data provided for this project include:

- Monthly energy (electricity and gas) consumption data for three Faculty and Staff Housing buildings from UBC Utilities,
- Monthly energy (electricity and gas) consumption data on all rental units owned by UBC Properties Trust for the year of 2010,
- CPR (Conservation Potential Review) data summary from BC Hydro,
- Floor plans and units area from UBC Infrastructure Development,
- Monthly energy consumption data of 10 anonymous addresses in Vancouver from BC Hydro and FortisBC (No analysis was conducted on these addresses. The data can be found in Appendix B).

2.3 METHODOLOGY

Nine residential buildings on UBC Campus were initially selected for analysis, mostly low-rises with four storey buildings except one high-rise building consisting of 17 storeys, a townhome and apartment mix of three levels, and one townhome of two levels. All of the buildings were built in the 2000s and six of them that were built after 2005 are REAP certified since the REAP rating system became mandatory in 2006. The other three buildings did not have to adopt the REAP rating system since they were completed in the early 2000s.

Data for three Faculty and Staff Housing buildings was studied whereas the other REAP certified buildings were excluded due to difficulties in obtaining data due to privacy issues and time delays getting permission and data from Strata Councils, property management companies, and energy providers. The obtained energy consumption data for the three buildings also contains some missing data for certain periods of time and errors due system interruption.

2.3.1 DATA ANALYSIS PROCEDURE

Evaluating energy performance of residential buildings usually involves quantifying total annual energy consumed for various energy sectors such as space heating, air conditioning, hot water heating, and appliances in each individual unit. However, energy consumption by end use is not analyzed in this report due to data limitations. The evaluation also involves description of other dwelling features that have impact on energy consumption, such as geometry (e.x. size of each unit and number of storeys), mechanical systems (e.x. fireplaces and hot water heaters), occupancy, and year of occupancy.

Energy consumption values are usually represented in either kWh or GJ. Here, the convention kWh is used throughout the whole report. Gas consumption data provided by UBC Utilities is given in cubic meters and GJ and these are converted to kWh as well using appropriate conversion factors. Energy intensity in kWh/m^2 is used to compare the buildings' total annual energy consumption. Electricity and gas meters are read regularly at about 30 day of intervals.

Electric baseboard heaters in each suite provide space heating. Electricity is also used for lighting and to power home appliances and plug-loads. Natural gas is used for domestic hot water heating and in natural gas fireplaces for all the three buildings in this study.

When more than one year of data is available, annual and monthly patterns are reviewed for consistency. The monthly consumption data is normalized for weather. Weather normalization allows a more accurate comparison of the monthly and annual electricity and natural gas consumption. Electricity and natural gas consumption are then combined to calculate the buildings' total energy consumption. The average over all years is used for this study when comparing the data with values from other studies.

3 RESULTS AND DISCUSSION

The construction completion date of Azalea House and Sumac House is May 2001 and that of Cascara House is September 2002. The suites in the three buildings are 602 ft^2 to 1,058 ft^2 in size, with a total of 11 to 42 suites per building. All the buildings are located in Hawthorn Place. The description of each building is summarized in the table below.

Table 1. Building Descriptions

Building	Year of Completion	Managed by	# of Units	# of Floors
Azalea House	May-01	Village Gate	11	2
Sumac House	May-01	Village Gate	42	4
Cascara House	Sep-02	Village Gate	36	4

More detailed data including size of each unit and common areas can be found in Table A1 in Appendix A.

Energy consumption for the entire building is calculated and a comparison of consumption to typical low rise residential buildings and subsequent recommendations for the reduction in energy consumption are provided in this section. A description of the method for calculating energy consumption, the levels of detailed data provided and output from the calculation are provided as well.

3.1 ENERGY CONSUMPTION ANALYSIS

There is no database of publicly available information that provides insight into energy use of the buildings. The most directly relevant source provided for this project is measured energy use of the buildings. This source came from energy providers and the data was available on the amount of each form of energy used including electricity and natural gas. The breakdown by end use energy, such as the amount of energy used for space heating, cooling, lighting, ventilation, domestic water heating and others, was not available. The data is analyzed to calculate the total energy use and energy intensity of the buildings. The total energy intensity ($kWh/m^2/yr$) is based on total energy used and floor area of suites and common areas.

The weather normalization is needed to adjust energy consumption data to factor out the variations in the outside air temperature and it allows a fair comparison of yearly

energy consumption of different buildings as well as buildings in different places. Heating degree days are used to normalize the energy consumption of the buildings.

For all the three buildings in this study, electricity consumption data provided covers a period from May 2008 to August 2011 with missing data for November 2008. Two complete years (from 2009 to 2010) of data with complete monthly energy consumption was used to analyze the energy consumption on a yearly basis.

3.1.1 Energy Consumption of Azalea House

Azalea House consists of 11 townhomes of two to three bedrooms with two different floor plan types. Type 1 has an area of 1,083 ft^2 and Type 2 has an area of 1,292 ft^2 (See Appendix A for unit floor plans for each building). The gross floor area is 13,376 ft^2. Each unit has two walls shared with the other units and there is no common area. The monthly and per heating degree day electricity consumption for the years 2009 and 2010 are shown in Figures 3 and 4 below.

Figure 2. Azalea House

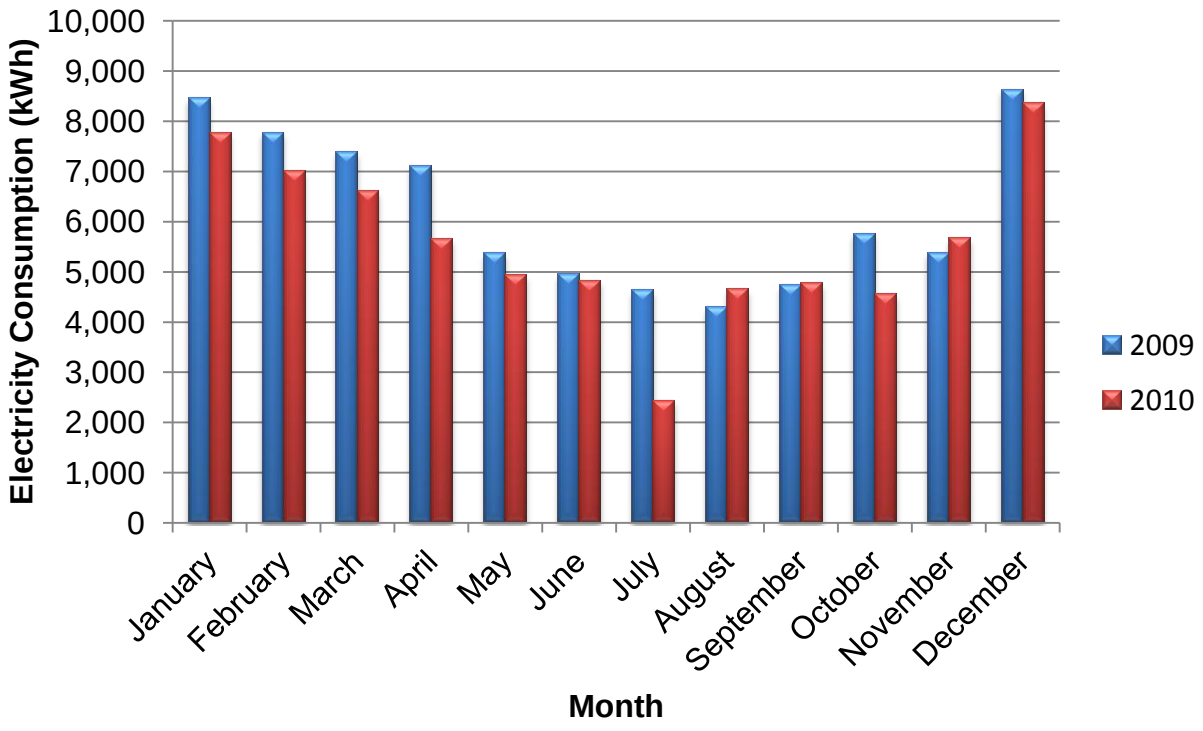

Figure 3. Monthly Electricity Consumption, Azalea House

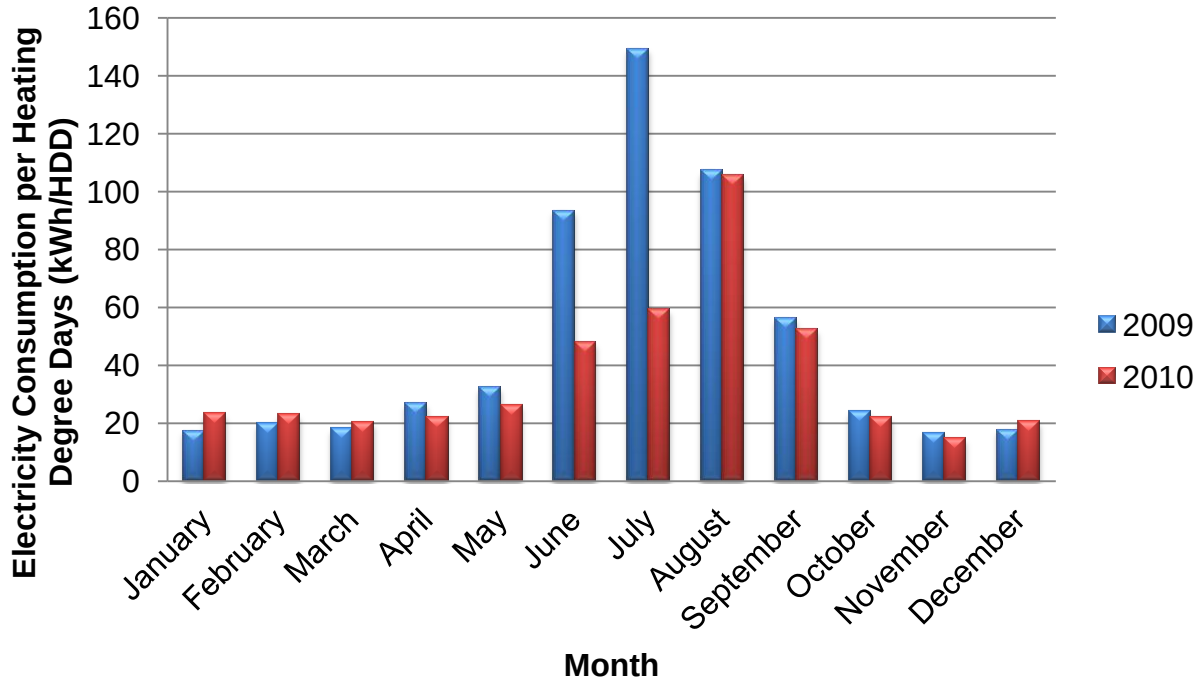

Figure 4. Monthly Electricity Consumption per Heating Degree Days, Azalea House

The heating degree days for 2009 and 2010 can be found in Table A2 in Appendix A.

As expected, the electricity consumption in the winter is higher than in the summer and this is mainly due to more heating required for the winter (More electricity is used for lighting as well in the winter. However, only heating is mentioned here since electricity used for space heating takes a significant proportion of consumption). Figure 4, the weather normalized consumption graph, shows the opposite trend compared to the total electricity graph, Figure 3, higher values in the summer and lower values in the winter. 2009 and 2010 have a very similar electricity consumption trend except June and July. This is because in June, the building used a similar amount of electricity even though the number of heating degree days in June 2009 was almost half that of June 2010 (53 HDDs in June 2009 vs. 101 HDDs in June 2010). For the difference between July 2009 and July 2010, all the units in the building used significantly lesser energy in 2010 than in 2009. Hence, it is assumed that there is an error in the data or a system interruption. The table below shows a yearly comparison of electricity consumption for 2009 and 2010.

Table 2. Comparison of Total Electricity Consumption, Azalea House

Year	Total Electricity Consumption (kWh)	Total Heating Degree Days	kWh per HDDs	Normalized kWh
2009	74375	2968	25	70816
2010	67170	2684	25	70724

When the energy consumption for 2009 is compared with that for 2010, the raw figures in the second column show that the building used less electricity in 2010 than it did in 2009. However, 2010 was warmer year than 2009 as indicated by the number of heating

degree days. Hence, it can be concluded that lesser energy was used in 2010 than in 2009 as the warmer outside temperatures in 2010 means that lesser energy was needed to heat the units in the building. The weather-normalized electricity consumptions for 2009 and 2010 are calculated using the heating degree day values. The kWh per degree day is calculated by dividing the total electricity consumption figures by the number of heating degree days in the period (one year) over which that electricity was used (2009 or 2010). As can be seen in the fourth column, 'kWh per HDDs,' of the table above, there is not much difference between 2009 and 2010. The normalized kWh in the last column of the table is calculated by multiplying the kWh per degree day figures by the average heating degree day value of the two years, which is calculated to be 2,826 days.

Azalea House has its own gas meter for hot water heating and fireplaces and hence, the gas consumption data was obtainable. However, there were many missing figures in the data and hence, it was not possible to analyze the gas data as accurately as electricity data. The gas consumption data contained gas data used for fireplaces and hot water heating separately and was given in cubic feet. The figures were converted to kWh. Azalea House uses approximately 115,000 kWh of energy provided by gas each year, which is about 92.5 kWh/m^2/yr. Of this, gas used for fireplaces takes up about 38.5%, which is approximately 44,300 kWh/yr or 35.6 kWh/m^2/yr (It was not possible to obtain efficiency and type of the fireplaces in the suites and hence, it was not possible to know how much energy from the fireplaces was being wasted). The exact total gas consumption and gas used for fireplaces were unavailable to obtain since the gas consumption for January 2010 as shown in Tables A6 and A8 in Appendix A does not

contain the gas used for fireplaces (The gas consumption for 2009 was not studied since there were many missing figures for the fireplace gas consumption, as mentioned earlier).

The gas used for domestic hot water heating in 2010 was found to be 68,601 kWh which gives the gas intensity of 55 kWh/m^2/yr. This is 42.6% of all the gas consumed when the January gas consumption was not considered in the calculation. The monthly gas consumption for domestic hot water heating is shown in Table A7 in Appendix A.

3.1.2 Energy Consumption of Sumac House and Cascara House

For Sumac House and Cascara House, electricity consumption data for each unit was available. However, gas consumption data for each building was not available since they use a single meter for measuring gas consumption.

Sumac House is a four-storey building which is composed of 42 units. There are 18 two-bedroom and den townhomes and on top of it, there are 24 1 and 2 bedroom apartment suites on the third and fourth floors. The area of each townhome unit ranges from 978 ft^2 (90.9 m^2) to 1,012 ft^2 (94.0 m^2) and that of each apartment unit ranges from 649 ft^2 (60.3 m^2) to 736 ft^2 (68.4 m^2). The gross floor area is 41,914 ft^2 (3,894 m^2) including a common area of

Figure 5. Sumac House

7,649 ft^2 (780 m^2). The monthly electricity consumption and electricity consumption per HDDs graphs are shown in Figures 6 and 7 below. Table 3 shows the normalized total electricity consumption.

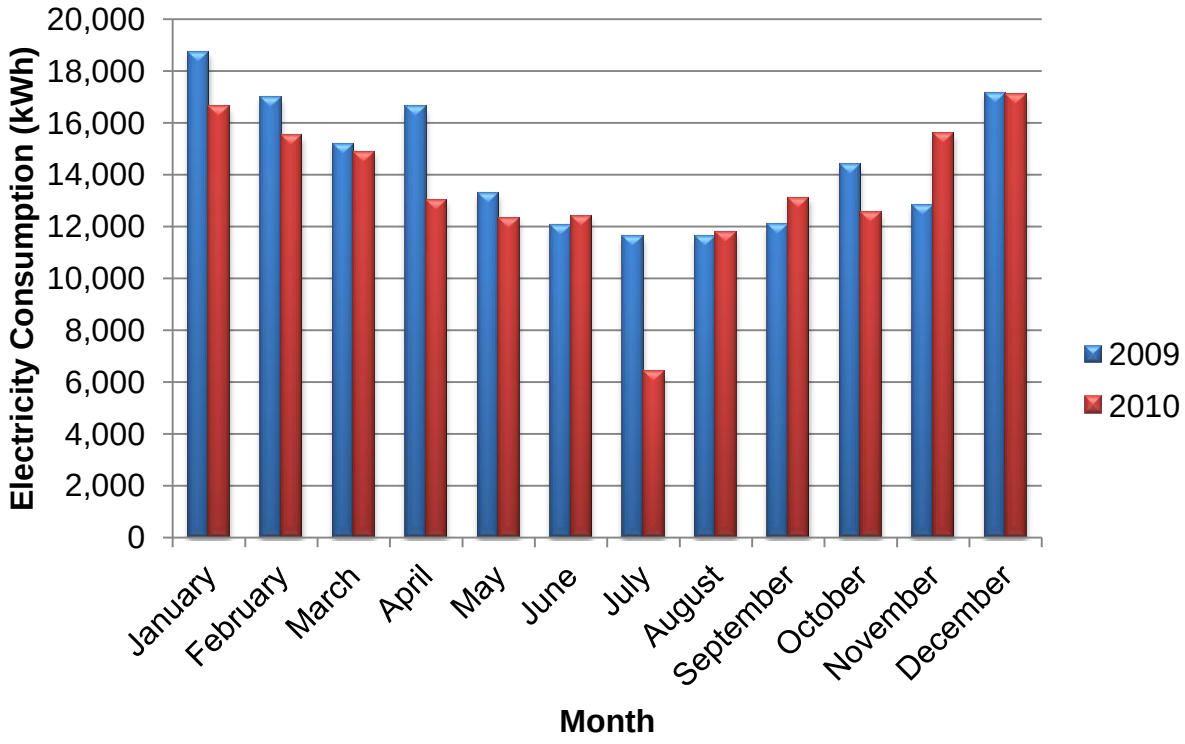

Figure 6. Monthly Electricity Consumption, Sumac House

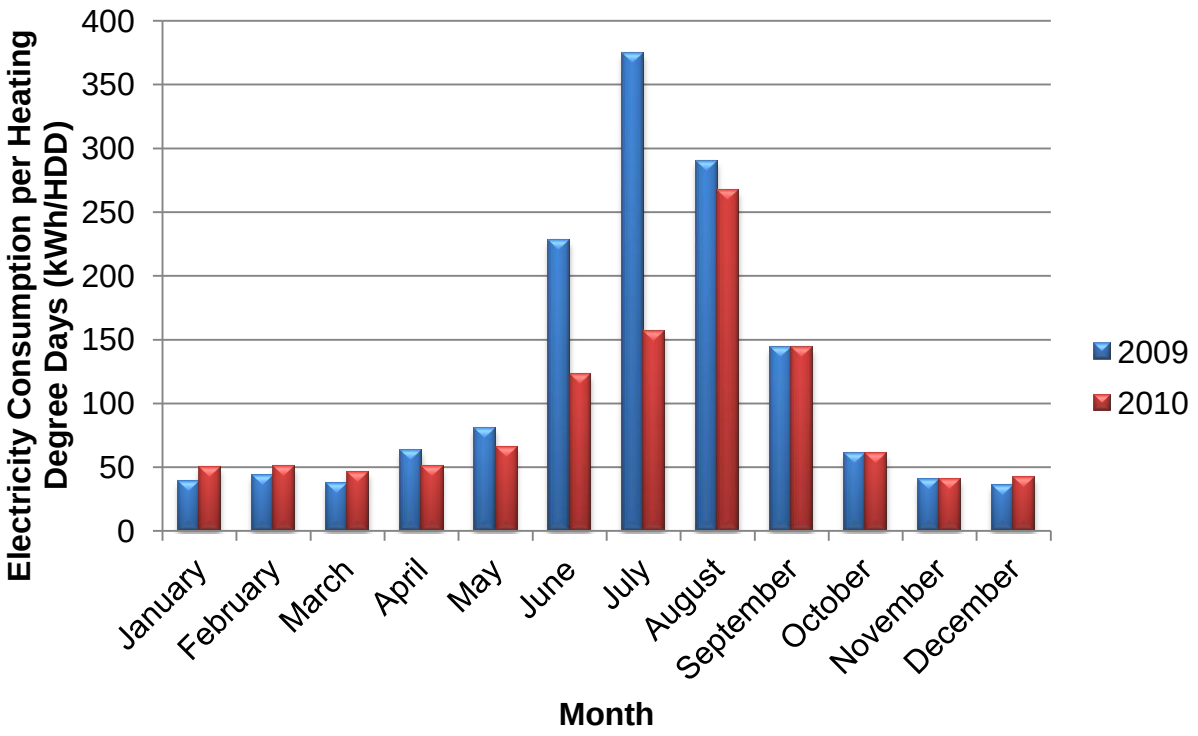

Figure 7. Monthly Electricity Consumption per Heating Degree Days, Sumac House

Table 3. Comparison of Total Electricity Consumption, Sumac House

Year	Total Electricity Consumption (kWh)	Total Heating Degree Days	kWh per HDDs	Normalized kWh
2009	172440	2968	58	164190
2010	161179	2684	60	169706

Cascara House is a four storey apartment which provides 36 units of one, one plus den, two, and three bedrooms. The area of each unit ranges from 602 ft^2 (55.9 m^2) to 1,058 ft^2 (98.3 m^2). The sum of the area of all units is 28,276 ft^2 (2,626.9 m^2) and that of the

Figure 8. Cascara House

common areas is 5,256 ft^2 (488.3 m^2), giving a gross floor area of 33,532 ft^2 (3,115.2 m^2). The monthly electricity consumption, electricity consumption per HDDs and normalized total electricity consumption are shown in Figures 9 and 10, and Table 4 below.

