

# **A Study of In-Dorm Student Energy Use at Smith College**

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## **Abstract**

Energy use features prominently in the search for solutions to economic and environmental problems as a major contributor to both climate change and cost of living. Smith College, in Northampton, Massachusetts, has embraced this search. The school committed itself to neutralizing its greenhouse gas emissions in 2007. Furthermore the school's recent budget plan includes a goal of funding conservation projects as well as a goal to reduce campus space by closing administrative buildings or student residences. The purpose of this study is to determine how much energy students use within their dorms, to determine which appliances are the biggest consumers on campus, and to identify patterns in dorm energy use so as to make energy savings recommendations to the school administrators. We sent a survey to all students living within Baldwin, Chase, Cutter, Duckett, Hopkins, Hubbard, Morris, Morrow, Talbot, and Wilson houses and analyzed data from the responses using Minitab 15. We found that student energy consumption varies with dorm size and dorm location and that six appliances are responsible for approximately 70% of student energy use. Our results should be considered when the administration makes the decision as to which campus buildings to close, as closing certain houses will result in more energy savings than others. Our results can also help the administration in prioritizing current and future conservation projects.

## **Introduction**

The beginning of the 21<sup>st</sup> century thus far is marked by both environmental and economic concerns. Governments, businesses, non-governmental organizations, and private households are all seeking ways to “protect the environment” that will not leave them bankrupt. Energy use features prominently in this search as a major contributor to both climate change and cost of living.

Impact on the environment can be measured in a number of ways, but among the most common is the carbon footprint. This “footprint” is a measurement of the amount of greenhouse gases released into the atmosphere over the course of a year as a result of one's daily actions (Weisbord 2008). Greenhouse gases — compounds in the atmosphere that absorb infrared light — include water, carbon dioxide, methane, nitrogen oxide, nitrogen dioxide, ozone, and hexafluorocarbons, among others, though carbon footprints are generally measured in carbon equivalents or in metric tons of carbon dioxide

(McNeill 2000, Luterbacher and Wiegandt 2007, Fagan 2009). Greenhouse gases are required at low concentrations in the atmosphere to maintain a global temperature conducive to life, but could be disastrous to life, as we know it, at higher concentrations (McNeill 2000, Fagan 2009). Because these gases are byproducts of many activities associated with technology and industrialization, greenhouse gas concentrations, particularly carbon dioxide, have been increasing since the Industrial Revolution and have also been linked to the concurrent rise in global temperatures (McNeill 2000). Continued rise in greenhouse gas concentrations is predicted to have drastic effects on climate worldwide, varying from warming to cooling and drought to flooding depending on the location (McNeill 2000, Solomon et al. 2007).

Smith College, in Northampton, Massachusetts, committed itself to neutralizing its greenhouse gas emissions, or carbon footprint, when President Carol Christ signed the American College and University Presidents Climate Commitment in 2007. In 2004 and 2007, students at Smith calculated the school's footprint and broke it down into three categories. The first category, stationary sources, includes combustion of fuels for use on campus or in college-owned vehicles, refrigeration, and gases produced from agricultural activities. The second category, purchased electricity, includes any emissions released during production of electricity used by the college. The third, "everything else," includes professor and student commutes to and from the college, air-travel, waste-disposal, and anything else not included in the first two categories. The students found that, of Smith's footprint of 35,030 metric tons equivalent to carbon dioxide, stationary sources contribute 50% and purchased electricity 44% (Weisbord 2008).

The school administration has already taken some measures to reduce emissions from category one, such as installing a combustion turbine, which will reduce emissions

by 30%, but Smith College is still far from carbon neutrality. Many measures remain to be taken, particularly in category two; in fact the college has included “conservation-oriented projects” in its recent proposed budget reduction plan (Christ 2009). Dano Weisbord, the Environmental Sustainability Director, is aware that the majority of the school’s emissions come from energy use in the many buildings on campus, but is not sure as to how energy is distributed among buildings or activities (Weisbord 2009). The purpose of this study is to determine how much energy students use within their dorms, to determine which appliances are the biggest consumers on campus, and to identify patterns in dorm energy use so as to make energy-savings recommendations to the administrators of Smith College.