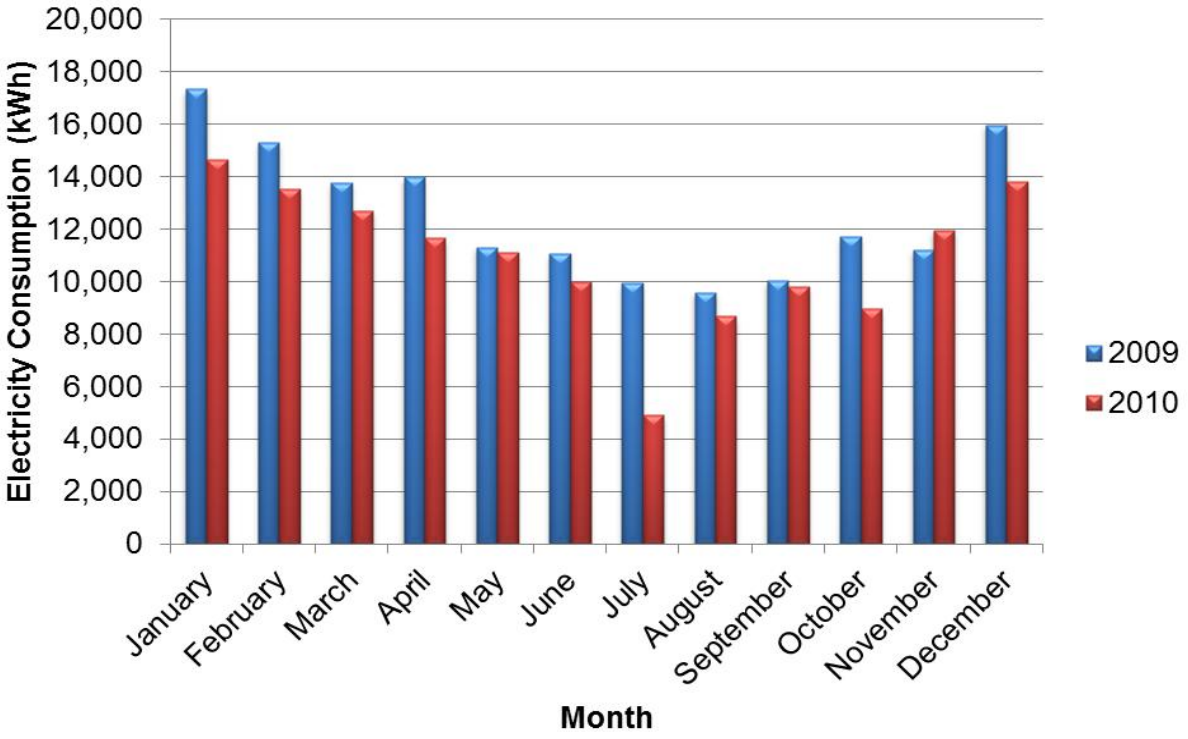

Figure 9. Monthly Electricity Consumption, Cascara House

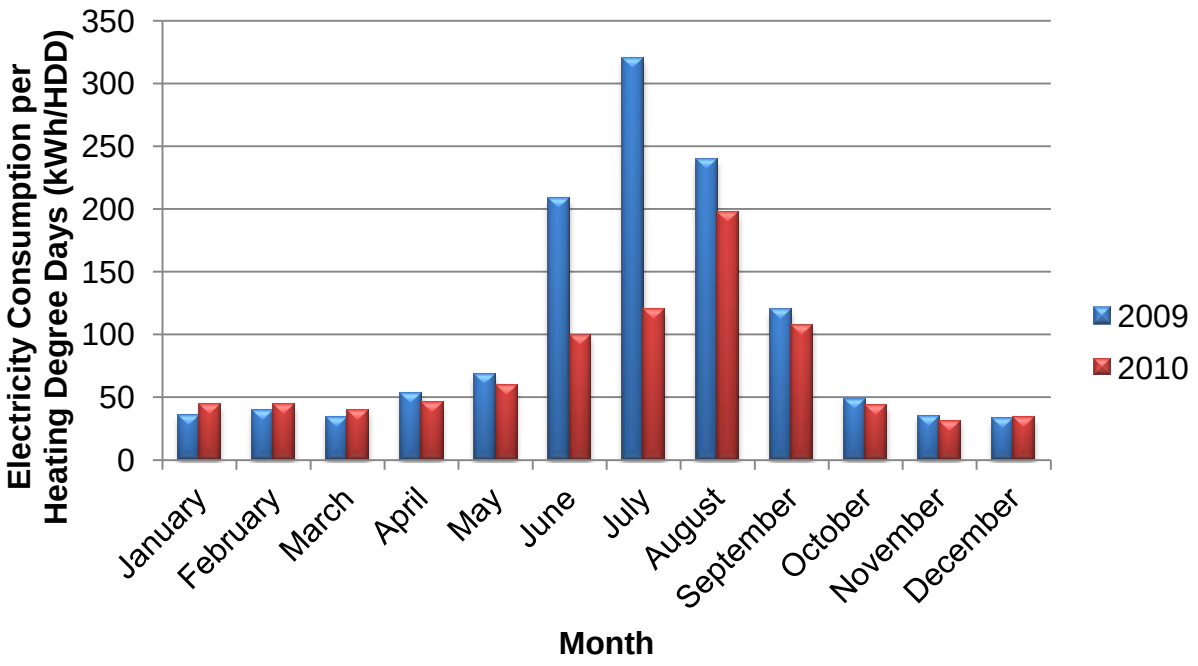

Figure 10. Monthly Electricity Consumption per Heating Degree Days, Cascara House

Table 4. Comparison of Total Electricity Consumption, Cascara House

Year	Total Electricity Consumption (kWh)	Total Heating Degree Days	kWh per HDDs	Normalized kWh
2009	151105	2968	51	143875
2010	131678	2684	49	138644

As with Azalea House, the electricity consumption of Sumac House and Cascara House show very similar trends. The abnormal trend in the electricity consumption per heating degree day figures in June and July 2009 and 2010 is assumed to be due to the same reason mentioned earlier for Azalea House. Note that all the three buildings have UBC Utilities as their energy provider and are managed by the same management company, Village Gate.

For the gas consumption, there is no separate data for Sumac House and Cascara House. Also, the obtained data does not show gas used in common areas separately from that used in the units. Sumac House and Cascara together used 875,151 kWh of energy provided by gas in 2010 which gives 124.9 kWh/m^2/yr of gas use. Of this, 563,241 kWh (80.4 kWh/m^2/yr) of gas was used for domestic hot water heating (accounting for 64.4% of total gas used) and 311,911 kWh (44.5 kWh/m^2/yr) of gas was used for fireplaces (35.6%). The gas intensity was calculated by dividing the total gas consumption by the total area of the two buildings including common areas. The total monthly gas consumption and gas used for hot water heating and fireplaces for the two buildings can be found in Tables A9, A10 and A11 in Appendix A.

Next, the electricity used in the common areas in Sumac House and Cascara House is shown in Figure 11 below.

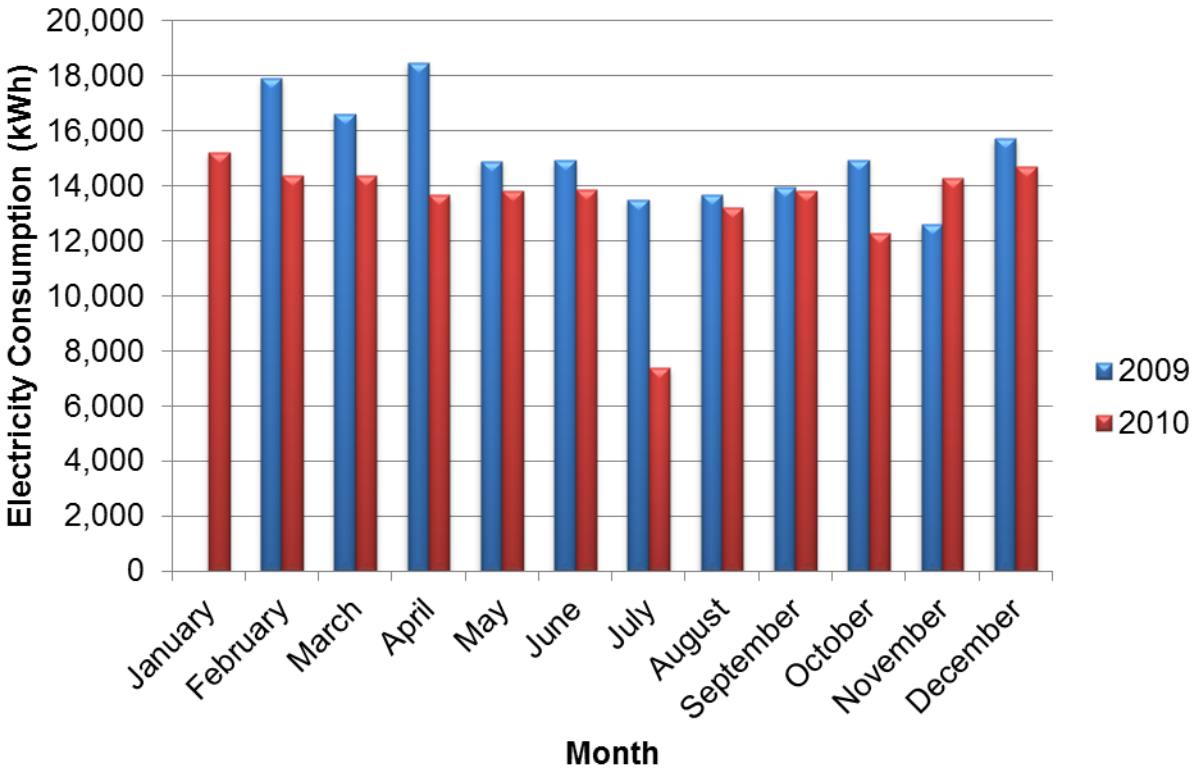

Figure 11. Common Area Electricity Consumption, Sumac House + Cascara House

The electricity data for January 2009 is not included since it was abnormally higher than for the rest of months, about three times higher on average. The ratio of the common area in Sumac House to that in Cascara House is approximately 1:1.45. However, the common areas calculated from the obtained data do not contain the underground parking area (parking area floor plans were missing) in each building, which means that only the heated area is considered in the analysis.

It should be noted that the total gas and common area electricity consumption calculated for Figure 11 above are not very reliable due to the fact that the data is based on a single meter for two different buildings. Sumac House and Cascara House have different

building types. Sumac House has a mix of townhomes and apartment units whereas Cascara House has only apartment units. Also, they have different building envelopes and used different construction materials. They might use different mechanical systems of different efficiencies from different companies. RDH Engineering (mentioned in the 'Literature Review' section of this report) excluded buildings that used a single gas or electricity meter for several buildings and buildings that had missing or erroneous data in their study on energy consumption in MURBs. They found those buildings were unsuitable to analyze.

3.1.3 Energy Used for Space Heating

All the three buildings are equipped with electric baseboard heaters and gas fireplaces. The electric baseboard heaters are the main source that provides space heating to the suites and gas fireplaces are used as a secondary space heating source and used for aesthetic purposes as well.

The amount of energy used for space heating was calculated by the method used by RDH Engineering's study. For the calculation of electricity used for space heating, it was assumed that direct space heating (electric baseboard heaters) was turned off during the summer (However, it should be noted that occupants might need to use baseboard heaters to heat up rooms even on the summer days when the occupants feel cold being in the room). Then, the electricity used in the summer months becomes non-variable data which means that the amount of electricity used during these months is used for

other purposes such as electric home appliances which are used continuously throughout the year. The non-variable electricity figure was calculated by averaging the electricity used for July and August. The amount of electricity used for space heating can then be calculated by summing up the differences between the total electricity used for each month and the average non-variable electricity figure. For gas, the non-variable data is the gas used for domestic hot water heating. Since the gas used for hot water heating was obtained separately from the gas used for fireplaces from UBC Utilities, the non-variable calculation was not required for gas. The total energy used for space heating is the sum of gas used for fireplaces and the non-variable electricity used.

For Azalea House, 37.9% of the total energy consumed was used for space heating and for Sumac House and Cascara House, the energy used for space heating accounts for 35.5% of the total energy used. More detailed data including portions of electricity and gas used for space heating was summarized in Tables A12 and A13 in Appendix A. These tables also summarize the total energy consumption and distribution of the energy.

3.1.4 Energy Consumption Comparisons

A comparison of energy consumption for the three buildings and to the other residential buildings is presented in this section. The energy intensity of the three buildings for the year 2009 and 2010 are shown in the table below. Note that the common area energy

intensity of Sumac House and Cascara House is not included in the total energy intensity values.

Table 5. Energy Intensity

Electricity Consumption (kWh/m^2)	**Year**	**Azalea House**	**Sumac House**	**Cascara House**	Average
	2009	59.9	54.2	57.5	
	2010	54.1	50.6	50.1	
	Average	57.0	52.4	53.8	54.4
Electricity Consumption (kWh/m^2/HDD)	2009	0.0202	0.0182	0.0194	
	2010	0.0201	0.0189	0.0187	
	Average	0.0202	0.0186	0.0190	0.0192
Gas Consumption (kWh/m^2)	2010	91.6	124.9	124.9	113.8
Total Energy Intensity (kWh/m^2)	2010	145.7	175.5	175.0	165.4

Table 5 above presents the total energy consumption for the three Faculty and Staff Housing buildings, normalized by gross floor area. Note again that gas consumption is calculated only for 2010 due to missing data in 2009 and hence, the total energy intensity calculated is only for that year as well. The average electricity consumption for the three buildings is 54.4 kWh/m^2/yr. Per heating degree day, the average electricity consumption is 0.019 kWh/m^2/yr per HDD in Vancouver where the average heating-degree days (18°C baseline) of 2009 and 2010 was 2,826. The average gas consumption for the year 2010 is 113.8 kWh/m^2. For the calculation of gas consumption in Sumac House and Cascara House, the total gas consumption data from the common gas meter was divided by the total floor area of the two buildings, hence giving the same figure for the gas consumption in kWh/m^2. The average total energy (electricity and gas)

use intensity is calculated to be 165.4 kWh/m^2/yr. This is a lot lower than the energy intensity value from RDH Engineering's 2010 study on energy intensity on MURBs, which was found to be 220 kWh/m^2/yr for buildings in Vancouver. The average total energy intensity for the three buildings is about 20 kWh higher than the value from BC Hydro's database for energy consumption, which is 146 kWh/m^2/yr (82 kWh/m^2/yr for electricity and 63.89 kWh/m^2/yr for gas) for low rise (<= 4 storeys) apartment units with electric heat. Note that BC Hydro's database was based on its 1.5 million resident customer billing data and the energy intensity value mentioned above is for the low rise apartment buildings that were built after 2007. In general, high-rise residential buildings and residential buildings that are gas-heated have higher energy intensity values.

3.2 DISCUSSION

3.2.1 Analyzed Data

The main barrier that hindered the energy performance analysis on the buildings was a lack of dependable consumption data, especially for gas. Azalea House uses its own gas meter to measure the amount of gas used. However, the data obtained contains missing data for some months. The most appropriate way to analyze the data was to use 2010 values only. For Sumac House and Cascara House, the problem was that they share a single meter for measuring electricity and gas. For electricity, the consumption for each unit in each building was obtained from UBC Utilities and hence, it was possible to analyze the electricity consumption separately. However, that was not the case for gas. For the purpose of analysis, the total gas consumption was divided by the sum of

the two buildings' floor areas. However, the proportion of the common area of each building is not the same as that of the sum of each unit for each building. Also, they are buildings of different types and they might at least have different thermal mass in their structure and have different wall thicknesses and window types. Also, they were constructed at a different time.

The normalization factor (floor area) was selected as a means to compare different buildings. The limitation in using a per unit area basis is the assumption that all suites regardless of size have the same amount of lighting and appliances and usage patterns, which is not the case. The primary benefit in using this unit area basis is that it gives a simple, easily performed estimate of expected energy consumption for any given home.

3.2.2 Potential Interventions to Reduce Consumption

Energy is used in residential buildings to heat, light and operate appliances. There are many options for energy management opportunities to reduce the amount of energy used to perform these tasks through technological improvements in the systems that are used in buildings, and effective control strategies. Processes for controlling energy consumption and costs vary depending on building types and applicability of energy management procedures should be evaluated specific to different building types. Residential buildings require an individual's effort within the household to adopt specific energy management programs such as replacing boilers or retrofitting lights (ASHRAE, 2007). Some of the energy management programs are listed below.

Seal and Insulate

The building envelope (outer walls, ceilings, windows and doors, and hidden gaps and cracks) affects the amount of air flowing in and out of the building and the requirements for heating and cooling systems of a building. Air leaks make residents feel uncomfortable and significantly raise energy costs. For example, in the winter, cold air can infiltrate into a unit through leaky windows, requiring a heating system to run more. In this case, the existing windows can be replaced with energy-efficient windows to reduce energy costs. “Low-emissivity” coating on the existing windows can also be used to retain more heat during the winter and reduce the amount of solar radiation received during the summer.

Heat and Cool Efficiently

Building energy performance also depends on how well the building is operated and maintained. In order for heating and cooling systems to perform better, annual maintenance (regular filter cleaning, check-ups, and proper service) is required. A well-designed and sealed duct system for the heating and cooling equipment can prevent losses in system efficiency up to 20 percent from leaky ducts (US EPA, 2011). Residents can try to heat and cool only those areas that they use. When the outside temperature is high and the interior temperature needs to be cooled, natural ventilation can be used. When heating is required, it is important to make sure that windows and doors are closed for maximum efficiency. Slight adjustments to thermostat set points of air conditioning systems can result in substantial energy savings as well.

Use of Energy Efficient Equipment

Outdated and inefficient equipment can be replaced or eliminated reducing energy consumption directly. Lighting can be upgraded with high efficiency bulbs and fixtures which use less energy. Purchasing and using ENERGY STAR qualifying products will offer significant energy savings as well.

Reducing Hot Water Use and Lowering Water Heating Temperature

Gas consumption can be lowered by reducing hot water use and this can lower water heating costs at the same time. Wasting less hot water can be achieved by repairing leaks in fixtures such as faucets and showerheads, installing low-flow fixtures, or purchasing energy-efficient dishwashers and clothes washers. Lowering the thermostat setting on a water heater can also lower the costs for water heating and help the heater last longer by lowering mineral build-up rate inside the heater.

Informing Residents and Changing Behaviour

Promoting energy conservation and rewarding wise energy decisions and behaviour will make people have a greater understanding of energy conservation and as a result, will significantly affect the amount of energy used. Consumers should be made well aware of the many choices they have for controlling the energy consumption. Use of individual metering system will also make people be aware of how much energy they consume and if they have to pay for what they use, they will be more inclined to conserve.

Performing Energy Assessments

It is important for residents to know how much energy their home consumes in order to evaluate what measures can be taken to use energy more efficiently. The energy assessment shows residents how they use energy, where the energy is wasted, how much energy and money can be saved over time. Home owners can perform a simple energy assessment or a professional energy auditor can be hired to perform a more thorough assessment.

The interventions listed above are generic. It is required to get access to the three buildings in order to find out measures that can be applicable specifically to those buildings. The 2007 ASHRAE Handbook – HVAC Applications lists some measures that can be implemented.

3.2.3 Potential Causes of Variations in Consumption

Occupancy, household composition, installed home appliances, and weather influence the amount of energy used even for the same type of homes of the same area. In residential buildings, occupants have complete control of all appliances and they can behave as they want. One way of reducing energy consumption is replacing or upgrading household equipment. However, this takes time to make residents understand the benefits from this replacement. High-efficient home appliances usually cost more than less efficient ones and thus, people prefer to buy cheaper and less efficient ones as long as these appliances have minimal features that people want to use. Frequency of use of each home appliance varies with time of day and year and this

affects the amount of energy consumed as well. According to Wood (2002), energy consumption can be classified as “predictable,” “moderately predictable” and “unpredictable.” The “predictable” energy consumption occurs when the building is unoccupied or when the occupants are asleep where there are steady energy loads such from refrigeration or lighting in the lobby or hallways. The “moderately predictable” and “unpredictable” consumptions relate to behaviour of residents and seasonal or weather variations. Watching TV at a regular time for regular periods and turning lights on at night after work and off before going to bed are examples of the “moderately predictable” consumption. The “unpredictable” consumption is energy use that occurs irregularly at the users’ discretion. Since most of the households have all three types of consumption, the variations in the energy consumption among similar households come from variations in micro-level activities such as time taken for each activity. Hence, changing occupants’ behaviour has a great potential to reduce energy consumption. It can reduce energy consumption by 10-30% (Spataru et al., 2010). Although residents in the UBC’s Faculty and Staff Housing buildings are a quite distinct group of people compared to residents in multi-family buildings in general, they still have different attitudes, age, income and health conditions. All these factors affect residents’ energy use behaviour. In addition, interpersonal relationships also affect energy-use behaviour. Hence, when addressing methods for reducing energy-consumption by changing residents’ behaviour, these differences should be considered. However, it is not easy to change one’s lifestyle, habits and behaviour and also, changing the existing home appliance is not effective since the life expectancy of home appliances is usually several years unless they are significantly damaged or broken down. Hence, understanding and pursuing initiatives that affect behaviour are of great importance.