## **Methodology**

### *Rationale*

This project is an extension of one conducted by Kristyn Hall during the fall of 2008 and supervised by Professor Denise McKay. Kristyn surveyed students in Ziskind House to gather information on their energy use and to determine if the installation of a solar photovoltaic system would be a feasible energy saving option for the dorm. Professor McKay suggested that a project determining how and why energy consumption behaviors differ across campus would be instrumental in directing energy conservation efforts (McKay Personal Interview). The methodology we developed after speaking with Professor McKay allows us to determine if and how energy consumption behaviors differ across the campus and throughout the student body.

**Valerie Nambiar-**

We are working on our Environmental Science and Policy Final Project measuring student energy use on campus. In order to do this we need to estimate the electrical load placed on the building. If you could take the time to complete this survey we would greatly appreciate it. This survey is anonymous and can be returned to the box in the foyer area. Students who complete this survey and return the slip at the end will be entered into a raffle for one of two \$25 gift certificates in town. Your contribution will help us develop energy efficiency and conservation proposals to Smith College. Please complete this survey by Monday March 30<sup>th</sup>. Questions can be directed to the e-mail addresses below. Thank you in advance for your help.

Sincerely,

Amy Zong and Urial Stalger

[azong@smith.edu](mailto:azong@smith.edu) , [urial@smith.edu](mailto:urial@smith.edu)

What class year are you?

Please fill out the table as well as possible.

	How many do you have?	How many hours in a wk per day on average?	Other information (example: energy efficient lightbulbs, computer on energy save mode, size of fridge, etc.)
Desk Lamp			
Floor Lamp			
Wall/Ceiling Mounted Light			
Desktop			
Laptop			
Phone Charger			
Television			
Hair Dryer			
Fridge			

How many loads of laundry do you wash each week?

How many loads of laundry do you dry each week?

Please list on the back any additional electrical devices (file printer, alarm clock, iron, coffee maker, stereo, etc.) and how many hours they are in use per day on average.

.....  
Remove this slip and return it to the box to be entered in the raffle.

e-mail:

Figure 1. Survey.

We designed a survey (Fig. 1) based on that used by Kristyn in her project — which was provided by Professor McKay (Email) — and sent it to 657 students in ten campus houses. We chose six of the houses (Hopkins, Duckett, Hubbard, Chase, Cutter, and Wilson) based on their size and another four (Baldwin, Morris, Morrow, and Talbot) based on their location (“Housing”). Surveys were anonymous, though students had the option of providing their e-mail address to enter a raffle for one of two twenty-five dollar gift certificates. We included the raffle as an incentive to encourage survey participation.

The surveys asked students for their class year, for their residence, and for information regarding the kinds and numbers of appliances they own and the number of hours each appliance is in use every day, as well as the number of loads of clothes washing and drying they do each week. We also gave students the option to include other information they thought might be useful. We distributed the surveys following spring break and collected them at the end of March, offering students approximately a week to complete the surveys.

#### *Calculations and Assumptions*

After the data were collected and recorded in an excel spreadsheet, we performed several calculations to convert the information into measurements of kilowatt-hours (kWh) per week. For most appliances, we multiplied the number of the appliance owned by the student times the number of hours reported by the student, then multiplied this number by the number of watts the appliance uses and by 7 to get the weekly watt-hours. We then divided this number by 1000 to calculate kWh per week. An example is provided in Equation 1. Some appliances, such as laptops and others that had two or more energy use modes, or washers, for which time was measured in loads/week rather than hours/day, required altered equations, though all calculated final energy consumption in

kWh/week. To carry out these calculations, we gathered wattage data on each appliance from a number of websites, as well as from Facilities Management. Table 1 lists the wattages we used for our calculations.

**Equation 1**

Values reported: 1 lamp with a 60-watt bulb that is on 5 hours per day  
 $(1 \text{ lamp}) * (5 \text{ hrs/day}) * (60 \text{ W/lamp}) * (7 \text{ days/week}) / (1000 \text{ W/kW}) = 2.1 \text{ kWh/week}$

**Table 1.** Appliance Wattage. Values for refrigerators were calculated from kWh/year and values for clothes washers were calculated from kWh/load. All other values obtained in watts.