Occupant characteristics, such as the number of occupants and their age, influence the amount of energy consumed in a household as well. Energy use generally increases with the number of occupants (Seryak, 2003) but it also varies widely with the same number of occupants due to their behaviour. Energy consumption is significantly influenced by the number of occupants, and depends on time of occupation, outside temperature, and behaviour of residents, whereas gas consumption is not as affected by the number of occupants. Rather, it is more affected by structural characteristics in addition to outside temperature and behaviour (Seryak, 2003). Age, income, and employment status affect energy use and energy use patterns. Households without children or with residents working or attending school during the day consume less energy than those with children or older people. Older people usually have low energy consumption but have high energy consumption in the winter due to a lower tolerance with cold temperature (Guerin et al., 2009). Age of buildings is an important household characteristic that also determines the amount of energy used. In general, older households consume more energy than newer households due to greater energy use for space heating. Also, there are many international studies stating that there are linear correlations between household size and energy use.

3.2.4 Data Privacy

There are issues involving privacy and security of energy consumption data. Collected personal information which includes recorded information such as name, address and phone number and thus identifiable should be handled in compliance with the relevant privacy regulation which might be the British Columbia Freedom of Information and

Protection of Privacy Act for this case. Hence, it is necessary to differentiate between personal and non-personal data when dealing with energy consumption data from different sources. The use of personal data requires informed consent from the customer. A meter reading is personal data if it can be traced back to households or the individual consumer which is the point of consumption and if it can identify directly or through inference a person. Hence, it is important to distinguish between personal and non-personal data to minimize the exposure of personal data and clarify which data is used by whom and for what purpose. BC Hydro and FortisBC control access to the collected data by preventing unauthorized use of a resource and making the information not available to unauthorized individuals or entities. The use of personal data is controlled by law.

Smart meters, which are considered to be one of the methods to save energy, have issues with privacy. BC Hydro announced that it was going to replace the old analog meters with smart meters and have planned to install 1.8 million meters across B.C. by the end of 2012. Smart meters are considered by electricity providers to help consumers monitor and control their energy usage, reduce their energy bills while helping the electricity providers have the ability to manage demand requirements and build a more efficient electricity system. However, consumers worry about the smart metering system lacking privacy protections. Smart meters track real-time electricity use of customers and tell electricity providers how much electricity consumers use, when they use it, what they use it for and even what appliances they use it with. The meters collect personal information on daily lives of consumers and reveal their energy use patterns. Smart meters transmit wireless signals and the signals can be intercepted and detailed energy

use data can be misused by unauthorized parties. They can use this data to monitor household occupancy, for example, which can aid criminal activities. The data could hold information on what kinds of appliances consumers have in their houses, which could be very valuable to marketers and advertisers.

The news released by Office of the Information and Privacy Commissioner for British Columbia in July 2011 shows how seriously consumers are worried about the security of personal information collected by smart meters. The privacy concerns prompted BC's Information and Privacy Commissioner to investigate BC Hydro's compliance with the Freedom of Information and Protection and Privacy Act. The Commissioner's report released in December includes a finding that BC Hydro is not in compliance with regard to the notification about the purpose for collecting personal information for the smart metering system. The report suggests recommendations to BC hydro for improving its privacy and security practices, especially for informing customers about the reasons for collecting information.

Energy providers, including BC Hydro, need to adopt strong rules to protect the privacy and security of customers' energy usage information in order to dispel worries. They need to assess their data security policies and procedures and review what type of personal information is in their possession, where the information is located, and how to safeguard this sensitive information. In addition, laws regarding personal information that smart meters are transmitting should detail how consumers' information is to be destroyed when no longer needed. When energy providers need to share data with a third-party service provider (although there is a question of how the energy providers

could ever justify giving data to third-parties), only the minimal amount of personally identifiable information should be provided and customers' names and other information that can identify the individual should not be used. Energy providers should give consumers assurances that their privacy is protected since they need not sacrifice privacy for energy efficiency.

3.2.5 Challenges in Energy Assessment

Energy is used mostly for space heating in residential sector and energy used for space heating depends on heat gains and losses throughout the building envelope which is determined by technical and architectural characteristics. The thermal quality of the building, household characteristics, occupant behaviour and climate are some of the parameters influencing energy demand in residential buildings. However, these characteristics cannot be found from utility bills or energy consumption data.

Performing energy assessment on existing buildings involves some challenges. In order to analyze building and utility data, the study of the installed equipment and building operational systems is also required as well as an analysis of energy bills. However, this requires more detailed data and access to each household or to the property which requires permission from the building or unit owners or property managers.

For this project, three Faculty and Staff Housing buildings were chosen for analysis. Luckily, data for all suites was obtained since all the buildings have energy provided by UBC Utilities. However, if other privately owned buildings were selected for building

performance analysis, it might not have been possible to get energy consumption data for all the units in a building. Hence, how much data from how many buildings (sample size) and from how many units can be collected is important. Usually, the larger the sample size, the more it can truly reflect the total population.

A descriptive statistical analysis of the data with an assumption that data for some units, not all, in a building is collected, is conducted as shown in Table A8 in Appendix A. For all the three buildings, the number of samples collected gives an average energy intensity value that differs by approximately 5%, demonstrating a narrow variability of energy use between different groups of units. When data for nine of 36 units in Cascara House was collected, the average of their energy intensity values differed only by 1.35% from the average of the total. However, it cannot be said that the sample size was large enough to be assumed representative of the total since the sample data collected is from residents who may be more energy-conscious.

4 CONCLUSION

There are many residential buildings on UBC campus and multi-unit residential buildings (MURBs) are becoming one of the most common building types. This study was established to evaluate the energy performance of UBC's residential buildings and analysis of energy consumption was made. The results describe the energy use of three Faculty and Staff Housing buildings totalling 89 units containing 88,822 ft^2 of floor space, which about 75,926 ft^2 is the sum of individual units and 12,896 ft^2 is the sum of common areas. The average total energy intensity for the three buildings was found to

be 165.4 kWh/m^2/yr. Of this, 67.7% of the energy consumption was gas and approximately 38.5% of the gas was used for space heating. The amount of electricity used for space heating could be estimated assuming that all the electrical baseboard heaters were not in use in the summer. Of the electricity used for all the three buildings in 2010, 35.4% was used for space heating. Considering the total energy used, energy used for space heating was approximately 35.8%. Electricity used for other purposes could not be determined due to the lack of breakdown in end use energy consumption data. Mechanical systems and home appliances can be replaced or upgraded to use energy more efficiently. Educating building occupants is another way of potentially reducing energy use.

5 RECOMMENDATIONS

The evaluation of the energy consumption of buildings was based on electricity and gas consumption data. It was good that a complete set of data was obtained for the three residential buildings. However, they do not represent all the residential buildings on campus and since they were built in the early 2000s, there might be a significant energy consumption difference between the three buildings and REAP certified buildings that most new residential buildings on campus are now. In order to improve the accuracy of analyses of UBC's residential buildings' energy consumption, data for more buildings is needed and should be collected. It would also be beneficial to study buildings that use energy savings technologies such as geothermal heat pump for domestic water heating or waste heat recycling system.

A lack of time prevented me from gathering as much data as needed since this project was scheduled to be finished in three months. For a more detailed analysis of energy consumption, more information would be needed concerning the allocation of the two major energy sources to different end-uses, such as space heating, water heating, and home appliances. However, utility bills, that are the primary source of data on total consumption, are not broken down by end-use and there is no practical means by which such information can be obtained directly from each suite. As a recommendation, a survey can be conducted. Occupants can be invited to participate in the survey and complete a paper survey such as during a monthly residents' meeting. The survey can include physical and operational characteristics of residential buildings. Examples of these are type and number of appliances that are most directly related to energy use, socioeconomic characteristics of the household (e.x. income), the area of heated floor space, residents' comfort level, and other household characteristics (e.x. hours per day occupied, number of people in a household, number of children, ownership, etc.). Building envelope and thermal characteristics, such as exterior wall materials and number and type of windows, can also be used for a better understanding of building structures. Another questionnaire might include consumer decision-making behaviour such as willingness to implement energy saving technologies and purchase new equipment, awareness and use of energy-conserving technologies.

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APPENDIX A

Figure A 1. Due to confidentiality, the figure cannot be attached within the report, please contact SEEDS office if you wish access.

Figure A 2. Due to confidentiality, the figure cannot be attached within the report, please contact SEEDS office if you wish access

Figure A 3 Due to confidentiality, the figure cannot be attached within the report, please contact SEEDS office if you wish access

Figure A 4. Due to confidentiality, the figure cannot be attached within the report, please contact SEEDS office if you wish access

Figure A 5. Due to confidentiality, the figure cannot be attached within the report, please contact SEEDS office if you wish access

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Figure A 9. Due to confidentiality, the figure cannot be attached within the report, please contact SEEDS office if you wish access

Figure A 10. Due to confidentiality, the figure cannot be attached within the report, please contact SEEDS office if you wish access

Table A 1. Units Area

Azalea House (Building A)			**Sumac House (Building B)**			**Cascara House (Building C)**		
Unit	**Area (ft^2)**	**Area (m^2)**	**Unit**	**Area (ft^2)**	**Area (m^2)**	**Unit**	**Area (ft^2)**	**Area (m^2)**
101	1083	100.61	101	999	92.81	101	751	69.77
102	1083	100.61	102	999	92.81	102	602	55.93
103	1292	120.03	103	978	90.86	103	762	70.79
104	1292	120.03	104	978	90.86	104	763	70.89
105	1292	120.03	105	999	92.81	105	781	72.56
106	1292	120.03	106	978	90.86	106	775	72.00
107	1292	120.03	107	983	91.32	107	790	73.39
108	1292	120.03	108	1010	93.83	108	790	73.39
109	1292	120.03	109	983	91.32	109	846	78.60
110	1083	100.61	110	999	92.81	201	799	74.23
111	1083	100.61	111	999	92.81	202	602	55.93
Total Area	13376	1242.67	112	978	90.86	203	762	70.79
			113	978	90.86	204	762	70.79
			114	999	92.81	205	781	72.56
			115	999	92.81	206	775	72.00
			116	1012	94.02	207	790	73.39
			117	1010	93.83	208	790	73.39
			118	983	91.32	209	1058	98.29
			301	672	62.43	301	799	74.23
			302	649	60.29	302	602	55.93
			303	649	60.29	303	762	70.79
			304	649	60.29	304	762	70.79
			305	736	68.38	305	799	74.23
			306	736	68.38	306	775	72.00
			307	672	62.43	307	790	73.39
			308	649	60.29	308	790	73.39

309	649	60.29	309	1058	98.29
310	672	62.43	401	812	75.44
311	736	68.38	402	602	55.93
312	736	68.38	403	762	70.79
401	672	62.43	404	762	70.79
402	649	60.29	405	812	75.44
403	649	60.29	406	788	73.21
404	649	60.29	407	790	73.39
405	736	68.38	408	790	73.39
406	736	68.38	409	1042	96.80
407	672	62.43	**Total**	28276	2626.93
408	649	60.29	**Common Area**	5256	488.30
409	649	60.29	**Total Area**	33532	3115.22
410	672	62.43			
411	736	68.38			
412	736	68.38			
Total	34274	3184.16			
Common Area	7639.99	709.78			
Total Area	41913.99	3893.94			

Table A 2. Heating Degree Days (HDDs)

	Month												
Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
2009	487	392	406	264	166	53	31	40	84	239	321	485	2968
2010	332	307	324	258	187	101	41	44	91	208	384	407	2684

Table A 3. Azalea House Electricity Consumption for 2009 and 2010

Azalea House	Year	Jan	Feb	Mar	Apr	May	Jun
Total Electricity (kWh)	2009	8453.39	7762.25	7373.1	7098.64	5366.63	4945.46
	2010	7761.63	7006.04	6595.988	5643.92	4936.31	4825.82
Electricity per Heating Degree Days (kWh/HDDs)	2009	17.36	19.80	18.16	26.89	32.33	93.31
	2010	23.38	22.82	20.36	21.88	26.40	47.78
Electricity per Unit Area (kWh/m^2)	2009	6.80	6.25	5.93	5.71	4.32	3.98
	2010	6.25	5.64	5.31	4.54	3.97	3.88

Azalea House	Year	July	August	September	October	November	December	Total
Total Electricity (kWh)	2009	4626.86	4280.52	4721.76	5754.35	5370.32	8621.54	74374.83
	2010	2432.74	4643.86	4758.56	4545.79	5662.39	8357.06	67170.11
Electricity per Heating Degree Days (kWh/HDDs)	2009	149.25	107.01	56.21	24.08	16.73	17.78	578.91
	2010	59.34	105.54	52.29	21.85	14.75	20.53	436.91
Electricity per Unit Area (kWh/m^2)	2009	3.72	3.44	3.80	4.63	4.32	6.94	59.85
	2010	1.96	3.74	3.83	3.66	4.56	6.73	54.05

Table A 4. Sumac House Electricity Consumption for 2009 and 2010

Sumac House	Year	January	February	March	April	May	June
Total Electricity (kWh)	2009	18711.92	16975.79	15179.00	16601.82	13264.03	12065.08
	2010	16636.14	15494.20	14874.43	13024.12	12326.56	12384.79
Electricity per Heating Degree Days (kWh/HDDs)	2009	38.42	43.31	37.39	62.89	79.90	227.64
	2010	50.11	50.47	45.91	50.48	65.92	122.62
Electricity per Unit Area (kWh/m^2)	2009	5.88	5.33	4.77	5.21	4.17	3.79
	2010	5.22	4.87	4.67	4.09	3.87	3.89

Sumac House	Year	July	August	September	October	November	December	Total
Total Electricity (kWh)	2009	11597.39	11597.83	12088.43	14397.88	12812.05	17148.64	172439.87
	2010	6387.40	11745.47	13110.97	12537.33	15573.20	17084.07	161178.67
Electricity per Heating Degree Days (kWh/HDDs)	2009	374.11	289.95	143.91	60.24	39.91	35.36	1433.03
	2010	155.79	266.94	144.08	60.28	40.56	41.98	1095.12
Electricity per Unit Area (kWh/m^2)	2009	3.64	3.64	3.80	4.52	4.02	5.39	54.16
	2010	2.01	3.69	4.12	3.94	4.89	5.37	50.62

Table A 5. Cascara House Electricity Consumption for 2009 and 2010

Cascara House	Year	January	February	March	April	May	June	
Total Electricity (kWh)	2009	17323.40	15300.23	13767.19	13988.42	11298.57	11044.47	
	2010	14651.44	13524.04	12703.05	11659.20	11085.48	9991.61	
Electricity per Heating Degree Days (kWh/HDDs)	2009	35.57	39.03	33.91	52.99	68.06	208.39	
	2010	44.13	44.05	39.21	45.19	59.28	98.93	
Electricity per Unit Area (kWh/m^2)	2009	6.59	5.82	5.24	5.33	4.30	4.20	
	2010	5.58	5.15	4.84	4.44	4.22	3.80	
Cascara House	**Year**	**July**	**August**	**September**	**October**	**November**	**December**	**Total**
Total Electricity (kWh)	2009	9918.19	9580.68	10023.48	11687.59	11217.46	15954.50	151104.18
	2010	4900.59	8680.67	9783.34	8957.24	11943.96	13797.29	131677.91
Electricity per Heating Degree Days (kWh/HDDs)	2009	319.94	239.52	119.33	48.90	34.95	32.90	1233.48
	2010	119.53	197.29	107.51	43.06	31.10	33.90	863.18
Electricity per Unit Area (kWh/m^2)	2009	3.78	3.65	3.82	4.45	4.27	6.07	57.52
	2010	1.87	3.30	3.72	3.41	4.55	5.25	50.13

Table A 6. Total Gas Consumption for Azalea House for Year 2010

	Month												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
kWh	7517.8	12914.7	13860.4	12352.5	10465.5	9144.0	4465.7	7724.2	7695.4	7410.9	10451.1	9858.8	113861
kWh/m^2	6.05	10.39	11.15	9.94	8.42	7.36	3.59	6.22	6.19	5.96	8.41	7.93	91.63

Table A 7. Gas Consumption for Domestic Hot Water Heating for Year 2010 – Azalea House

	Month												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
kWh	7517.8	7516.5	6884.9	6559.0	6620.9	6236.9	3147.2	5645.2	5460.7	5136.7	6068.7	1806.9	68601
kWh/m^2	6.05	6.05	5.54	5.28	5.33	5.02	2.53	4.54	4.39	4.13	4.88	1.45	55.2

Table A 8. Gas Consumption for Fireplaces for Year 2010 – Azalea House

	Month												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
kWh	-	5398.2	6975.5	5793.5	3844.6	2907.1	1318.4	2079.0	2234.7	2274.1	4382.5	8051.9	45259
kWh/m^2	-	4.34	5.61	4.66	3.09	2.34	1.06	1.67	1.80	1.83	3.53	6.48	36.4

Table A 9. Total Gas Consumption for Sumac House and Cascara House for Year 2010

	Month												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
kWh	102270	94275.1	94144.5	84553.4	70516.9	63455.7	26159.1	40491.8	46900.3	50120.5	84390.0	117875.0	875151
kWh/m^2	14.59	13.45	13.43	12.06	10.06	9.05	3.73	5.78	6.69	7.15	12.04	16.82	124.86

Table A 10. Gas Consumption for Domestic Hot Water Heating for Year 2010 – Sumac House and Cascara House

	Month												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
kWh	60442.6	58977.5	59372.3	54208.5	50468.4	47574.2	20907.0	32737.9	36523.4	34200.7	49778.8	58049.5	563241
kWh/m^2	8.62	8.41	8.47	7.73	7.20	6.79	2.98	4.67	5.21	4.88	7.10	8.28	80.4

Table A 11. Gas Consumption for Fireplaces for Year 2010 – Sumac House and Cascara House

	Month												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
kWh	41827.1	35297.5	34772.2	30344.8	20048.5	15881.5	5252.1	7753.9	10376.8	15919.8	34611.1	59825.0	311911
kWh/m^2	5.97	5.04	4.96	4.33	2.86	2.27	0.75	1.11	1.48	2.27	4.94	8.54	44.5

Table A 12. Energy Consumption Summary – Azalea House

Building Description:			
Date of Construction	2001		
Number of Suites	11		
Number of Floors	2		
Total Unit Area	1,243	m^2	
	13,376	ft^2	
Gross Floor Area	1,243	m^2	
	13,376	ft^2	
Consumption and Distribution Summary:			
Gas and Electric Data from January 2010 to December 2010			
Total Energy			
Total Energy	181,031	kWh	
Total Energy/Suite	16,457	kWh	
Total Energy/Floor Area	146	kWh/m^2	
% of Total Energy used for Space Heat	39	%	
% of Space Heat Energy is Gas	65	%	
% of Space Heat Energy is Elec	35	%	
Gas			
Total	113,861	kWh	(excluding January 2010 data)
Total Consumption /Floor Area	92	kWh/m^2	
Total Consumption/Suite	10,351	kWh	
Total Gas used for Space Heat	45,259	kWh	
% of Total Gas used for Space Heat	40	%	
Electricity			
Total	67,170	kWh	
Total Suite Consumption	67,170	kWh	
Total Suite Consumption used for Space Heat	24,710	kWh	
Total Common Consumption	No Common Area		
Total Consumption/Floor Area	54	kWh/m^2	
Total Consumption/Suite	6,106	kWh	
Total Suite Consumption/Suite	6,106	kWh	
Total Common Consumption/Suite	No Common Area		
% of Total Elec. used for Space Heat	37	%	

Table A 13. Energy Consumption Summary – Sumac House and Cascara House

Building Description:	**Sumac House**				**Cascara House**	
Date of Construction	2001				2002	
Number of Suites	42				36	
Number of Floors	4				4	
Total Unit Area	3,184	m^2			2627	m^2
	34,274	ft^2			28,276	ft^2
Gross Floor Area	3,894	m^2			3,115	m^2
	41,914	ft^2			33,532	ft^2
Consumption and Distribution Summary:						
Gas and Electric Data from January 2010 to December 2010						
Total Energy						
Total Energy	1,328,776	kWh				
Total Energy/Suite	17,036	kWh				
Total Energy/Floor Area	190	kWh/m^2				
% of Total Energy used for Space Heat	34	%				
% of Space Heat Energy is Gas	69	%				
% of Space Heat Energy is Elec	31	%				
Gas						
Total			875,151	kWh *		
Total Consumption /Floor Area			151	kWh/m^2 **		
Total Consumption/Suite			11,220	kWh *		
Total Gas used for Space Heat			311,911	kWh *		
% of Total Gas used for Space Heat			36	% *		
Electricity						
Total Suite Consumption	161,179	kWh			131,678	kWh
Total Suite Consumption used for Space Heat	52,381	kWh			50,190	kWh
Total Common Consumption			160,768	kWh ***		

Total Common Consumption used for Space Heat				37,426	kWh ***		
Total Consumption used for Space Heat				139,998	kWh		
Total Suite Consumption/Suite	3,838	kWh				3,658	kWh
Total Common Consumption/Suite				2,061	kWh ***		
Total Consumption /Floor Area				65	kWh/m^2 ***		
Total Consumption/Suite				308	kWh ***		
% of Suite Elec. used for Space Heat	32	%				38	%
% of Total Common Elec. used for Space Heat				23	% ***		

* Sumac House and Cascara House share a single gas meter. The gas consumption values obtained were the total gas used by all suites in the two buildings.

** 'Floor Area' does not include common areas since the gas consumption obtained were for gas used in the suites only.

*** The common area electricity obtained was the total common area electricity consumed in the two buildings. Hence, the calculated values are applicable to the buildings as a whole.

Table A 14. Sample Size Statistical Data

Azalea House	Sample Size			
	3 (27.2%)	6 (54.5%)	9 (81.8%)	Total (100%)
Average	146.8	153.7	143.9	145.7
Minimum	142.4	136.1	116.6	116.6
Maximum	155.5	166.9	166.9	166.9
Median	142.6	154.0	142.6	144.7
Standard Deviation	7.5	11.7	15.4	14.4
% Avg. Difference from Total	0.78	5.49	-1.26	

Sumac House	Sample Size					
	7 (16.7%)	14 (33.3%)	21 (50%)	28 (66.6%)	35 (83.3%)	Total (100%)
Average	171.9	175.9	174.4	175.0	176.0	175.6
Minimum	144.9	141.7	141.7	141.7	141.7	141.7
Maximum	201.4	217.0	217.0	217.0	217.0	217.0
Median	170.6	171.2	171.5	169.7	170.6	171.7
Standard Deviation	19.7	19.8	21.1	21.4	20.1	20.3
% Avg. Difference from Total	-2.14	0.13	-0.72	-0.34	0.20	

Cascara House	Sample Size			
	9 (25%)	18 (50%)	27 (75%)	Total (100%)
Average	172.4	177.1	172.9	174.7
Minimum	148.7	143.4	143.4	143.4
Maximum	193.8	217.3	217.3	217.3
Median	173.8	175.5	171.0	172.9
Standard Deviation	15.6	21.9	19.3	20.1
% Avg. Difference from Total	-1.35	1.33	-1.06	

APPENDIX B

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 1

Consumption is in KWh

Building No	Suite No	07-Jan	07-Feb	07-Mar	07-Apr	07-May	07-Jun	07-Jul	07-Aug	07-Sep	07-Oct	07-Nov	07-Dec	08-Jan	08-Feb	08-Mar	08-Apr	08-May	08-Jun
1	1	610	209	100	100	105	191	225	250	253	341	361	543	613	386	360	278	260	230
1	2	1,186	803	808	573	500	470	482	469	451	678	740	864	905	622	603	522	515	458
1	3	1,136	857	897	673	609	484	468	454	437	682	752	1,015	1,113	878	894	665	611	479
1	4	1,393	1,035	1,079	599	549	517	123	267	308	424	451	681	769	594	600	417	368	308
1	5	793	603	632	490	452	370	361	370	363	511	548	726	791	588	586	475	455	392
1	6	966	871	964	674	582	217	115	306	361	633	715	943	1,027	804	816	543	469	375
1	7	1,382	1,074	1,137	730	590	400	360	333	314	770	921	1,457	1,663	1,181	1,158	598	422	387
1	8	243	511	990	633	510	426	420	458	456	801	906	1,198	1,305	1,032	645	377	307	299
1	9	1,195	862	888	629	547	469	465	480	470	879	1,007	1,409	1,561	1,236	1,259	799	667	521
1	10	752	744	620	482	446	245	195	263	278	656	781	859	881	686	695	506	460	223
1	11	562	415	431	255	192	191	199	206	203	368	419	649	738	486	463	277	222	186
1	12	216	449	574	360	285	78	19	275	353	1,379	1,737	218	845	590	575	499	431	588
1	13	1,121	884	940	822	48	62	69	192	228	308	327	335	334	274	282	232	225	197
1	14	776	573	596	475	447	426	267	312	318	713	842	926	948	645	622	392	325	301
1	15	1,055	748	767	596	666	440	391	468	479	806	903	1,084	1,146	899	193	261	297	240
1	16	896	668	698	593	577	538	550	543	334	664	769	1,123	1,257	969	979	729	671	514
1	17	470	281	267	209	194	226	246	240	231	344	375	489	530	348	331	252	233	217
1	18	774	647	701	574	547	529	546	551	535	717	759	672	625	562	595	550	559	503
1	19	923	405	275	362	423	516	567	489	448	764	858	1,143	1,248	663	568	466	450	428
1	20	748	539	556	482	474	645	725	573	503	554	549	593	604	518	540	518	533	685
1	21	2,195	1,708	1,808	1,350	1,218	639	491	753	817	1,462	1,659	1,854	1,911	1,648	1,722	1,186	1,045	833
1	22	313	318	364	277	253	236	482	493	482	591	608	593	579	516	544	461	450	407
1	23	1,028	691	694	664	436	490	528	546	536	611	613	613	604	600	651	513	486	487
1	24	873	717	763	634	655	491	462	519	521	730	782	1,014	1,098	886	899	659	702	503
1	25	792	606	638	486	445	410	418	438	433	647	706	878	939	680	672	520	488	406
1	26	832	394	329	325	339	309	313	328	323	520	577	707	752	540	531	372	330	298
1	27	545	361	359	314	309	306	319	286	267	317	324	411	443	349	354	317	318	258
1	28	1,028	493	438	281	228	157	143	178	186	337	384	525	577	491	511	335	285	218
1	29	896	692	732	575	535	512	527	486	313	430	459	736	843	625	622	339	252	302
1	30	695	743	856	544	436	462	491	431	398	626	691	857	916	736	753	520	458	488
1	31	687	469	473	281	212	207	215	232	233	559	667	814	864	590	570	306	223	214
1	32	635	546	595	576	595	345	284	306	305	670	789	1,141	1,274	816	767	463	373	316
1	33	1,355	943	958	686	602	470	451	468	460	884	1,018	1,293	1,392	1,137	1,169	832	747	516
1	34	952	759	811	554	471	446	458	474	464	723	797	1,048	1,140	837	831	514	422	357
1	35	617	511	553	233	107	141	368	337	317	492	540	676	725	638	671	429	360	317
1	36	1,499	1,207	1,292	903	779	325	201	188	382	715	787	912	952	782	806	493	509	335
1	37	797	403	351	263	239	218	222	224	218	331	362	525	586	373	350	240	211	208
1	38	412	1,353	1,795	1,137	909	610	546	447	400	1,245	1,534	2,063	2,258	1,516	1,455	822	629	592
1	39	784	617	655	504	464	394	390	432	434	615	661	830	890	646	638	472	432	360
1	40	788	391	336	324	335	318	327	367	368	625	701	961	1,058	707	678	514	278	300
1	41	1,130	621	566	306	209	217	230	242	240	491	571	847	952	598	558	380	331	275
1	42	914	604	602	400	333	222	198	206	203	413	480	585	622	320	270	233	229	195
1	43	1,605	1,840	2,155	1,368	1,096	690	597	431	361	550	602	817	896	777	699	635	701	550
1	Strata	11,670	10,136	11,100	10,249	10,372	9,888	10,170	10,059	9,697	10,526	10,387	10,857	10,908	9,857	10,440	9,975	10,260	9,620

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 1

Consumption is in KWh

Building No	Suite No	08-Jul	08-Aug	08-Sep	08-Oct	08-Nov	08-Dec	09-Jan	09-Feb	09-Mar	09-Apr	09-May	09-Jun	09-Jul	09-Aug	09-Sep	09-Oct	09-Nov	09-Dec
1	1	230	252	250	202	176	502	595	285	255	245	253	242	469	514	508	680	694	717
1	2	458	445	427	525	537	800	871	674	720	510	479	446	456	444	427	592	608	706
1	3	453	461	448	540	549	1,048	1,189	939	1,007	587	506	434	431	440	428	664	694	834
1	4	300	325	322	441	464	743	819	631	673	453	417	427	449	414	392	618	647	741
1	5	386	408	401	368	340	693	793	547	566	417	398	368	375	363	349	326	308	542
1	6	359	369	360	557	601	977	1,081	733	753	565	541	482	485	464	445	665	691	808
1	7	177	251	264	799	950	1,693	1,901	1,280	1,312	808	669	412	582	667	665	1,011	1,053	1,089
1	8	309	321	315	684	783	1,474	1,668	1,196	1,250	759	667	420	363	354	340	855	945	1,286
1	9	491	499	485	1,015	1,155	1,585	1,699	1,322	1,412	814	699	579	568	576	560	1,167	1,266	1,237
1	10	147	236	254	463	516	800	878	713	770	448	387	442	478	438	414	584	601	756
1	11	181	183	177	284	309	596	676	472	489	246	195	179	182	205	204	437	476	492
1	12	648	584	548	642	647	1,054	1,167	883	936	605	547	578	612	554	522	728	749	772
1	13	196	210	207	367	407	421	943	510	401	272	251	206	202	245	247	456	488	373
1	14	306	253	230	421	469	810	905	668	704	302	213	323	370	288	257	185	506	644
1	15	229	239	234	301	311	468	510	322	323	217	199	202	211	242	241	366	381	590
1	16	480	370	328	417	431	807	913	673	241	363	409	429	454	419	398	578	598	540
1	17	221	220	212	253	257	475	537	341	343	233	215	207	213	233	230	248	543	434
1	18	506	473	361	451	432	598	642	514	553	389	364	355	367	385	376	524	538	530
1	19	440	350	314	591	662	1,110	1,234	640	595	372	331	184	147	351	388	704	751	815
1	20	771	630	570	586	566	666	689	533	569	541	556	633	684	411	334	359	350	417
1	21	255	588	663	895	936	1,509	1,667	1,150	1,187	787	719	292	171	175	178	800	915	1,088
1	22	410	381	360	469	486	502	209	54	39	96	202	233	252	241	231	255	251	561
1	23	509	531	520	581	577	543	528	385	172	262	294	501	586	402	346	438	442	476
1	24	454	469	458	686	721	1,057	1,150	969	1,051	632	574	545	561	554	535	801	833	906
1	25	394	381	364	592	646	969	1,057	771	810	497	439	363	356	359	348	658	706	733
1	26	299	278	263	456	503	520	792	195	28	251	411	695	811	545	465	442	419	530
1	27	248	252	245	302	309	458	499	356	372	316	314	281	284	278	280	556	600	624
1	28	204	212	208	259	265	487	549	374	384	265	246	156	135	159	159	379	416	474
1	29	334	335	325	428	446	929	1,066	730	753	501	458	392	390	435	431	724	765	950
1	30	521	476	448	594	620	1,005	1,111	813	855	495	424	557	621	446	390	683	726	917
1	31	220	202	191	244	252	498	568	445	476	247	200	203	213	207	199	313	328	451
1	32	309	315	307	548	609	600	1,130	575	530	451	450	380	375	399	391	590	615	648
1	33	456	502	498	818	894	1,322	1,438	1,113	1,188	703	611	482	464	921	997	770	685	1,108
1	34	349	346	334	486	517	781	853	644	682	402	349	321	326	367	328	7	51	37
1	35	315	235	205	384	429	727	809	489	483	318	289	266	271	238	222	458	496	587
1	36	287	378	391	911	1,053	1,660	1,827	1,200	1,220	511	355	392	421	454	447	720	757	794
1	37	216	188	257	484	474	603	636	566	625	431	399	374	382	366	351	535	558	561
1	38	107	216	240	295	302	608	694	358	332	242	229	195	193	207	204	332	349	440
1	39	350	339	326	493	530	800	874	575	586	517	60	363	471	646	665	973	1,008	1,073
1	40	322	345	340	485	503	925	1,022	709	719	355	275	311	336	336	136	409	475	575
1	41	267	245	231	429	479	904	1,024	649	652	352	291	234	227	242	238	547	600	772
1	42	192	162	148	393	461	794	887	489	466	221	169	156	159	181	180	401	438	571
1	43	520	611	617	923	969	1,558	1,724	1,262	1,307	700	707	568	553	669	674	1,123	1,185	1,243
1	Strata	9,804	9,716	9,377	12,049	12,454	12,869	12,869	11,624	12,609	4,410	4,500	8,123	9,579	9,600	9,295	10,278	10,103	10,414

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 1

Consumption is in KWh

Building No	Suite No	10-Jan	10-Feb	10-Mar	10-Apr	10-May	10-Jun	10-Jul	10-Aug	10-Sep	10-Oct	10-Nov	10-Dec	11-Jan	11-Feb	11-Mar	11-Apr	11-May	11-Jun	11-Jul
1	1	717	454	431	117	27	156	210	230	229	377	397	706	793	674	728	487	447	294	260
1	2	729	568	596	516	515	423	409	442	439	553	558	660	685	581	627	606	166	269	298
1	3	868	679	714	664	678	570	557	553	534	584	1,012	1,158	1,191	991	1,059	658	586	301	228
1	4	762	577	598	507	502	374	345	280	249	450	480	654	700	572	606	404	370	318	58
1	5	607	462	479	387	376	345	350	386	386	442	438	613	660	524	548	287	234	209	211
1	6	836	635	658	573	572	568	587	740	768	1,028	1,050	1,275	1,331	1,093	1,162	878	844	762	770
1	7	1,089	957	1,049	828	797	659	638	611	582	1,088	1,166	1,412	1,472	1,212	1,290	955	912	689	652
1	8	1,377	1,073	1,124	474	154	308	325	349	346	1,006	1,124	1,347	1,401	1,008	1,002	644	562	206	456
1	9	1,217	1,090	1,204	757	654	610	622	582	550	1,066	1,147	1,409	1,474	1,232	1,320	860	781	579	544
1	10	796	536	525	429	419	408	423	331	290	649	709	636	608	698	838	499	435	265	225
1	11	492	380	397	266	238	207	205	219	217	476	519	504	495	392	410	255	227	218	225
1	12	772	635	680	522	497	564	614	565	530	719	736	1,227	1,363	517	257	486	563	520	530
1	13	335	318	357	242	217	198	200	216	214	296	304	353	364	329	348	222	209	347	404
1	14	680	432	411	392	403	300	276	240	45	279	773	926	963	870	646	462	425	356	350
1	15	647	584	647	188	29	375	518	507	488	725	753	803	811	653	688	551	540	512	226
1	16	517	419	446	432	267	312	378	384	374	452	452	555	581	478	509	364	343	277	284
1	17	397	376	422	318	300	217	197	232	237	251	406	546	583	513	562	359	323	332	349
1	18	522	479	534	392	367	343	575	809	722	609	557	553	546	473	515	469	477	508	540
1	19	826	582	583	472	459	496	533	456	415	718	762	1,023	1,091	815	827	582	545	424	406
1	20	433	286	277	259	252	257	271	322	328	643	692	787	808	655	692	477	312	347	373
1	21	1,129	815	827	640	611	587	605	522	477	871	930	1,086	1,122	870	900	676	649	570	571
1	22	650	567	620	449	417	401	414	414	400	678	718	787	801	619	638	335	274	257	263
1	23	482	353	360	258	238	328	375	399	394	708	755	943	990	817	871	671	649	392	331
1	24	920	747	795	604	572	467	450	446	430	654	682	793	819	735	812	497	439	352	342
1	25	735	665	736	507	459	350	326	353	351	646	690	797	821	718	785	552	517	364	333
1	26	559	535	604	430	396	320	438	480	479	574	574	715	750	682	757	543	512	442	440
1	27	625	331	281	362	403	219	162	312	352	516	535	547	545	415	425	352	349	282	275
1	28	487	403	432	310	287	237	229	230	223	519	569	844	918	767	822	566	525	324	277
1	29	997	654	633	466	436	393	395	312	288	699	677	933	1,002	819	869	612	573	541	555
1	30	966	631	609	452	425	469	506	423	382	827	900	1,132	1,191	897	914	545	476	421	423
1	31	484	366	379	255	229	223	232	234	227	290	294	392	417	321	331	278	277	243	243
1	32	652	515	543	465	461	390	382	458	469	615	626	563	1,308	1,193	1,249	909	862	599	546
1	33	1,225	997	1,064	727	656	401	326	407	421	973	1,067	1,201	1,230	1,214	1,390	964	898	529	440
1	34	33	34	405	190	133	149	162	149	140	407	455	478	480	319	302	165	138	139	145
1	35	609	329	283	215	203	202	218	256	260	644	710	913	965	810	869	544	486	353	329
1	36	798	203	34	32	300	518	518	477	447	911	986	961	944	797	858	534	475	441	450
1	37	77	254	631	484	460	355	333	348	342	701	760	1,016	1,084	979	700	510	490	398	388
1	38	463	352	365	249	225	195	193	221	224	231	443	781	694	557	586	439	421	377	381
1	39	1,082	815	842	658	631	574	580	569	547	929	983	1,016	476	603	460	400	402	331	324
1	40	599	142	209	191	194	265	303	377	389	573	594	654	666	267	414	251	220	314	357
1	41	817	497	462	339	317	264	257	266	260	150	118	132	135	597	872	530	467	299	261
1	42	605	404	394	231	191	159	154	161	158	342	372	523	563	369	346	221	200	168	166

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 2

Consumption is i — **Consumption (KWh)**

uilding N	Suite No	07-1	07-2	07-3	07-4	07-5	07-6	07-7	07-8	07-9	07-10	07-11	07-12	08-1	08-2	08-3	08-4	08-5	08-6	08-7	08-8	08-9	08-10	08-11	08-12	09-1	09-2	09-3	09-4	09-5	09-6	09-7	09-8
2	1						89	114	146	148	179	177	173	172	110	109	89	87	84	30	44	46	112	124	54	46	19	18	23	24	30	32	32
2	2	242	130	123	64	60	64	235	235	227	441	456	508	514	558	614	442	389	135	101	46	32	28	26	216	237	190	208	42	32	32	33	35
2	3				20	156	256	291	301	293	423	427	580	601	399	399	250	223	209	21	24	29	22	19	28	29	16	17	22	23	29	31	30
2	4	801	501	501	273	257	216	215	218	212	309	312	558	593	358	349	314	318	226	14	21	25	18	16	345	380	136	123	27	21	28	30	29
2	5	619	619	776	339	303	215	202	206	426	599	602	681	690	595	627	592	190	194	13	21	25	17	14	922	1,020	773	836	218	182	46	33	33
2	6	751	478	340	273	275	281	295	304	296	421	424	392	385	203		58	106	102	156	31				501	555	419	453	139	122	37	29	190
2	7	536	475	524	506	523	411	400	435	429	480	470	518	523	471	500	393	381	173	148	56	33	22	19	614	678	606	671	284	266	58	37	37
2	8	943	660	695	571	562	414	394	472	475	727	738	779	782	645	675	551	543	456	4	77	92	72	64	242	261	228	252	248	257	79	63	63
2	9	254	253	286	193	190	189	197	173	162	350	365	390	392	319	333	240	226	219	3,126	2,307	2,020	1,347	1,131	396	313	512	598	407	408	123	96	96
2	10	397	312	334	166	153	84	70	107	112	300	317	337	339	280	294	135	101	99	7									139	144	67	61	61
2	11				166	153	84	70	107	112	300	317	337	339	280	294												139	139	144	67	61	61
2	12	295	241	261	207	208	202	209	193	183	224	222	260	265	224	236	223	230	184	12									73	75	108	116	121
2	13				207	208	202	209	193	183	224	222	260	265	224	236												73	73	75	108	116	121
2	14	200	318	332	317	326	291	294	182			176	571	605	354	343	303	306	277	18									110	114	208	226	129
2	15				317	326	291	294	182			176	571	605	354	343												110	110	114	208	226	129
2	16	619	344	329	250	250	219	221	229	224	305	306	365	373	270	276	238	238	101	84	3								77	79	128	139	139
2	17				250	250	219	221	229	224	305	306	365	373	270	276												77	77	79	128	139	139
2	18	329	289	318	291	299	261	263	306	306	300	288	365	375	327	345	278	273	229										35	36	51	55	85
2	19				291	299	261	263	306	306	300	288	365	375	327	345												35	35	36	51	55	85
2	20	386	234	232	239	249	436	501	488	469	522	510	628	644	502	520	447	447	377	12									37	38	109	121	113
2	21				239	249	436	501	488	469	522	510	628	644	502	520												37	37	38	109	121	113
2	22	379	283	299	190	185	188	196	191	183	299	305	379	388	353	376	254	234	165	5									42	43	130	145	105
2	23				190	185	188	196	191	183	299	305	379	388	353	376												42	42	43	130	145	105
2	24	312	420	598	428	425	443	467	431	409	582	586	679	690	639	682	550	574	1,557	1,804	1,947	1,917	1,865	1,778	179	2	63	78	424	464	144	114	114
2	25	1,322	913	777	410	384	243	218	273	278	677	711	1,010	1,051	871	912	528	454	439	495	408	374	908	1,000	1,714	1,787	1,142	1,202	403	360	174	160	160
2	26	283	234	254	223	228	195	195	182	144	201	202	69	49	149	177	151	151	139	388	341	320	522	549	859	890	644	692	382	374	162	144	132
2	27		279	361	349	361	349	361	363	352	434	430	449	450	339	349	339	350	178	145	58	36	37	36	458	503	315	331	78	63	28	26	26
2	28	205	84	510	484	491	431	435	440	428	460	448	588	607	482	500	452	459	201	181	56	26	20	18	258	284	94	83	28	24	33	35	35
2	29	321	271	297	259	264	288	305	281	267	285	277	293	295	270	287	298	313	192	86	41	29	21	18	566	625	490	533	153	131	42	34	20
2	30	43	274	359	265	264	256	259	346	359	460	458	582	598	492	514	403	390	213	93	41	28	20	17	418	461	229	229	42	30	33	35	40
2	31	99			11	344	204	178	370	402	766	792	681	661	438	438	123	49	46	33	30	29	19	16	509	562	431	468	87	62	41	40	38
2	32	236	313	371	124	101	97	100	100	295	431	422	505	516	434	456	360	352	320		31	37	27	24	466	513	426	468	129	109	49	45	61
2	33	448	367	398	230	220	218	227	244	241	323	323	442	458	97	47	555	705	188	117	46	28	20	18	396	437	59	21	25	26	33	36	35
2	34	323	400	297	292	303	200	182	182	153			152	337	333	359	330	336	159	128	45	24	57	63	392	428	345	376	115	101	33	27	58
2	35	165	316	268	228	232	207	209	196	186	277	280	314	318	340	371	296	290	344	6,207	4,146	3,534	2,670	1,788	4,015	4,330	2,454	2,523	392	254	37	14	58
2	36	122	160	189	158	161	179	191	243	248	158	139	155	157	200	223	220	228	161	30									254	263	44	22	21
2	37				158	161	179	191	243	248	158	139	155	157	200	223												254	254	263	44	22	21
2	38		8	260	230	235	200	199	228	228	308	308	386	396	319	333	286	287	241										354	366	51	18	17
2	39				230	235	200	199	228	228	308	308	386	396	319	333												354	354	366	51	18	17
2	40	300	478	624	424	418	251	220	389	416	881	918	1,166	1,199	791	790	463	400	291	28									165	171	48	37	36