Appliance	Watts
Incandescent Bulb (Floor & Desk Lamp)	60
Fluorescent Bulb (Floor & Desk Lamp)	15 <sup>a</sup>
Mounted Light	26 <sup>b</sup>
Desktop on	73.97 <sup>c</sup>
Desktop asleep	21.13 <sup>c</sup>
Laptop on	44.28 <sup>c</sup>
Laptop asleep	4.42 <sup>c</sup>
Cell Phone and & Phone Charger	2.24 <sup>c</sup>
Phone Charger Only	0.14 <sup>c</sup>
Television (19")	110 <sup>d</sup>
Hair Dryer	1875 <sup>d</sup>
Mini Fridge (3.5 ft <sup>3</sup> )	38.7 <sup>e</sup>
Energy Star Mini Fridge	30.3 <sup>e</sup>
Mini Fridge with Microwave	33.2 <sup>f</sup>
Clothes Washer (Hot Water)	7860 <sup>g</sup>
Clothes Dryer	4400 <sup>h</sup>
Fan	250 <sup>d</sup>
Coffeemaker	1200 <sup>d</sup>
Alarm Clock	10 <sup>d</sup>
Stereo	400 <sup>d</sup>
DVD Player	25 <sup>d</sup>
Electric Kettle	1500 <sup>i</sup>
Humidifier	80 <sup>j</sup>
Printer on Standby	2 <sup>k</sup>
Printer While Printing	15 <sup>k</sup>

a. ("Frequently Asked Questions") b. (Benoit 2009) c. ("How to Reduce Vampire Power" 2009) d. ("Estimating Energy Use" 2009) e. ("Refrigerators and Freezers") f. ("College Rentals, Sales and Service" 2009) g. ("How to Save Money on the Use of Washing Machines (Clothes Washers)" 2008) h. ("Calculate Your Electric Cost" 2008) i. ("1500-watt 7-cup Stainless Steel Electric Kettle") j. ("Fujitronic FH-777 80-Watt Tower Air Cooler and Humidifier" 2009) k. ("Epson Stylus C120 Inkjet Personal Color Printer" 2009)

In addition to obtaining wattage data, we had to make several assumptions to carry out the calculations. Chief among our assumptions was the decision to provide a high estimate of student energy use. This means that when we encountered ranges, either in the wattage of an appliance or in the number of hours a student uses an appliance, we used the highest value to carry out our calculations. One example is that we based our calculations for clothes washing on values for loads using hot water, as opposed to warm or cold water. We also made individual assumptions for ten specific appliances due to inadequate survey response. First, we assumed that all desk and floor lamps use 60 watt or 60-watt equivalent bulbs. When a student reported using an energy-efficient light bulb, we assumed the student uses a 15-watt fluorescent bulb. If a student did not report using an energy-efficient light bulb, we assumed the student uses a 60-watt incandescent bulb. Second, we assume that all refrigerators are 3.5 cubic feet and that all televisions have 19-inch screens. Our third assumption is that desktops and laptops are on, rather than in sleep mode, for the number of hours reported by the student. We also assumed that most students do not know the difference between “sleep mode” and “energy saver mode,” and so in cases when a student reported that a computer is in “energy saver mode” for a certain number of hours, we took that to mean that the computer is asleep for that number of hours. Our fifth assumption is that if a student reported a phone charger is in use for less than 16 hours a day, both the phone and the charger are plugged into the outlet, but if the student reported a phone charger is in use for 16 hours or more a day, then only the phone charger is in use. Sixth, we assumed that each load of washing lasts forty minutes and that each load of drying lasts for one hour. Finally, we assumed that any printer that is reported to be in use for more than 2 hours a day is in standby, rather

than on. These assumptions were used for each survey response, unless the participant specifically told us otherwise.

Once each survey response was converted into kWh/week, we calculated total participant weekly consumption (the total kWh used by each participant each week), total sample weekly consumption (the total kWh used by all participants each week), total appliance weekly consumption (the total kWh used by each appliance type each week), average appliance weekly consumption (the total appliance consumption divided by the sample size), and percentage of total weekly consumption used by each appliance (total appliance consumption divided by total sample consumption). After calculating these values, we decided to remove two responses that appeared to be outliers. Two survey participants reported that their televisions are in use 12 or 24 hours per day. We made the decision to remove these two students from the sample based on two factors. First, they are the only two participants to use more than 500 kWh per week. Second, we believe it is unlikely that anyone watches television twenty-four hours a day, seven days a week, and that these two students likely meant that their televisions are plugged in, and not necessarily on. These two students live in Baldwin and Talbot and therefore do not affect the study on house capacity, though their removal from the sample does affect the results of the other three studies.