BC hydro
FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 3

Consumption is in KWh

Building No	Suite No	07-4	07-5	07-6	07-7	07-8	07-9	07-10	07-11	07-12	08-1	08-2	08-3	08-4	08-5	08-6	08-7	08-8	08-9	08-10	08-11
3	1	665	719	396	267	239	225	1,144	1,238	1,597	1,645	1,170	1,188	456	291	219	217	231	226	472	512
3	2	1,053	1,125	687	605	610	729	393	329	518	544	400	409	371	377	362	373	337	318	342	334
3	3	805	860	325	105	129	135	251	256	264	1,315	770	733	552	529	268	238	214	202	578	646
3	4	554	591	518	47	57	188	892	963	1,596	1,685	1,001	972	655	602	329	299	169	134	679	783
3	5	584	625	337	180	89	525	543	526	758	790	459								17	22
3	6	969	1,010	208	172	351	399	852	888	217	114	880	1,613	683	453	618	668	988	1,030	1,051	1,014
3	7	464	496	480	309	111	107	423	454	924	991	641	636	301	230	78	16	149	175	337	363
3	8	578	618	598	378	122	116	659	715	1,174	1,238	898	915	580	520	159	109	185	196	610	684
3	9	715	764	739	394	238	422	1,047	1,101	983	960	754	782	428	357	106	72	161	177	599	676
3	10	871	932	200	20	20	20	156	171	604	668	634	680	309	229	110	95	85	80	419	483
3	11	438	468	453	416	361	349	770	804	1,063	1,097	821	843	640	616	112	39	39	211	254	250
3	12	622	672	346	224	193	179	510	540	549	548	489	519	348	318	188	175	422	466	463	444
3	13	562	601	303	241	240	234	532	557	651	663	331	304	305	317	279	284	258	243	256	249
3	14	795	850	742	16	16	17	277	305	312	312	289	309	267	268	249	255	301	301	306	295
3	15	452	483	468	252	85	86	507	550	881	927	597	592	138	30	734	870	425	308	314	303
3	16	729	779	584	195	195	190	1,076	1,167	1,175	1,170	1,186	1,283	855	784	539	522	571	564	957	1,013
3	17	633	677	655	662	646	625	646	625	964	1,012	526	491	435	286	175	164	148	140	278	299
3	18	389	420	199	122	122	120	373	396	770	824	666	694	411	357	266	263	316	318	580	620
3	19	268	286	435	436	289	279	980	1,048	1,349	1,388	1,128	1,177	683	588	542	15	459	444	1,016	1,113
3	20	515	551	533	425	283	42	1,113	1,230	1,440	1,466	931	920	530	454	304	292	355	358	843	925
3	21	516	551	409	124	124	120	466	500	702	730	526	535	314	272	155	143	149	145	678	779
3	22	515	551	460	229	229	223	352	358	599	633	430	432	313	296	268	275	249	235	313	320
3	23	424	454	439	266	45	43	65	62	443	500	466	498	300	263	189	185	206	204	512	565
3	24	516	551	389	357	357	345	539	547	710	731	636	672	477	448	405	414	353	327	301	172
3	25	866	925	353	385	373	11	392	434	668	700	491	497	387	375	254	246	287	287	626	683
3	26	503	538	520	340	129	125	148	146	277	296	173	167	76	56	44	44	44	295	641	673
3	27	641	694	422	299	299	290	299	290	670	725	485	486	264	219	278	298	201	172	262	273
3	28	520	555	537	348	126	126	403	429	313	294	400	449	222	174	168	174	285	301	377	380
3	29	799	854	307	95					11	339	187	177	296	337	99	66	198	222	503	550
3	30	822	879	850	454	9	142	984	1,073	1,321	1,353	978	996	594	519	163	115	178	187	719	818
3	31	731	781	189	43	43	44	933	1,030	881	854	317	257	91	53	38	37	108	120	212	225
3	32	527	563	545	458	345	334	683	709	954	987	687	695	363	296	157	142	179	173	494	551
3	33	796	831	232	239	210	195	1,428	1,558	1,937	1,985	837	721	371	299	186	176	176	109	394	445
3	34	315	337	148	140	126	77	333	359	860	933	530	509	305	266	245	253	290	281	323	321
3	35	668	714	691	406	1,167	1,130	1,167	1,130	-	1,424	572	473	310	282	230	231	246	241	494	534
3	36	714	741	73	75	34	21	595	658	821	993	315	232	226	233	226	234	204	190	384	415
3	37	412	447	296	218	219	219	388	398	614	644	540	567	303	248	127	114	184	195	707	802
3	38	373	399	168	61	67	112	298	315	348	1,012	409	345	189	158	160	166	173	169	173	168
3	39	760	813	181	143	108	109	1,326	1,458	1,666	1,690	1,387	1,449	680	515	322	304	474	498	917	981

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 4

Consumption is in I

Building N	Suite No	07-1	07-2	07-3	07-4	07-5	07-6	07-7	07-8	07-9	07-10	07-11	07-12	08-1	08-2	08-3	08-4	08-5	08-6	08-7	08-8	08-9	08-10	08-11	08-12	09-1	09-2	Cons 09-3
4	1	411	412	466	345	340	278	275	331	336	309	286	335	343	321	343	337	350	327	137	249	261	322	324	545	562	571	624
4	2	414	261	261	136	122	181	204	189	179	298	326	641	700	350	306	162	125	140	149	142	136	242	258	512	548	534	596
4	3	909	668	703	519	510	530	557	592	584	677	680	706	707	605	634	494	472	474	493	484	466	536	531	811	850	655	710
4	4	677	558	603	396	380	185	144	227	244	439	488	692	728	509	505	379	356	185	159	261	276	446	469	682	711	532	574
4	5	155	243	294	129	109	119	126	253	280	196	159	164	163	147	157	270	279	267	275	253	240	424	452	902	966	639	677
4	6	1,759	1,058	1,044	723	701	489	456	239	535	870	948	974	973	913	977	694	638	-	43	491	278	300	293	451	473	404	444
4	7	420	441	503	353	330	257	249	247	239	460	517	534	972	882	943	775	370	310	348	346	334	436	443	759	803	583	626
4	8	515	327	328	276	279	220	215	241	242	296	302	396	412	349	365	248	222	222	231	228	220	262	262	444	470	373	406
4	9	185	161	177	153	155	170	181	159	148	167	166	180	182	165	176	154	153	152	158	155	150	168	166	201	205	170	186
4	10	210	219	249	206	207	154	147	134	128	105	92	83	81	69	72	52	48	47	49	49	48	46	43	55	56	90	106
4	11	126	65	60	44	44	41	42	66	70	73	284	316	223	133	126	253	302	126	96	98	96	358	407	811	869	719	788
4	12	376	303	327	260	260	236	240	219	207	222	215	288	301	375	422	226	176	77	60	81	83	179	195	393	422	324	351
4	13	355	196	187	129	125	104	103	107	105	220	250	119	93	59	57	52	53	51	69	174	182	173	164	169	655	405	382
4	14	267	162	160	153	157	139	140	151	150	245	267	291	294	196	192	151	144	125	127	132	129	159	160	153	151	232	270
4	15	388	672	822	530	506	276	231	244	240	235	223	448	489	393	365	371	388	292	285	243	226	397	423	701	740	537	577
4	16	530	460	505	430	435	475	505	474	450	477	465	513	519	471	500	486	502	506	527	474	447	537	537	525	520	435	477
4	17	813	603	636	532	536	504	76	324	384	442	443	679	721	488	480	356	334	296	173	284	301	335	330	716	772	533	568
4	18	256	261	295	267	273	229	228	193	178	272	292	376	391	282	283	270	276	226	225	284	288	345	345	370	371	354	394
4	19	387	338	372	396	415	392	402	383	365	404	399	477	489	470	504	420	405	405	421	434	422	596	598	786	793	619	655
4	20	586	559	625	437	425	306	290	301	295	487	533	826	879	658	667	453	407	305	297	282	269	351	356	593	626	509	556
4	21	292	226	240	128	115	73	66	75	76	166	190	269	283	210	212	130	110	65	59	97	102	206	223	322	336	284	312
4	22	519	503	565	454	455	375	371	266	227	121	74	112	248	186	189	161	160	140	40	102	298	354	354	379	381	322	354
4	23	299	259	284	258	264	244	250	262	258	311	317	366	374	297	305	269	270	242	246	239	229	243	237	319	330	324	363
4	24	632	459	480	354	348	280	275	302	301	383	395	487	502	417	434	401	408	367	374	358	343	410	409	563	583	455	494
4	25	657	479	502	460	471	401	401	401	345	330	408	593	626	464	469	332	304	154	131	120	113	384	434	542	555	477	525
4	26	404	360	396	287	281	268	276	195	166	162	153	270	292	116	89	75	75	88	95	73	65	54	49	64	66	63	160
4	27	590	288	260	345	372	195	159	269	291	380	395	365	357	422	471	442	60	59	61	146	161	168	163	147	144	148	167
4	28	273	214	229	214	219	178	175	237	248	306	313	443	467	341	343	254	237	251	264	202	180	237	242	270	273	176	185
4	29	924	612	624	583	599	579	39			188	375	427	435	379	399	331	325	228	218	241	239	392	413	501	512	402	437
4	30	361	285	309	234	240	188	183	275	292	349	354	487	510	381	382	220	222	140	130	177	182	285	298	356	363	326	361
4	31	376	343	381	215	198	111	89	310	364	595	649	514	374	120	249	229	233	225	232	232	224	475	517	448	154	254	296
4	32	326	301	335	231	224	203	206	206	177	180	183	148	140	144	157	144	139	134	138	76	58	103	110	112	111	143	166
4	33	186	216	251	49				75	174	196	195	227	232	191	199	194	201	117	205	197	189	218	216	286	295	283	316
4	34	368	320	365	282	280	186	170	189	188	243	252	343	360	278	281	209	222	176	174	201	201	230	228	252	254	238	265
4	35	381	340	375	344	352	341	346	141	95	127	132	189	200	158	162	106	94	57	53	125	138	148	144	209	218	167	182

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 5

Consumption is in k

Building N	Suite No	07-1	07-2	07-3	07-4	07-5	07-6	07-7	07-8	07-9	07-10	07-11	07-12	08-1	08-2	08-3	08-4	08-5	08-6	08-7	08-8	08-9	08-10	08-11	08-12	09-1	09-2	Cons 09-3
5	1	10	286	317	269	272	170	83				27	834	834	524	503	155	55	86	156	131	121	145	144	167	164		
5	2	917	641	649	355	324	233	221	240	239	553	638	789	814	635	650	418	365	320	324	377	377	626	661	1,087	1,147	892	969
5	3	992	952	1,066	805	795	663	658	739	740	853	855	853	848	734	772	614	592	489	489	493	478	750	785	690	672	456	485
5	4	839	648	691	603	613	535	539	538	520	504	477	458	458	421	285	311	211	236	243	208	193	256	261	503	537	513	572
5	5	1,211	966	1,039	736	717	527	502	562	562	949	1,043	1,553	1,644	1,264	1,290	897	815	532	496	385	347	652	700	1,397	1,497	1,096	1,180
5	6	107	83	88	85	309	375	361	315	294	433	462	609	635	561	592	425	393	367	377	404	397	467	465	882	941	683	735
5	7	554	463	503	416	419	337	330	355	350	407	409	532	554	465	486	471	487	459	96	96	92	95	399	548	533	427	465
5	8	191	112	108	94	95	99	104	92	86	136	147	277	301	222	225	156	141	106	103	100	96	80	73	330	367	201	206
5	9	156	221	264	196	193	229	280	324	326	376	378	427	434	444	484	468	118	254	291	303	297	478	502	676	699	549	598
5	10	249	244	274	235	238	217	221	227	223	251	249	264	266	229	240	225	231	121	104	182	194	238	239	244	244	212	233
5	11	327	298	329	280	283	216	208	241	244	259	253	253	252	292	325	260	252	276	292	303	296	288	274	274	273	324	369
5	12	727	524	548	387	377	262	244	351	371	441	447	610	638	553	582	447	425	358	359	338	322	350	342	561	592	765	878
5	13	350	320	355	323	331	291	293	281	269	364	382	358	351	320	340	309	313	286	292	323	320	340	331	352	353	285	311
5	14	680	327	292	200	194	187	194	198	195	327	358	544	578	267	225	175	166	165	172	187	185	219	218	392	417	257	269
5	15	540	452	491	211	180	286	325	325	136	338	441	674	717	639	675	576	584	446	437	400	378	582	593	813	824	722	796
5	16	34	111	142	54	42	75	86	168	185	191	185	366	399	595	685	245	122	93	91	70	63	113	121	667	748	309	293
5	17	780	674	739	598	599	494	489	418	386	615	667	778	795	822	897	756	745	526	503	523	511	756	785	1,356	1,437	1,079	1,166
5	18	716	521	546	333	313	229	217	259	263	425	462	668	705	561	578	396	357	235	220	228	223	441	476	857	911	745	815
5	19	895	633	658	480	471	387	382	424	425	700	766	1,075	1,130	950	992	689	626	325	278	264	252	110	72	567	640	245	227
5	20	643	557	610	527	534	516	313	249	248	294	298	361	371	319	334	284	292	315	333	327	315	342	335	496	507	366	389
5	21	242	251	285	195	198	333	344	370	367	572	619	794	824	769	822	662	642	339	292	242	223	215	204	444	478	476	533
5	22	376	348	388	359	369	318	319	278	257	271	263	305	312	221	221	103	71	112	125	138	136	242	257	406	426	375	414
5	23	613	465	493	371	366	373	390	351	329	383	385	444	453	372	386	309	299	106	72	65	61	49	44	117	412	329	358
5	24	396	300	319	299	308	263	263	271	265	275	267	310	316	290	309	213	193	224	411	333	304	310	299	564	602	459	497
5	25	505	372	392	320	321	314	326	342	336	383	383	483	500	391	401	318	306	283	290	292	337	322	305	258	250	263	297
5	26	1,143	894	957	365	246	238	206	297	323	512	555	732	762	563	562	399	431	383	389	422	417	700	722	1,181	1,246	883	920
5	27	1,685	1,484	1,634	954	847	314	197	236	240	508	579	650	660	470	420	285	58			368	409	466	461	802	850	657	713
5	28	308	569	700	130	47	257	320	371	375	351	327	362	367	300	311	358	387	329	331	300	283	375	382	413	415	336	367
5	29	445	289	291	187	179	148	147	170	172	298	329	418	433	253	237	196	191	178	183	173	165	189	187	376	402	279	298
5	30	756	622	675	582	590	531	539	385	235	380	414	513	530	441	459	354	337	253	247	272	269	366	374	120	80	35	34
5	31	379	290	308	237	235	222	228	221	212	298	315	359	366	300	311	271	270	234	236	214	202	397	428	427	424	308	331
5	32	333	303	336	319	329	309	317	310	299	396	413	336	319	338	371	291	279	239	237	138	133	120	112	183	193	140	151
5	33	400	326	352	287	288	265	270	298	298	391	407	550	575	519	550	430	412	326	322	442	456	504	496	656	677	577	634
5	34	371	266	295	272	207	200	207	260	267	503	564	737	767	625	647	499	476	287	236	240	267	311	309	438	456	341	368
5	35	369	334	369	302	311	279	283	315	316	347	343	332	328	288	304	234	223	259	277	283	275	311	307	414	428	288	306
5	36	341	251	264	249	256	224	225	226	221	436	491	589	605	333	304	264	263	245	251	193	174	322	345	583	616	485	528
5	37	350	281	303	184	173	77	56	54	52	47	43	362	423	392	419	341	330	261	258	299	300	402	410	604	631	487	528
5	38	653	552	602	499	502	446	451	498	498	588	594	742	767	615	635	512	496	418	419	466	462	540	537	752	782	582	628
5	39	1,086	981	1,144	484	396	295	283	283	9		44	339	339	751	899	505	407	244	222	232	227	568	627	1,263	1,354	912	968
5	40	369	323	354	303	307	319	336	268	241	291	296	314	315	276	291	334	360	333	342	291	270	312	310	362	368	298	326
5	41	432	330	350	312	318	307	317	332	327	402	411	660	706	431	410	371	375	343	350	355	344	421	422	763	811	591	635
5	42	514	478	532	448	452	358	349	330	316	361	361	436	448	414	441	314	289	275	284	470	498	611	613	608	605	622	699
5	43	342	332	373	219	204	140	131	134	219	306	323	403	417	274	268	371	419	284	268	178	36	36	34	240	270	310	295
5	44	377	399	456	337	331	321	330	325	313	408	423	554	577	438	446	326	304	235	230	110	84	87	238	390	376	336	372
5	45	41	53	62	280	323	325	339	344	335	361	354	368	368	349	374	265	243	277	295	357	360	354	339	501	524	351	372
5	46	475	286	282	145	129	186	208	319	342	888	1,039	995	980	608	582	368	318	265	265	272	265	514	553	415	392	203	204
5	47	880	646	692	481	467	415	419	448	443	572	592	681	695	582	607	529	528	438	438	425	408	546	557	606	611	572	636

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 6

Consumption is in KV

Building Nc	Suite No	07-1	07-2	07-3	07-4	07-5	07-6	07-7	07-8	07-9	07-10	07-11	07-12	08-1	08-2	08-3	08-4	08-5	08-6	08-7	08-8	08-9	08-10	08-11	08-12
6	1	1,103	845	907	357	309	115	81	131	139	897	976	1,832	1,955	678	528	120	24	172	202	282	288	500	521	1,452
6	2	516	735	863	610	605	358	323	399	405	1,103	1,166	1,013	984	647	645	645	671	420	397	354	335	575	599	397
6	3	54	281	570	110	62	58	60	56	53	35	31	32	1,027	1,341	1,413	473	414	449	472	375	345	369	359	1,090
6	4	144	97	100	69	68	124	140	131	125	61	50	62	64	156	183	150	148	140	145	149	145	521	574	498
6	5	1,085	208	87	114	122	75	69	120	129	554	597	854	889	597	598	305	243	132	121	184	190	314	326	173
6	6	848	605	640	620	640	132	64	64	163	720	756	1,395	1,487	1,081	1,103	361	190	152	153	171	169	196	194	203
6	7	208	134	138	93	92	91	95	88	85	84	81	100	103	86	91	96	101	94	96	98	95	99	96	195
6	8	1,083	933	1,025	709	700	504	486	465	347	873	919	589	536	493	525	302	258	127	112	275	297	454	467	956
6	9	1,547	861	854	663	666	295	233	233	126	205	216	198	194	345	1,881	605	311	144	124	263	280	473	492	652
6	10	518	364	383	321	326	163	137	266	288	541	559	973	1,032	579	554	319	272	231	234	247	241	311	312	489
6	11	2,874	1,307	1,208	756	733	396	345	262	236	418	429	2,177	2,434	2,472	2,676	1,475	1,236	294	161	127	117	206	216	668
6	12	26	24	26	38	40	84	96	83	79	57	51	42	40	163	196	198	206	65	46	231	258	283	277	576
6	13	143	261	312	321	334	200	182	178	171	266	270	822	902	490	463	284	251	176	172	184	180	227	227	461
6	14	1,226	1,006	1,095	252	167	273	305	353	353	705	731	778	781	822	894	456	365	215	200	256	259	819	895	751
6	15	1,252	941	1,006	393	339	360	378	357	340	951	1,006	1,984	2,124	1,270	1,196	652	690	173	101	170	177	1,103	1,239	2,435
6	16	118	135	153	96	93	110	118	113	109	99	94	76	73	208	246	226	230	236	247	214	201	280	285	186
6	17	436	391	431	399	410	313	306	298	286	429	435	453	453	409	435	385	387	385	400	411	400	419	406	642
6	18	2,428	1,226	1,178	450	385	356	365	421	420	867	901	1,866	2,005	1,346	1,348	704	572	407	397	388	374	611	634	1,992
6	19	637	626	702	560	564	260	209	472	519	571	558	328	291	303	329	358	379	378	393	533	541	421	382	361
6	20	706	540	579	399	394	317	314	298	285	469	479	977	1,048	787	809	454	384	185	162	171	168	277	288	1,152
6	21	2,034	1,630	1,765	784	704	638	650	791	801	1,817	1,901	2,407	2,473	1,730	1,750	1,026	886	716	718	664	632	1,244	1,314	1,911
6	22	213	85	73	97	103	156	173	140	129	88	79	78	78	75	80	81	83	102	109	96	90	86	82	80
6	23	536	714	816	286	296	265	270	436	460	687	695	358	305	421	473	368	357	358	372	374	362	422	417	781
6	24	465	245	239	382	412	328	324	424	435	667	676	655	649	132	60	416	522	387	382	348	330	465	473	253
6	25	386	236	239	201	204	191	197	196	192	350	361	1,100	1,208	598	548	318	274	205	202	218	214	407	428	756
6	26	1,632	1,102	1,151	507	454	306	290	317	307	976	1,004	697	800	355	312	554	42	216	252	247	239	779	853	1,557
6	27	1,257	936	999	727	724	435	395	369	352	748	779	1,064	1,103	891	929	651	608	411	397	407	396	727	762	1,042
6	28	417	305	323	258	260	249	257	292	292	508	521	852	899	504	481	392	386	287	283	257	244	350	357	637
6	29	138	231	276	240	245	234	186	438	483	1,036	1,080	1,752	1,846	994	938	674	637	504	143	178	147	62	43	174
6	30	2,916	2,157	2,300	1,229	1,156	832	801	963	970	1,889	1,955	3,164	3,334	2,178	2,167	1,235	1,053	739	719	757	740	1,466	1,550	3,065
6	31	705	586	639	463	468	474	495	503	489	813	831	55	705	1,524	1,016	573	486	247	220	180	167	723	802	1,295
6	32	730	581	628	284	256	171	161	232	243	554	579	731	751	675	717	353	277	265	273	207	188	326	340	1,278
6	33	1,276	957	1,024	647	629	434	412	457	453	798	819	1,172	1,221	1,025	1,076	743	690	452	433	517	516	770	789	1,299
6	34	2,242	2,024	2,241	1,257	1,195	556	451	421	19	290	319	516	544	432	449	254	215	87	70	154	165	359	382	522
6	35	1,653	1,037	1,063	625	599	358	324	251	227	234	227	221	219	241	264	215	211	215	225	234	229	228	219	520
6	36	1,643	1,171	1,239	614	567	439	559	536	514	1,160	1,213	1,836	1,923	1,328	1,339	939	878	538	507	517	502	969	1,022	1,083
6	37	1,290	960	1,024	407	354	251	241	285	286	472	482	1,069	1,154	625	591	377	338	273	273	290	284	537	564	606
6	38	722	492	515	232	209	246	263	246	235	374	381	519	538	321	312	213	197	241	257	220	206	303	310	435
6	39	1,568	1,122	1,188	583	538	350	327	399	403	861	897	1,188	1,227	986	1,026	536	435	395	404	391	376	729	769	1,120
6	40	626	611	685	650	307	412	450	535	537	1,087	1,128	1,512	1,564	1,776	1,953	880	327	397	410	159	107	83	75	114
6	41	1,159	737	758	297	256	196	192	213	212	494	517	969	1,033	772	793	402	321	262	263	271	264	530	560	1,199
6	42	600	188	143	138	55	67	79	156	171	339	352	633	673	337	310	196	176	110	104	130	130	283	302	545
6	43	54	49	55	124	136	74	64	270	310	743	780	891	904	763	802	529	481	245	219	245	242	403	418	1,094

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 7

Consumption is in KWh

Building No	Suite No	10-6	10-7	10-8	10-9	10-10	10-11	10-12	11-1	11-2	11-3	11-4	11-5	11-6	11-7
7	1	214	359	213	206	213	206	101	101	96	106	93	96	285	294
7	2	102	175	164	158	53	488	505	505	456	505	488	505	488	505
7	3	64	115	169	164	169	164	141	141	150	166	143	148	60	62
7	4	103	187	91	90	144	153	565	565	518	574	558	577	478	494
7	5	146	245	157	151	156	95	93	93	93	104	135	140	153	158
7	6	87	150	149	144	149	83	62	62	55	61	78	81	128	132
7	7	110	190	190	184	236	314	331	331	285	314	260	269	269	278
7	8	70	120	112	107	79	78	41	41	42	47	70	73	108	112
7	9	88	146	71	68	70	49	163	163	131	145	140	145	182	188
7	10	159										28	853	532	550
7	11	219	485	485	472	542	525	564	564	467	516	465	480	470	486
7	12	46	85	176	168	118	115	102	102	83	92	104	108	119	123
7	13	176	302	279	266	166	162	227	227	215	238	210	218	173	179
7	14	174	293	191	184	191	133	185	185	153	171	221	228	135	140
7	15	126	216	28		50	1,492	1,542	99	756	830	600	621	474	490
7	16	131					123	1,268	1,268	-					
7	17	59	147	185	37	127	257	459	459	335	373	408	422	386	399
7	18	168	289	283	270	169	164	169	169	158	175	149	154	145	150
7	19	147	250	216	203	211	204	261	261	177	196	186	193	241	250
7	20	275	91	256	246	219	211	311	311	240	266	239	247	306	316
7	21	151	253	152	147	152	92	111	111	99	109	83	86	124	129
7	22	213	352	145	140	145	102	433	433	449	495	417	431	547	566
7	23	259	424	106	103	106	68	86	86	285	316	314	325	302	313
7	24	273	462	356	345	356	384	364	364	413	456	392	406	481	498
7	25	308	419	419	411	606	586	1,233	1,233	1,141	1,261	1,137	1,175	964	996
7	26	288	471	111	107	110	339	294	294	422	459	199	206	214	222
7	27	166	285	271	262	271	230	341	341	358	399	470	486	531	549
7	28	39	75	183	177	183	188	176	176	166	183	164	170	109	113
7	29	143	331	331	326	493	477	629	629	476	523	410	424	443	458
7	30	95	163	167	162	167	151	79	79	73	82	125	130	160	166
7	31	36	61	53	51	52	58	78	78	68	76	101	104	143	148
7	32	95	163	166	160	165	98	86	86	75	82	69	71	63	65
7	33	105	180	161	154	123	120	89	89	100	114	195	202	190	196
7	34	111	183	61	59	61	51	138	138	125	141	198	205	164	169
7	35	4	20	216	209	216	113	173	173	162	180	175	181	198	205
7	36	171		33	487	380	368	423	423	281	312	292	645	645	666
7	37	99	164	69	66	68	70	74	74	104	117	167	173	102	106

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 8

Consumption is in KV

Building Nc	Suite No	07-9	07-10	07-11	07-12	08-1	08-2	08-3	08-4	08-5	08-6	08-7	08-8	08-9	08-10	08-11	08-12	09-1	09-2	09-3	09-4	09-5	09-6	09-7	09-8
8	1		462	451	521	499	468	510	430	557	458	824	559	221	518	551	618	599	462	464	483	465	732	733	530
8	2		311	313	352	369	247	202	101	247	344	340	300	470	407	348	351	387	356	356	340	388	353	514	469
8	3	7	233	737	649	534	552	554	505	508	481	665	638	551	401	429	537	587	387	443	432	475	690	688	504
8	4		606	592	690	547	441	415	297	398	373	740	528	454	349	355	644	569	357	341	406	660	684	807	801
8	5				497	812	594	482	393	319	262	402	307	264	332	389	659	692	480	535	336	276	594	745	871
8	6			35	1,076	963	981	940	869	792	1,126	1,427	1,146	946	1,020	970	776	652	469	436	330	246	293	306	325
8	7		2	93	715	791	655	741	506	368	321	266	315	325	416	544	694	678	549	603	417	390	376	173	244
8	8		131	127	74	62	90	447	352	321	322	336	346	258	287	395	486	426	358	346	340	271	292	304	325
8	9		295	305	315	453	426	12	302	251	270	343	440	371	332	332	387	340	390	461	363	422	446	478	586
8	10		300	298	413	239	124	689	579	797	781	1,101	837	619	630	711	931	808	636	627	585	721	1,015	976	994
8	11					360	495	732	527	477	175	163	158	173	237	193	119	365	306	341	168	188	162	171	209
8	12		55	547	517	530	405	372	505	624	607	945	788	721	523	520	636	544	422	452	484	591	784	861	742
8	13						18	285	124	153	153	258	258	208	202	204	312	249	216	329	218	237	425	470	475
8	14	10	325	306	199	137	285	146	73	97	79	424	912	746	695	726	975	908	624	659	597	692	902	994	556
8	15		380	376	500	485	403	71	142	127	117	278	209	165	426	621	819	938	489	548	386	327	390	690	748
8	16	21	637	630	840	751	613	541	537	582	652	628	644	512	661	733	1,003	938	738	710	541	616	727	746	781
8	17		212	206	235	233	192	156	107	132	167	195	199	175	224	189	272	296	235	220	179	280	444	552	494
8	18		168	169	265	216	128	86	319	323	229	242	275	290	351	473	642	624	448	438	348	309	263	299	354
8	19		610	603	811	679	584	518	429	476	467	699	565	438	479	493	468	539	449	451	426	517	590	870	909
8	20		285	279	336	270	74	281	577	581	485	819	696	559	561	675	814	738	586	563	462	481	813	812	871
8	21		551	243	628	525	389	352	281	243	246	204	299	262	327	427	529	509	431	433	320	295	323	285	357
8	22				658	777	674	617	553	541	486	581	621	546	581	649	786	763	692	749	702	645	728	771	672
8	23		360	565	784	698	605	553	459	480	498	713	600	433	423	466	546	478	397	18	534	655	720	870	992
8	24					268	732	382	173	267	553	947	982	961	858	777	854	822	620	691	662	677	904	800	1,066
8	25		463	481	962	872	636	567	529	491	516	691	652	589	443	665	710	633	549	557	434	546	835	867	927
8	26		383	387	459	436	359	382	340	189	148	171	208	276	440	656	458	474	365	354	263	261	334	412	902
8	27		6	202	353	296	192	171	128	127	97	145	218	128	132	149	224	205	152	4	122	143	275	310	241
8	28					27	773	726	634	724	626	978	988	829	625	624	646	832	639	806	695	602	1,022	1,059	911
8	29		205	219	431	303	239	227	189	209	203	338	391	320	367	241	259	205	305	387	439	382	395	482	761
8	30		120	129	314	452	320	303	195	185	221	420	242	168	222	168	410	474	306	299	197	207	248	295	309
8	31		262	272	426	810	682	343	188	141	266	285	156	230	191	299	602	564	454	450	352	195	222	223	264
8	32	4	119	111	52	88	68	144	203	158	228	426	377	264	132	193	562	429	316	358	225	198	296	433	507
8	33		10	314	326	478	551	333	151	191	208	344	107	679	522	817	1,117	1,301	887	739	451	552	961	1,099	1,089
8	34		323	320	291	191	173	117	157	312	360	318	340	195	212	117	177	89	81	91	115	223	506	524	496
8	35	18	550	130	440	330	301	373	295	248	289	419	294	192	317	438	574	460	323	353	205	201	204	149	435
8	36	18	694	733	1,059	1,076	899	805	689	798	715	1,039	957	779	662	823	810	1,063	648	823	773	468	510	489	408

BC hydro

FOR GENERATIONS

Load Analysis

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 9

Consumption is in KV

Building Nc	Suite No	07-1	07-2	07-3	07-4	07-5	07-6	07-7	07-8	07-9	07-10	07-11	07-12	08-1	08-2	08-3	08-4	08-5	08-6	08-7	08-8	08-9	08-10	08-11	08-12	09-1
9	1	739	497	513	386	394	383	397	428	423	487	488	824	886	569	552	403	361	352	365	369	359	445	448	814	866
9	2	1,355	1,489	1,712	620	476	340	320	338	332	959	1,619	1,556	1,534	1,524	1,649	1,024	877	542	497	486	468	977	1,060	2,034	2,173
9	3	543	220	177	230	248	275	294	311	307	455	486	651	680	258	191	192	200	273	299	354	355	390	383	488	502
9	4	574	554	539	141	86	132	149	372	425	1,686	2,052	2,833	2,970	2,330	2,391	1,287	1,006	529	455	602	617	1,776	1,984	3,438	3,644
9	5	2,737	2,033	2,145	1,169	1,064	359	198	554	637	1,498	1,733	2,395	2,512	2,044	2,117	1,364	1,193	570	468	623	639	1,660	1,839	3,401	3,624
9	6	2,212	1,500	1,540	665	556	464	460	390	358	468	486	1,277	1,426	953	933	567	480	389	387	350	330	443	453	1,225	1,338
9	7	33	274	362	130	100	106	172	193	171	772	948	797	762	597	613	415	372	292	288	353	357	597	631	606	599
9	8	2,291	1,538	1,574	820	735	592	581	737	758	1,210	1,314	2,207	2,370	1,432	1,356	839	718	625	631	595	568	998	1,062	1,954	2,082
9	9	2,272	955	793	523	501	270	224	254	255	539	614	1,591	1,776	616	426	282	249	225	230	231	224	532	585	1,664	1,821
9	10	1,713	1,166	1,199	825	800	602	578	723	742	1,029	1,084	1,647	1,749	1,281	1,291	881	793	688	695	644	611	817	834	1,427	1,511
9	11	3,906	3,092	3,001	1,707	1,526	574	360	756	828	2,133	2,496	3,241	3,368	2,645	2,703	1,857	1,785	709	522	821	864	2,450	2,733	4,040	4,221
9	Strata	9,770	7,977	8,594	7,250	7,322	6,898	7,080	7,239	7,200	8,249	8,255	9,327	9,480	8,249	8,685	7,421	7,314	6,744	6,900	6,942	6,728	7,142	6,956	8,923	9,180

Monthly Calendarized Consumption for Selected LEED Buildings-Building # 10

Consumption is in KV

Building Nc	Suite No	07-9	07-10	07-11	07-12	08-1	08-2	08-3	08-4	08-5	08-6	08-7	08-8	08-9	08-10	08-11	08-12	09-1	09-2	09-3	09-4	09-5	09-6	09-7	09-8
10	1											36	494	333	364	357	507	527	334	351	295	302	281	290	280
10	2	473	777	816	947	968	754	772	606	581	309	267	229	212	628	703	1,148	1,211	859	920	558	551	298	281	259
10	3	291	487	514	681	710	795	879	566	495	267	232	225	312	425	435	515	525	417	455	423	436	306	303	317
10	4	212	399	432	699	748	582	597	380	329	276	277	325	326	448	460	798	846	681	743	422	415	235	224	324
10	5	89	88	78	55	50	47	50	102	122	170	187	247	253	467	499	773	811	728	805	233	201	215	224	242
10	6					17	492	522	445	470	277	250	268	264	485	519	692	715	659	731	369	357	197	187	187
10	7	380	757	799	894	907	556		0	12	12	13	263	313	405	410	420	420	367	404	370	381	379	393	412
10	8			77	1,398	1,206	939	961	790	773	581	566	618	610	772	779	1,191	1,249	992	1,080	812	821	379	344	488
10	9	166	460	263	541	609	460	467	312	277	169	154	155	150	234	245	557	602	457	494	196	181	146	151	167
10	10	113	309	317	369	377	384	418	340	332	261	257	265	258	261	252	349	362	273	295	255	261	257	266	272
10	11	121	490	486	505	506	472	505	299	249	121	101	153	161	315	340	423	433	311	334	215	214	169	171	145
10	12	148	252	27	111	330	456	489	345	315	234	227	297	303	322	314	385	418	489	556	271	260	251	120	225
10	13	50	121			168	237	376	154	94	191	218	35	98	179	173	68								9
10	14	389	467	617	1,080	1,165	654	602	394	347	324	333	339	532	808	843	821	813	735	567	637	724	494	16	240
10	15	227	438	434	1,180	1,321	1,425	1,565	961	819	538	504	451	424	892	968	1,636	1,730	1,217	1,302	626	599	416	411	406
10	16	159	275	275	349	362	303	317	224	205	123	112	145	159	479	464	438	432	380	419	349	356	312	319	335
10	17	302	377	379	632	679	671	726	469	410	193	157	167	164	235	243	232	229	275	314	264	269	255	263	267
10	18	102	281					139	343	274	150	132	130	125	394	443	715	754	446	462	151	134	108	110	146
10	19	254	344	508	640	663	589	623	535	200	190	195	266	274	363	369	609	643	518	565	384	384	226	217	295
10	20	107	387	702	510	427	192	159	117	91	102	108	81	72	151	164	656	728	545	589	343	337	276	280	273
10	21	39	186	226	633	710	656	700	431	368	84	31	89	126	149	149	201	208	193	214	121	119	76	74	104
10	22					554	324	275	181	159	162	169	161	154	195	197	271	281	249	275	201	203	206	214	180
10	23	154	510	519	587	597	564	604	560		31	160	207	211	193	181	423	458	397	437	245	240	126	118	177
10	24	317	314	278	334	343	253	256	234	237	243	254	209	192	199	193	473	513	351	375	261	262	243	250	213
10	25	287	473	497	603	621	137	48	42	42	43	46	108	188	249	254	458	487	459	510	193	177	149	152	172
10	26	292	303	273	313	319	269	281	250	251	128	109	181	192	310	326	315	312	245	267	282	294	248	252	212
10	27	169	374	418	273	243	264	291	228	218	226	237	196	180	205	203	160	153	166	187	108	105	55	51	54
10	28	292	616	707	755	760	779	849	626	586	567	420	273	284	321	317	372	379	284	307	271	278	281	292	268
10	29	428	530	513	530	530	496	530	513	530	513	530	496	288	703	681	752	759	564	608	472	480	448	461	477
10	30	186	185	163	119	110	166	192	143	134	121	328	283	261	306	304	407	421	325	353	316	324	313	129	136
10	31							5	156	161	156	161	161	156	161	156	353	381	429	486	285	281	235	239	203
10	32	101	369	85	234	262	261	283	179	154	137	140	187	192	279	289	218	206	212	238	230	189	181	187	187
10	33	125	279	391	428	433	307	306	175	141	206	228	233	227	291	295	252	244	260	293	217	219	211	180	150
10	34	172	247	335	282	269	94	66	146	175	196	208	198	189	175	165	58	42	40	45	132	143	159	167	173
10	35	178	328	371	355	350	275	282	162	132	82	75	251	284	376	383	332	323	351	397	259	258	326	346	347
10	36	182	139	64	139	153	128	133	118	118	111	114	111	107	136	138	228	240	196	214	178	182	194	202	164
10	37	89	326	475	422	409	259	250	234	239	191	190	189	183	201	197	303	317	158	158	179	186	163	166	202
10	38	205	147	54	22	15	12	13	17	19	17	17	17	17	9		419	721	315	304	182	180	95	89	213
10	39	110	258	249	350	368	281	287	229	220	178	177	172	165	199	200	240	245	252	284	72	60	41	40	40
10	40	182	170	115	532	715	470	458	266	219	210	165	170	166	279	295	591	634	445	476	282	277	265	273	237
10	41	212	154	47	108	119	51	41	38	39	85	98	62	52	44	40	72	76	35	35	42	44	47	49	37
10	42	87						115	171	189	146	143	151	149	201	206	243	248	221	244	184	186	142	143	168
10	43	22		24	730	730	681	729	511	453	368	366	222	181	430	472	579	593	485	530	306	300	180	173	173
10	44	233	290	50	344	400	397	431	337	322	269	270	246	233	287	288	311	313	220	236	192	196	225	237	229
10	45				10	311	187	177	91	68	66	66	211	239	305	308	355	361	318	351	309	317	242	243	261
10	46	617	765	740	815	825	515	493	407	398	355	361	361	349	538	562	810	844	649	703	486	488	472	419	195
10	47	256	450	480	535	542	438	453	396	396	397	414	392	375	450	450	588	607	486	530	374	376	437	460	408
10	48	414	570	571	662	676	586	616	507	495	489	507	492	473	575	577	674	686	561	614	525	537	493	506	502
10	49	372	647	688	780	793	703	743	526	483	420	424	416	401	468	465	598	616	476	516	499	216	28	67	206
10	50	495	675	673	773	788	673	706	615	613	576	592	586	566	634	625	853	884	713	779	577	583	486	493	519
10	51																8	234	154	162	64	59	56	58	107
10	52	298	414	416	580	609	481	494	278	224	109	90	55	45	136	153	112	105	256	662	557	569	874	940	799
10	53	345	464	461	453	448	334	338	300	301	298	309	284	269	285	278	322	327	231	247	268	279	261	269	242
10	54	11	346	335	322	318	202	195	199	209	201	207	232	230	294	297	491	518	467	517	442	452	392	400	406
10	55	35	120	188	210	214	240	265	239	241	232	182	216	217	355	374	520	540	327	341	236	237	212	217	165
10	56	394	384	386	442	451	373	388	325	318	315	327	337	329	335	323	434	449	358	390	327	334	335	347	328
10	57	64	126	131	187	197	186	199	169	166	150	153	161	157	167	163	180	181	159	176	158	162	144	148	140
10	58	41	177	431	566	590	502	526	345	305	227	220	211	203	360	383	395	395	380	425	98	78	75	78	175