### *Statistical Analysis*

We conducted data analysis using Minitab 15, with a significance level of 0.05. For our first study of the relationship between house capacity and per capita energy consumption (average student energy use), we generated linear, quadratic and cubic regressions as well as F-scores and p-values. As stated, houses included in this study are Hopkins, Duckett, Hubbard, Chase, Cutter, and Wilson. This selection includes two

small houses (capacity below 40), two medium houses (capacity between 41 and 65), and two large houses (capacity larger than 65). Our second study sample consisted of one large house, from each of the main areas of campus: Upper Elm (Talbot), Lower Elm (Baldwin), Center Campus (Cutter), Green Street (Morris), and the Quad (Morrow) (“Housing”). We conducted one-sided, two-sample t-tests on each location pairing to test the null hypothesis that per capita energy consumption does not vary with house location. Our third test consisted of a second set of regressions and F-tests on the null hypothesis that per capita energy consumption does not vary with class year. The final study is primarily a visual analysis of the distribution of energy consumption across appliance, though we also conducted F-tests on a few appliance pairs to confirm our conclusions.

### **Results**

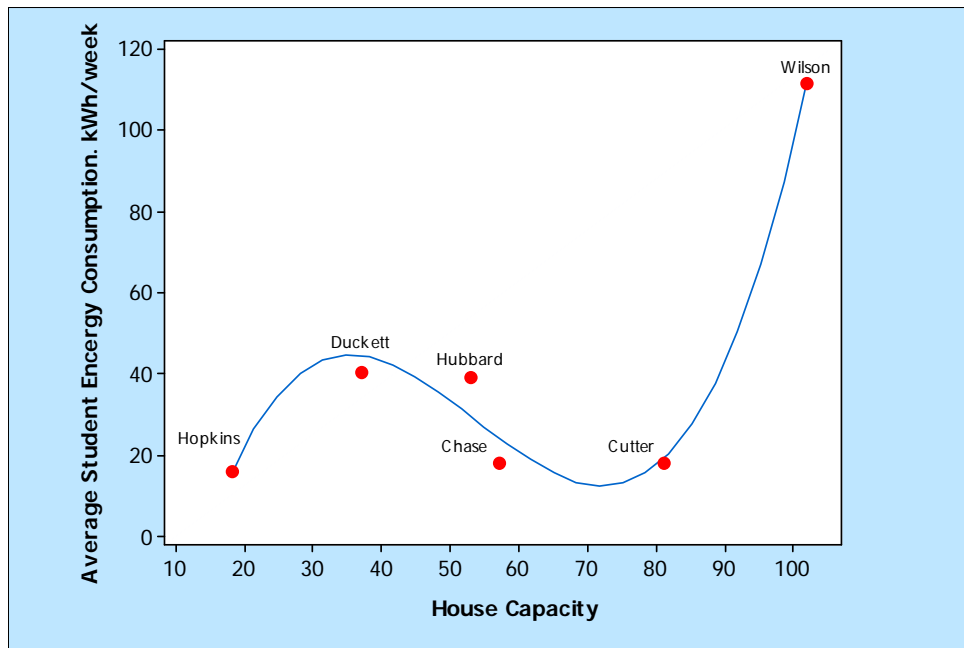
Of the 657 surveys we distributed, we received 210 completed surveys for a total response rate of 32%. Table 2 lists the response rates of the individual houses.

**Table 2.** Survey Response Rate.

<b>House</b>	<b>Capacity</b>	<b>Sample Size</b>	<b>Response Rate</b>
Baldwin	77	17	22%
Chase	57	19	33%
Cutter	81	31	38%
Duckett	37	8	22%
Hopkins	18	10	56%
Hubbard	53	21	40%
Morris	68	15	22%
Morrow	84	42	50%
Talbot	80	28	35%
Wilson	102	19	19%
<b>Total</b>	<b>657</b>	<b>210</b>	<b>32%</b>