FortisBC

Commercial & Industrial Marketing

16705 Fraser Highway, Surrey, B.C. V4N 0E8

E-mail: commercial.energy@fortisbc.com

Natural Gas Consumption History

Customer: **Premise 1**

Date: 22-Nov-2011

Service Address:

Customer Number: 0 Premise Number: 0

Current Rate: #N/A Service Area: Coastal

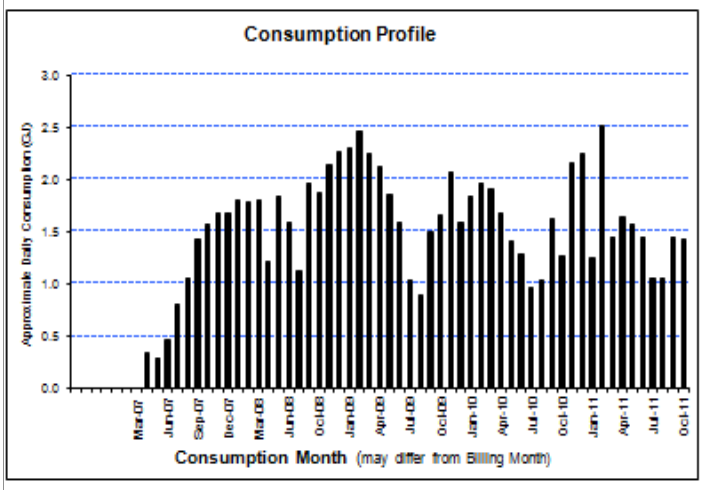
Annual Cons'n: 579.6 GJ / 365 Days

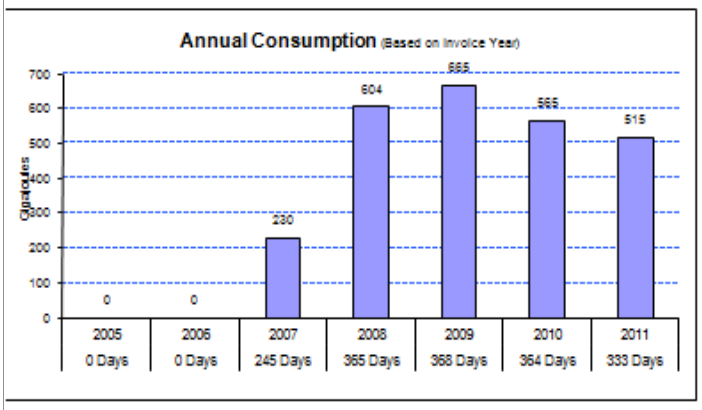
Daily Peak: 3 GJ

Notes:

Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

We believe this data to be correct and accurate, however FortisBC assumes no liability for errors or omissions. Actual billing data shall prevail.





Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
04-Nov-11	29	44.1		
06-Oct-11	30	43.0		
06-Sep-11	32	32.3		
05-Aug-11	29	32.6		
07-Jul-11	31	42.9		
06-Jun-11	32	48.5		
05-May-11	30	49.1		
05-Apr-11	29	44.6		
07-Mar-11	31	70.1		
04-Feb-11	29	38.5		
06-Jan-11	31	69.4		
06-Dec-10	32	64.5		
04-Nov-10	30	39.2		
05-Oct-10	32	48.5		
03-Sep-10	29	31.9		
05-Aug-10	30	29.8		
06-Jul-10	32	38.4		
04-Jun-10	30	43.6		
05-May-10	29	49.9		
06-Apr-10	32	59.1		
05-Mar-10	29	54.6		
04-Feb-10	29	56.6		
06-Jan-10	30	49.2		
07-Dec-09	33	62.0		
04-Nov-09	30	51.1		
05-Oct-09	32	44.8		
03-Sep-09	29	27.5		
05-Aug-09	30	31.9		
06-Jul-09	32	47.5		
04-Jun-09	30	57.5		
05-May-09	32	63.5		
03-Apr-09	29	69.2		
05-Mar-09	29	69.0		
04-Feb-09	29	71.4		
06-Jan-09	33	70.0		
04-Dec-08	29	63.9		
05-Nov-08	29	57.7		
07-Oct-08	32	58.5		
05-Sep-08	59	69.3		
08-Jul-08	33	47.2		
05-Jun-08	30	56.5		
06-May-08	29	36.2		
07-Apr-08	33	55.8		
05-Mar-08	29	51.5		
05-Feb-08	28	55.7		
08-Jan-08	34	51.8		
05-Dec-07	29	49.9		
06-Nov-07	32	48.4		
05-Oct-07	28	42.7		
07-Sep-07	31	32.2		
07-Aug-07	32	24.4		
06-Jul-07	29	13.5		
07-Jun-07	31	8.7		
07-May-07	1	1.2		
06-May-07	32	8.6		
04-Apr-07				

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Natural Gas Consumption History

Customer: **Premise 2**

Date: 22-Nov-2011

Service Address:

Customer Number: 0 Premise Number: 0

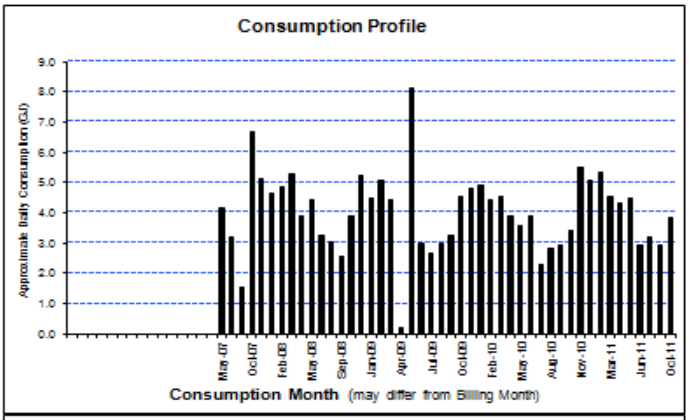
Current Rate: #N/A Service Area: Coastal

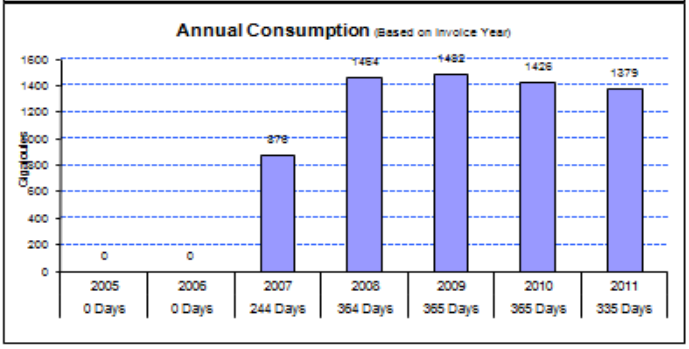
Annual Cons'n: 1,543.4 GJ / 365 Days
Daily Peak: 7 GJ

Notes:
Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

We believe this data to be correct and accurate, however FortisBC assumes no liability for errors or omissions. Actual billing data shall prevail.

Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
08-Nov-11	28	122.8		
11-Oct-11	33	109.8		
08-Sep-11	30	89.9		
09-Aug-11	32	98.3		
08-Jul-11	30	87.0		
08-Jun-11	30	138.3		
09-May-11	32	129.2		
07-Apr-11	29	140.8		
09-Mar-11	28	148.7		
09-Feb-11	30	146.3		
10-Jan-11	33	167.6		
08-Dec-10	30	164.7		
08-Nov-10	32	105.9		
07-Oct-10	29	87.6		
08-Sep-10	30	86.9		
09-Aug-10	32	70.7		
08-Jul-10	29	115.9		
09-Jun-10	33	110.3		
07-May-10	29	116.1		
08-Apr-10	30	140.3		
09-Mar-10	29	123.4		
08-Feb-10	28	131.7		
11-Jan-10	34	172.1		
08-Dec-09	29	144.3		
09-Nov-09	33	140.6		
07-Oct-09	29	96.8		
08-Sep-09	32	91.6		
07-Aug-09	30	82.6		
08-Jul-09	30	89.2		
08-Jun-09	32	252.3		
07-May-09	30	5.6		
07-Apr-09	29	136.9		
09-Mar-09	31	141.8		
06-Feb-09	28	138.8		
09-Jan-09	32	161.8		
08-Dec-08	28	116.6		
10-Nov-08	32	120.0		
09-Oct-08	30	75.8		
09-Sep-08	62	186.9		
09-Jul-08	30	98.0		
09-Jun-08	32	136.3		
08-May-08	29	116.8		
09-Apr-08	33	163.9		
07-Mar-08	29	141.2		
07-Feb-08	29	143.6		
09-Jan-08	30	165.3		
10-Dec-07	32	146.3		
08-Nov-07	29	120.6		
10-Oct-07	30	86.9		
10-Sep-07	32	93.1		
09-Aug-07	30	107.0		
10-Jul-07	32	86.2		
08-Jun-07	30	128.7		
09-May-07	29	107.5		
10-Apr-07				





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Natural Gas Consumption History

Customer: **Premise 3**

Date: 22-Nov-2011

Service Address:

Customer Number: 0 Premise Number: 0

Current Rate: #N/A Service Area: Coastal

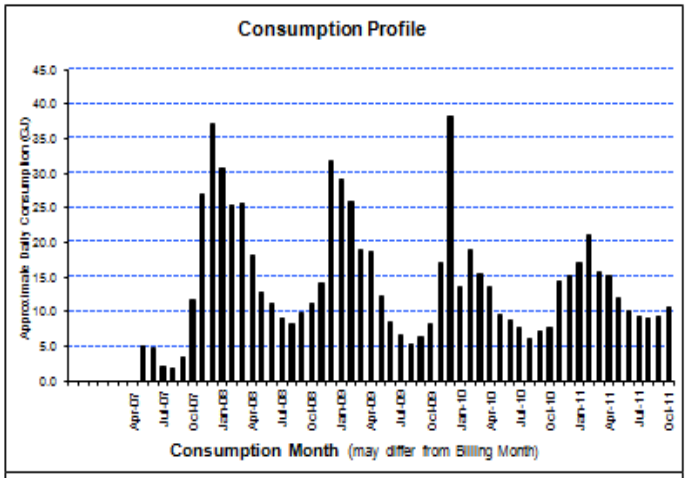
Annual Cons'n: 4,801.5 GJ / 365 Days

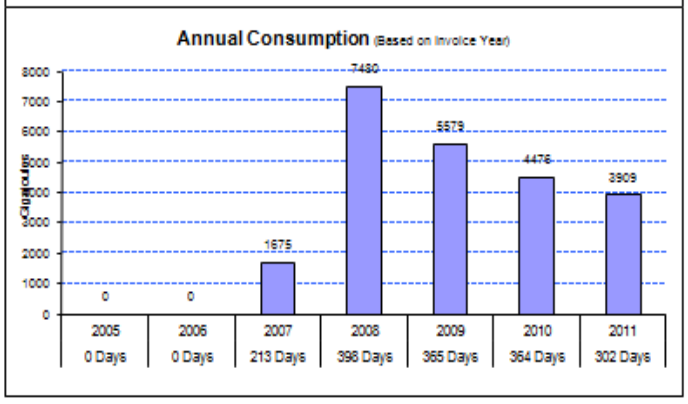
Daily Peak: 24 GJ

Notes:

Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

We believe this data to be correct and accurate, however FortisBC assumes no liability for errors or omissions. Actual billing data shall prevail.





Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
28-Oct-11	29	328.2		
29-Sep-11	31	276.6		
29-Aug-11	31	274.2		
29-Jul-11	31	290.2		
28-Jun-11	29	304.5		
30-May-11	31	372.9		
29-Apr-11	31	453.1		
29-Mar-11	29	488.3		
28-Feb-11	31	591.9		
28-Jan-11	29	528.7		
30-Dec-10	31	466.9		
29-Nov-10	32	426.0		
28-Oct-10	30	236.3		
28-Sep-10	32	211.5		
27-Aug-10	29	185.8		
29-Jul-10	31	234.4		
28-Jun-10	31	259.5		
28-May-10	30	297.2		
28-Apr-10	29	409.7		
30-Mar-10	29	473.7		
01-Mar-10	32	529.1		
28-Jan-10	24	422.3		
04-Jan-10	4	323.5		
31-Dec-09	34	861.0		
27-Nov-09	30	508.6		
28-Oct-09	30	257.2		
28-Sep-09	32	188.4		
27-Aug-09	29	159.7		
29-Jul-09	33	204.7		
26-Jun-09	29	256.8		
28-May-09	29	377.0		
29-Apr-09	30	559.8		
30-Mar-09	32	582.4		
26-Feb-09	29	726.4		
28-Jan-09	28	897.0		
31-Dec-08	33	980.0		
28-Nov-08	30	420.9		
29-Oct-08	30	346.4		
29-Sep-08	32	292.3		
28-Aug-08	30	255.8		
29-Jul-08	32	276.9		
27-Jun-08	29	333.3		
29-May-08	30	397.0		
29-Apr-08	28	546.3		
01-Apr-08	34	795.5		
27-Feb-08	28	737.4		
30-Jan-08	28	948.3		
02-Jan-08	34	1149.5		
29-Nov-07	30	806.3		
30-Oct-07	32	360.4		
28-Sep-07	14	56.1		
14-Sep-07	16	44.0		
29-Aug-07	30	50.2		
30-Jul-07	32	59.1		
28-Jun-07	29	141.2		
30-May-07	30	157.5		
30-Apr-07				

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Natural Gas Consumption History

Customer: **Premise 4**

Date: 22-Nov-2011

Service Address:

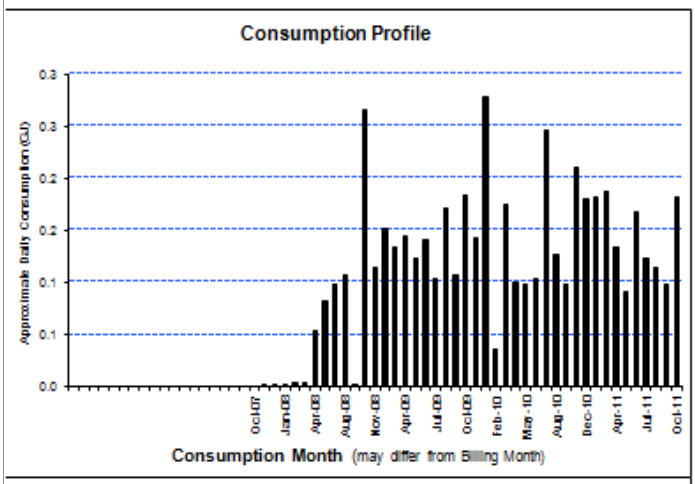
Customer Number: 0 Premise Number: 0

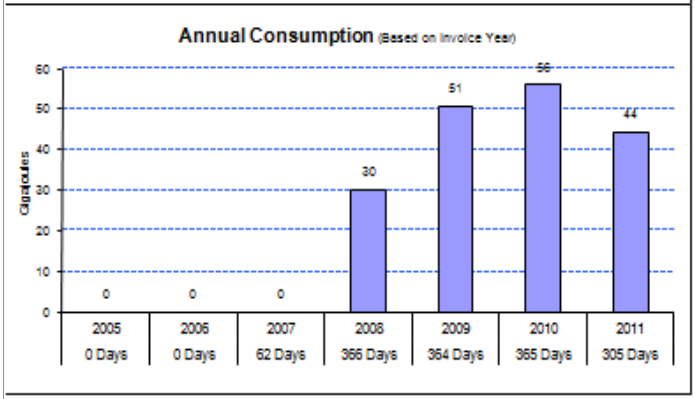
Current Rate: #N/A Service Area: Coastal

Annual Cons'n: 55.0 GJ / 368 Days
Daily Peak: 0 GJ

Notes:
Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

We believe this data to be correct and accurate, however FortisBC assumes no liability for errors or omissions. Actual billing data shall prevail.





Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
31-Oct-11	33	5.6		
28-Sep-11	29	2.9		
30-Aug-11	33	3.5		
28-Jul-11	30	3.8		
28-Jun-11	29	5.0		
30-May-11	28	2.8		
02-May-11	34	4.0		
29-Mar-11	29	5.8		
28-Feb-11	60	10.7		
30-Dec-10	63	10.9		
28-Oct-10	30	6.5		
28-Sep-10	29	2.9		
30-Aug-10	32	3.9		
29-Jul-10	31	7.6		
28-Jun-10	31	3.1		
28-May-10	30	3.0		
28-Apr-10	30	3.0		
29-Mar-10	31	5.4		
26-Feb-10	29	1.0		
28-Jan-10	29	8.6		
30-Dec-09	62	8.7		
29-Oct-09	31	5.7		
28-Sep-09	32	3.2		
27-Aug-09	30	5.3		
28-Jul-09	32	3.2		
26-Jun-09	29	4.2		
28-May-09	29	3.8		
29-Apr-09	62	8.8		
26-Feb-09	57	7.9		
31-Dec-08	36	4.7		
25-Nov-08	27	3.4		
29-Oct-08	43	8.2		
16-Sep-08	18	0.0		
29-Aug-08	63	6.6		
27-Jun-08	29	2.9		
29-May-08	30	2.5		
29-Apr-08	29	1.6		
31-Mar-08	33	0.1		
27-Feb-08	28	0.1		
30-Jan-08	30	0.0		
31-Dec-07	32	0.0		
29-Nov-07	30	0.0		
30-Oct-07				

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Natural Gas Consumption History

Customer: **Premise 5**

Date: 22-Nov-2011

Service Address:

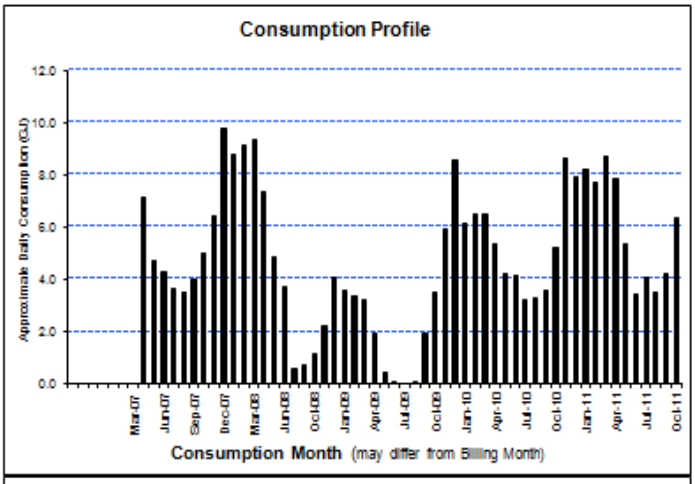
Customer Number: 0 Premise Number: 0

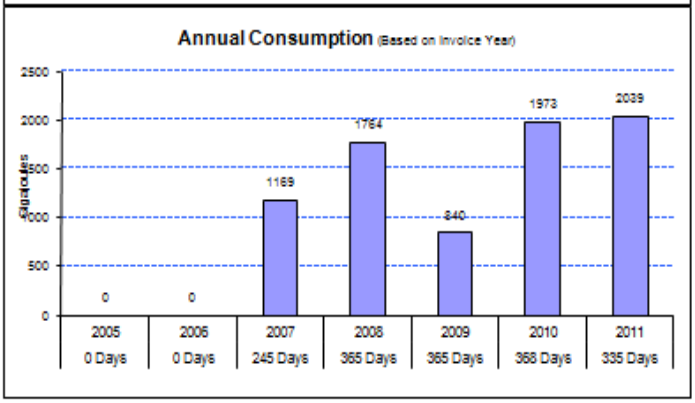
Current Rate: #N/A Service Area: Coastal

Annual Cons'n: 2,113.2 GJ / 344 Days
12 GJ

Notes:
Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

We believe this data to be correct and accurate, however FortisBC assumes no liability for errors or omissions. Actual billing data shall prevail.





Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
07-Nov-11	31	196.8		
07-Oct-11	30	125.5		
07-Sep-11	30	108.0		
08-Aug-11	32	125.1		
07-Jul-11	29	102.6		
08-Jun-11	30	163.9		
09-May-11	33	235.3		
06-Apr-11	29	268.0		
08-Mar-11	29	214.7		
07-Feb-11	31	254.4		
07-Jan-11	31	245.0		
07-Dec-10	9	73.9		
28-Nov-10	24	185.0		
04-Nov-10	29	159.7		
06-Oct-10	29	106.4		
07-Sep-10	33	101.6		
05-Aug-10	30	97.8		
06-Jul-10	32	123.4		
04-Jun-10	30	129.7		
05-May-10	29	159.3		
06-Apr-10	32	201.4		
05-Mar-10	29	180.7		
04-Feb-10	29	188.5		
06-Jan-10	33	265.6		
04-Dec-09	30	176.5		
04-Nov-09	30	107.3		
05-Oct-09	32	57.7		
03-Sep-09	29	1.5		
05-Aug-09	30	0.0		
06-Jul-09	32	0.1		
04-Jun-09	30	11.6		
05-May-09	32	56.8		
03-Apr-09	29	98.4		
05-Mar-09	29	94.0		
04-Feb-09	29	110.6		
06-Jan-09	33	125.6		
04-Dec-08	29	65.9		
05-Nov-08	29	35.4		
07-Oct-08	32	20.2		
05-Sep-08	59	33.2		
08-Jul-08	11	5.6		
27-Jun-08	22	105.6		
05-Jun-08	30	149.1		
06-May-08	29	220.1		
07-Apr-08	33	289.0		
05-Mar-08	29	264.4		
05-Feb-08	28	272.2		
08-Jan-08	34	302.9		
05-Dec-07	29	191.0		
06-Nov-07	32	155.0		
05-Oct-07	28	119.2		
07-Sep-07	31	107.6		
07-Aug-07	32	110.8		
06-Jul-07	29	127.3		
07-Jun-07	31	144.8		
07-May-07	33	213.0		
04-Apr-07				

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Natural Gas Consumption History

Customer: **Premise 6**

Date: 22-Nov-2011

Service Address:

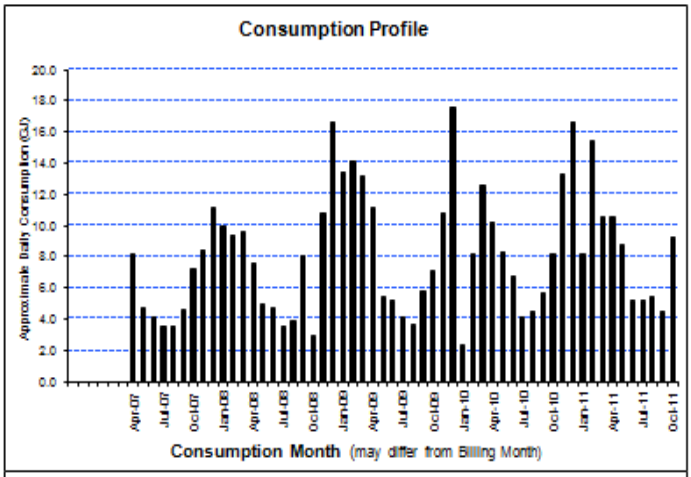
Customer Number: 0 Premise Number: 0

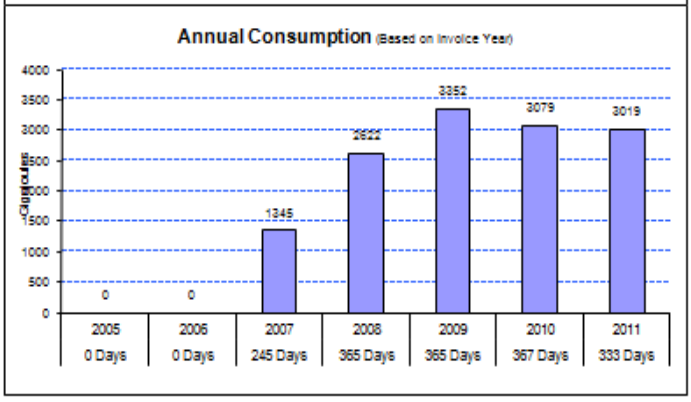
Current Rate: #N/A Service Area: Coastal

Annual Cons'n: 3,417.6 GJ / 365 Days
Daily Peak: 21 GJ

Notes:
Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

We believe this data to be correct and accurate, however FortisBC assumes no liability for errors or omissions. Actual billing data shall prevail.





Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
04-Nov-11	30	286.7		
05-Oct-11	2	14.4		
03-Oct-11	27	119.9		
06-Sep-11	32	166.3		
05-Aug-11	30	160.3		
06-Jul-11	30	155.9		
06-Jun-11	32	271.1		
05-May-11	30	317.5		
05-Apr-11	29	328.2		
07-Mar-11	31	431.2		
04-Feb-11	29	253.3		
06-Jan-11	31	514.3		
06-Dec-10	32	398.5		
04-Nov-10	30	251.3		
05-Oct-10	28	168.4		
07-Sep-10	33	138.5		
05-Aug-10	30	125.6		
06-Jul-10	32	202.5		
04-Jun-10	30	254.7		
05-May-10	29	307.1		
06-Apr-10	32	390.2		
05-Mar-10	29	226.9		
04-Feb-10	29	70.4		
06-Jan-10	33	544.9		
04-Dec-09	30	324.7		
04-Nov-09	30	221.3		
05-Oct-09	32	173.8		
03-Sep-09	29	113.5		
05-Aug-09	30	128.2		
06-Jul-09	32	154.7		
04-Jun-09	30	167.2		
05-May-09	32	334.9		
03-Apr-09	29	409.2		
05-Mar-09	29	395.6		
04-Feb-09	28	414.6		
07-Jan-09	34	514.6		
04-Dec-08	28	321.8		
06-Nov-08	31	91.3		
06-Oct-08	31	241.2		
05-Sep-08	30	120.5		
06-Aug-08	30	109.4		
07-Jul-08	32	141.3		
05-Jun-08	30	152.0		
06-May-08	29	225.4		
07-Apr-08	33	295.8		
05-Mar-08	29	270.1		
05-Feb-08	28	309.0		
08-Jan-08	34	344.0		
05-Dec-07	28	252.0		
07-Nov-07	33	223.2		
05-Oct-07	28	138.6		
07-Sep-07	31	107.5		
07-Aug-07	32	109.4		
06-Jul-07	30	123.5		
06-Jun-07	30	145.5		
07-May-07	33	245.6		
04-Apr-07				

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Natural Gas Consumption History

Customer: **Premise 7**

Date: 22-Nov-2011

Service Address:

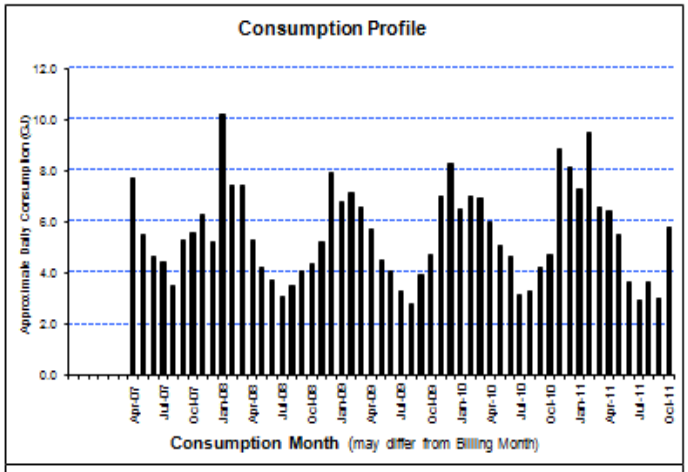
Customer Number: 0 Premise Number: 0

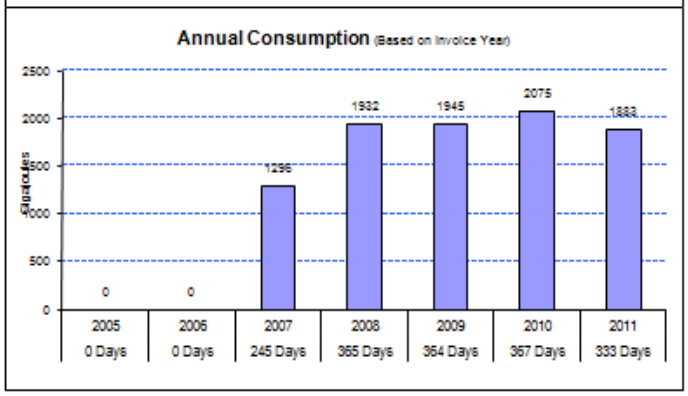
Current Rate: #N/A Service Area: Coastal

Annual Cons'n: 2,148.4 GJ / 365 Days
Daily Peak: 11 GJ

Notes:
Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

We believe this data to be correct and accurate, however FortisBC assumes no liability for errors or omissions. Actual billing data shall prevail.





Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
04-Nov-11	30	177.6		
05-Oct-11	29	89.8		
06-Sep-11	32	112.0		
05-Aug-11	30	90.6		
06-Jul-11	30	108.0		
06-Jun-11	32	169.5		
05-May-11	30	191.9		
05-Apr-11	29	202.5		
07-Mar-11	31	264.3		
04-Feb-11	29	225.5		
06-Jan-11	31	251.7		
06-Dec-10	32	265.0		
04-Nov-10	30	144.1		
05-Oct-10	32	125.3		
03-Sep-10	29	101.5		
05-Aug-10	30	97.0		
06-Jul-10	32	139.0		
04-Jun-10	30	157.1		
05-May-10	29	179.7		
06-Apr-10	32	214.2		
05-Mar-10	29	194.6		
04-Feb-10	29	201.0		
06-Jan-10	33	256.3		
04-Dec-09	30	210.0		
04-Nov-09	30	146.1		
05-Oct-09	32	117.4		
03-Sep-09	28	85.0		
06-Aug-09	31	99.9		
06-Jul-09	32	120.6		
04-Jun-09	30	139.1		
05-May-09	32	169.4		
03-Apr-09	29	203.3		
05-Mar-09	29	199.5		
04-Feb-09	28	210.0		
07-Jan-09	33	244.7		
05-Dec-08	29	155.6		
06-Nov-08	30	133.4		
07-Oct-08	32	121.9		
05-Sep-08	29	106.8		
07-Aug-08	31	94.4		
07-Jul-08	31	110.7		
06-Jun-08	31	130.3		
06-May-08	28	158.1		
08-Apr-08	34	229.0		
05-Mar-08	28	215.3		
06-Feb-08	29	315.9		
08-Jan-08	33	160.3		
06-Dec-07	29	187.4		
07-Nov-07	29	171.2		
09-Oct-07	32	157.8		
07-Sep-07	30	107.9		
08-Aug-07	33	136.6		
06-Jul-07	29	137.4		
07-Jun-07	31	168.3		
07-May-07	32	229.4		
05-Apr-07				

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Natural Gas Consumption History

Customer: **Premise 8**

Date: 22-Nov-2011

Service Address:

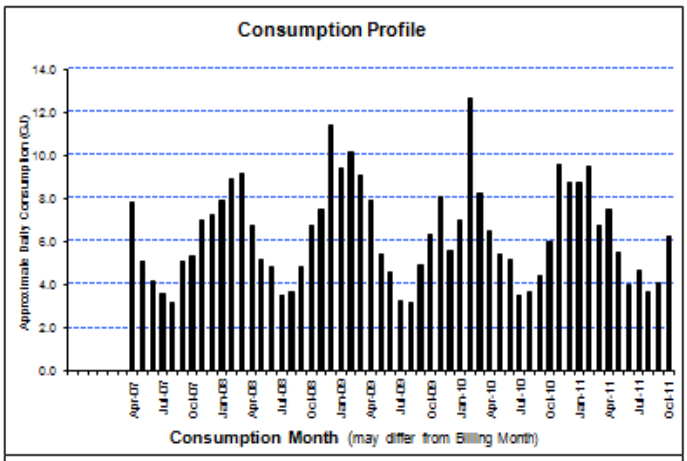
Customer Number: 0 Premise Number: 0

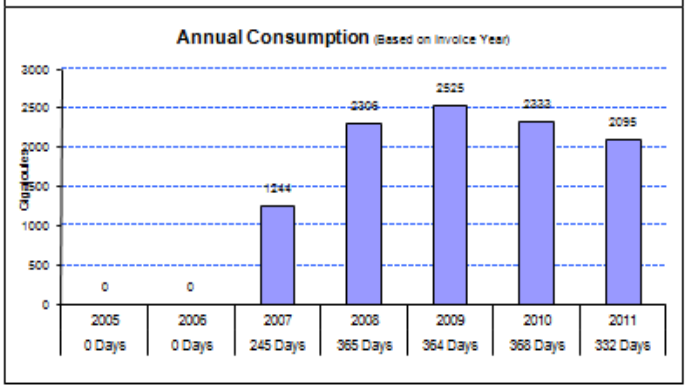
Current Rate: #N/A Service Area: Coastal

Annual Cons'n: 2,380.4 GJ / 365 Days
Daily Peak: 12 GJ

Notes:
Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

We believe this data to be correct and accurate, however FortisBC assumes no liability for errors or omissions. Actual billing data shall prevail.





Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
04-Nov-11	21	153.0		
14-Oct-11	9	40.3		
05-Oct-11	29	121.8		
06-Sep-11	29	113.0		
08-Aug-11	33	143.7		
06-Jul-11	29	118.0		
07-Jun-11	33	168.0		
05-May-11	30	224.6		
05-Apr-11	29	206.7		
07-Mar-11	28	263.9		
07-Feb-11	32	270.9		
06-Jan-11	30	270.6		
07-Dec-10	33	285.9		
04-Nov-10	29	184.8		
06-Oct-10	33	131.3		
03-Sep-10	29	113.1		
05-Aug-10	30	106.3		
06-Jul-10	32	154.5		
04-Jun-10	30	167.2		
05-May-10	28	194.2		
07-Apr-10	33	254.2		
05-Mar-10	28	354.5		
05-Feb-10	30	214.9		
06-Jan-10	33	172.1		
04-Dec-09	30	241.1		
04-Nov-09	29	194.2		
06-Oct-09	33	147.1		
03-Sep-09	29	97.4		
05-Aug-09	30	99.9		
06-Jul-09	32	136.4		
04-Jun-09	30	167.1		
05-May-09	32	235.5		
03-Apr-09	29	280.9		
05-Mar-09	29	283.5		
04-Feb-09	28	290.3		
07-Jan-09	33	351.5		
05-Dec-08	11	92.2		
24-Nov-08	18	131.0		
06-Nov-08	30	208.4		
07-Oct-08	32	144.8		
05-Sep-08	29	111.5		
07-Aug-08	31	107.7		
07-Jul-08	31	143.2		
06-Jun-08	30	159.6		
07-May-08	29	201.0		
08-Apr-08	34	283.8		
05-Mar-08	28	257.3		
06-Feb-08	29	243.5		
08-Jan-08	33	222.3		
06-Dec-07	29	208.1		
07-Nov-07	29	165.3		
09-Oct-07	32	150.1		
07-Sep-07	30	98.0		
08-Aug-07	33	109.7		
06-Jul-07	29	123.3		
07-Jun-07	31	155.2		
07-May-07	32	234.6		
05-Apr-07				

FortisBC

Commercial & Industrial Marketing
16705 Fraser Highway, Surrey, B.C. V4N 0E8
E-mail: commercial.energy@fortisbc.com

Natural Gas Consumption History

Customer: **Premise 9**

Date: 22-Nov-2011

Service Address:

Customer Number: 0 Premise Number: 0

Current Rate: #N/A Service Area: Coastal

Annual Cons'n: 2,231.4 GJ / 364 Days
Daily Peak: 11 GJ

Notes:
Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

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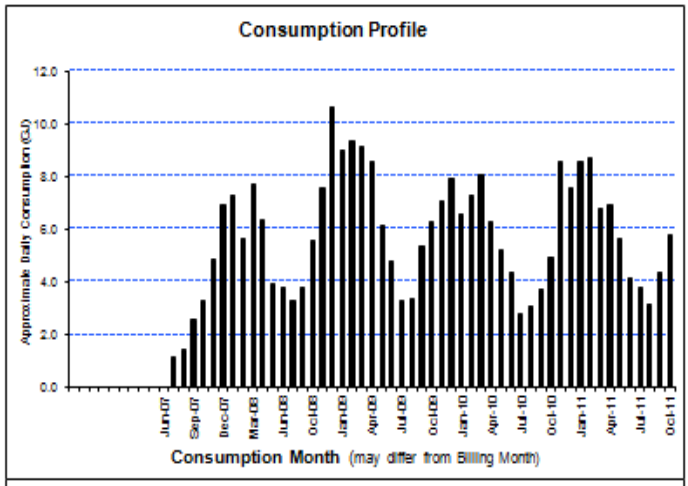

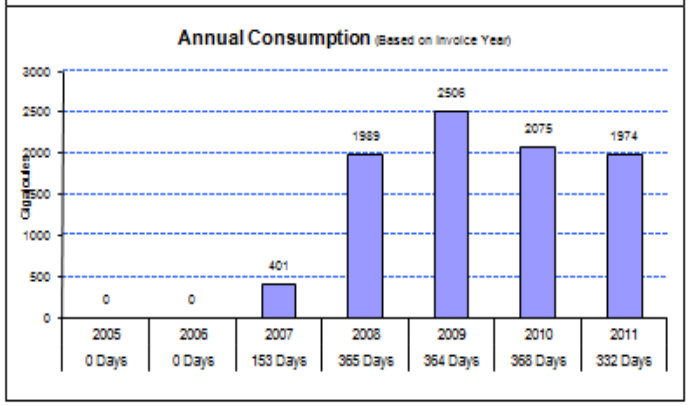

Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
04-Nov-11	30	178.7		
05-Oct-11	29	128.8		
06-Sep-11	29	96.3		
08-Aug-11	32	116.1		
07-Jul-11	30	122.4		
07-Jun-11	33	174.2		
05-May-11	30	206.5		
05-Apr-11	29	208.9		
07-Mar-11	28	242.8		
07-Feb-11	32	265.5		
06-Jan-11	30	234.1		
07-Dec-10	32	257.1		
05-Nov-10	30	151.9		
06-Oct-10	29	109.6		
07-Sep-10	33	94.7		
05-Aug-10	30	85.7		
06-Jul-10	32	130.5		
04-Jun-10	30	160.3		
05-May-10	28	187.3		
07-Apr-10	33	248.6		
05-Mar-10	28	202.7		
05-Feb-10	30	202.2		
06-Jan-10	33	244.4		
04-Dec-09	30	211.5		
04-Nov-09	29	192.9		
06-Oct-09	33	159.1		
03-Sep-09	29	101.9		
05-Aug-09	30	101.2		
06-Jul-09	32	142.7		
04-Jun-09	30	188.9		
05-May-09	32	256.9		
03-Apr-09	29	281.6		
05-Mar-09	29	262.0		
04-Feb-09	28	278.8		
07-Jan-09	33	328.8		
05-Dec-08	11	90.6		
24-Nov-08	18	134.5		
06-Nov-08	30	172.7		
07-Oct-08	61	227.3		
07-Aug-08	31	101.8		
07-Jul-08	31	112.4		
06-Jun-08	30	121.5		
07-May-08	29	189.1		
08-Apr-08	34	238.3		
05-Mar-08	28	162.2		
06-Feb-08	29	224.1		
08-Jan-08	33	214.0		
06-Dec-07	30	145.4		
06-Nov-07	28	100.9		
09-Oct-07	32	76.8		
07-Sep-07	30	44.2		
08-Aug-07	33	34.1		
06-Jul-07				

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Natural Gas Consumption History

Customer: **Premise 10**

Date: 22-Nov-2011

Service Address:

Customer Number: 0 Premise Number: 0

Current Rate: #N/A Service Area: Coastal

Annual Cons'n: 47.7 GJ / 349 Days
0 GJ

Notes:
Approx. Costs (if shown) are based on current Rate in effect at Billing Date. Costs may vary due to billing period crossovers and other factors. Costs include Basic Monthly Charge.

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Billing Date	Days	Cons'n (GJ)	Appr. Cost	Remarks
01-Nov-11	32	4.7		
30-Sep-11	30	4.6		
31-Aug-11	29	4.0		
02-Aug-11	33	3.0		
30-Jun-11	29	4.1		
01-Jun-11	30	5.4		
02-May-11	32	0.7		
31-Mar-11	58	7.8		
01-Feb-11	62	11.7		
01-Dec-10	14	1.7		
17-Nov-10	16	2.0		
01-Nov-10	32	4.2		
30-Sep-10	62	3.1		
30-Jul-10	59	3.0		
01-Jun-10	29	0.0		
03-May-10	34	0.0		
30-Mar-10	63	0.0		
26-Jan-10	26	0.0		
31-Dec-09	30	0.0		
01-Dec-09	29	0.0		
02-Nov-09	33	0.0		
30-Sep-09