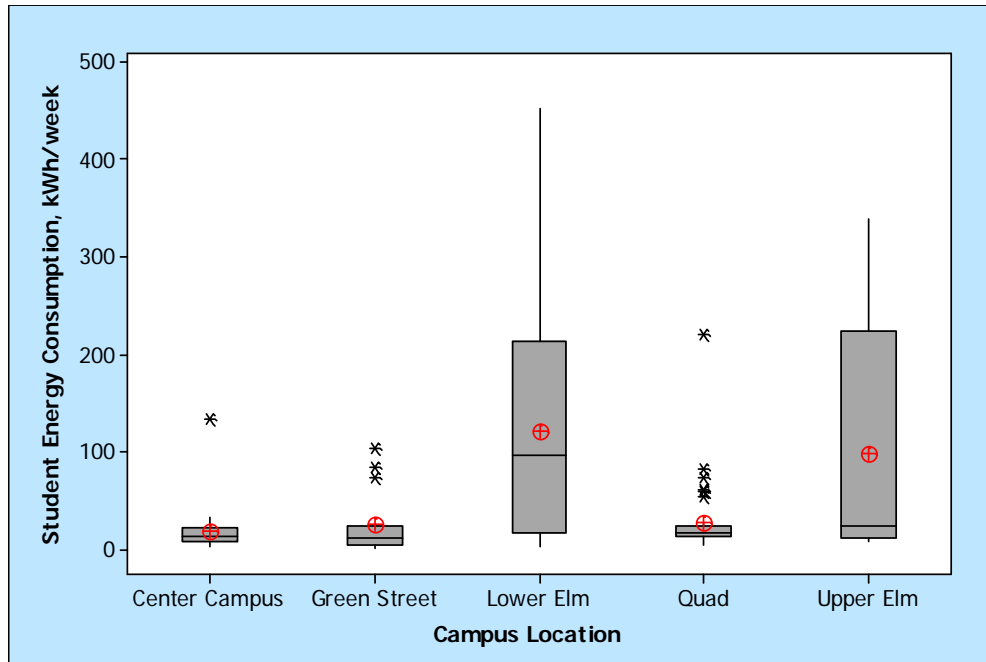
Our results show that the cubic regression of house capacity versus per capita energy consumption is statistically significant ( $F = 29.82$ ,  $p = 0.033$ ). Per capita energy

consumption is significantly, and strongly ( $R^2 = 0.987$ ) correlated with house capacity (Fig. 2).



**Figure 2.** Cubic regression of house capacity versus per capita energy consumption. The equation of the regression is  $E = -104.6 + 10.05 * C - 0.211 * C^2 + 0.001306 * C^3$ , where E is average consumption and C is capacity.  $R^2 = 97.8$ ,  $F = 29.82$ , and  $p = 0.033$ .

Results also show that Lower Elm and Upper Elm differ significantly in energy use from Center Campus, Green Street and the Quad (Fig. 3). Tests of the null hypothesis that students living in Lower Elm do not use more energy per capita than students living in Center Campus, Green Street and the Quad generated p values between 0.004 and 0.006. Tests of the null hypothesis that students living in Upper Elm do not use more energy per capita than students living in Center Campus, Green Street and the Quad generated p values lower than 0.001. All other pairings generated p-values greater than 0.05. Thus, we reject the null hypothesis that students living in Lower and Upper Elm use the same amount of energy per capita as students living in Center Campus, Green Street, and the Quad.



**Figure 3.** Energy consumption by house location. Gray box plots represent the range of responses for each location. Stars represent outliers. The two largest outliers (values over 500 kWh/week) were removed from the sample. Red circles represent mean consumption. Means of Center Campus, Green Street, Lower Elm, the Quad and Upper Elm are 18.19, 24.82, 121.7, 27.19, and 98.6 respectively.

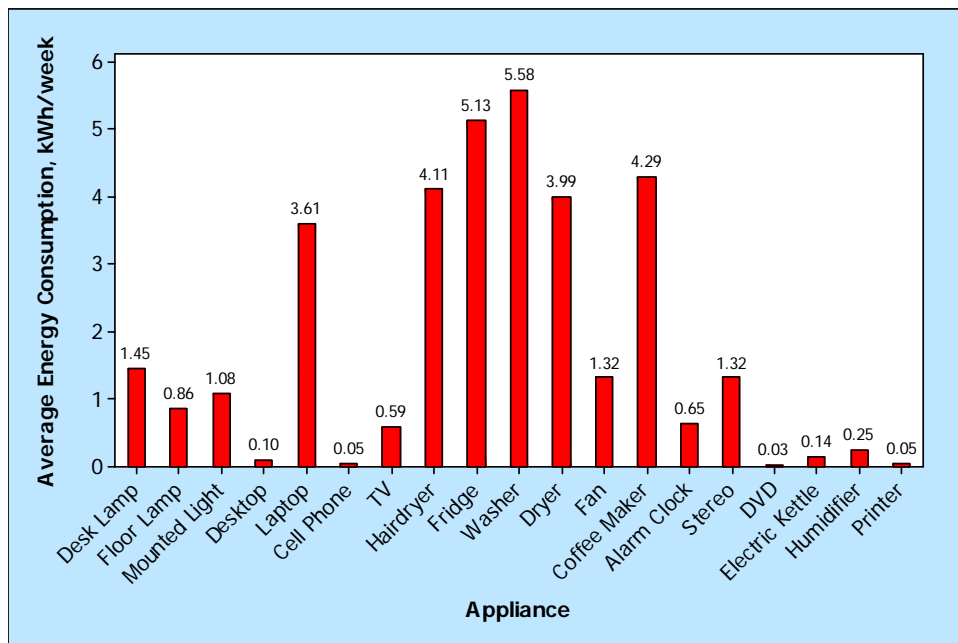
The correlation of class year with per capita energy consumption is moderately strong (linear regression  $R^2 = 0.686$ ), but is not significant. The linear regression generates an F-score of 4.36 and a p-value of 0.172 (Fig. 4).

Our analysis of the distribution of energy consumption across appliances shows that there are four levels, or tiers, of consumer (Fig. 5). The first tier is defined as appliances using more than 5 kWh per week per student and includes clothes washers (5.58 kWh/week/student, 16.2% of total sample energy consumption) and mini refrigerators (5.13 kWh/week/student, 14.7%). The second tier is defined as appliances using between 3.5 and 5 kWh per week per student and includes coffeemakers (4.28 kWh/week/student, 12.4%), hairdryers (4.11 kWh/week/student, 11.9%), clothes dryers (3.99 kWh/week/student, 11.6%), and laptops (3.61 kWh/week/student, 10.4%). All other appliances use less than 1.5 kWh per week per student and less than 5% of total

energy consumption. Those that fall into the third tier use between 1 and 2 kWh per week per student and those that fall into the fourth tier use less than 1 kWh per week per student. T-tests of several appliance pairs confirm that the differences between the four tiers differ significantly from one another.



**Figure 4.** Linear regression of class year versus per capita energy consumption. The equation of the regression is  $E = 19972 - 9.902 * Y$  where E is per capita or average energy consumption and Y is class year.  $R^2 = 68.6$ ,  $F = 4.36$ , and  $p = 0.172$ .



**Figure 5.** Average weekly energy consumption per student grouped by appliance.

## Discussion

The results of our first analysis show that there is a complex relationship between house capacity and per capita energy consumption (Fig. 2). Students living either in the smallest houses (about 20 students or fewer per house), or in slightly large houses (about 60-80 students per house) use the least energy. Students living in medium sized houses (about 20-60 students per house) and in moderately large houses (about 80-90 students per house) use moderate amounts of energy. Those students living in the largest houses on campus (90 students or more per house) use the most energy.

The results of our second analysis show that, in addition to variation by house capacity, energy consumption also varies by house location (Fig. 3). On average, students living in Upper and Lower Elm will use more energy than their classmates in Center Campus, Green Street and the Quad. We were able to control for house capacity in this study, and can therefore be fairly confident that it was not a confounding variable; however, we were unable to control for house location in the first study. Therefore, these results introduce a source of error to our first analysis, in that two of the houses used for that study, Chase and Duckett, are located in Lower Elm, while the rest are located in the three lower-consuming areas of campus. For this reason, we recommend that future EVS 300 students conduct a study similar to ours, but control for house location by selecting houses only in the low-consuming areas or only in the high-consuming areas. Those students might also want to consider re-testing our second analysis, house location versus consumption, using a larger sample size to confirm our results.

Though the regression of class year versus energy consumption appears oblique, and is moderately strong, it is not significant (Fig. 4); therefore we cannot make any conclusions about differences in energy consumption across classes. If future students

retest our first two analyses, they may also want to consider retesting the relationship between class year and energy use, as a larger sample size might have yielded more significant results (Peckol 2009).

Our results show that there are some interesting patterns in student energy use across campus and throughout the dorms, though they do not explain why. Future EVS students may want to consider this when designing their own projects. Regarding house capacity, one possibility is that students living in small dorms know each other better and therefore talk more with each other about bad habits and energy savings than students in large dorms. Unfortunately, this explanation does not explain the full complexities of the relationship between house capacity and energy use. Regarding house location, any student on campus would readily admit that each area of campus, each dorm in fact, has its own personality. Houses on Elm Street are reputed to be quieter than other houses, and the Quad is widely known to be the party area. One hypothesis for future study is that energy consciousness is a part of the personality of each location or dorm. Future surveys should include questions addressing how vocal or informed students are about energy use and compare distribution of these characteristics to distribution of energy use.

Taking sample size into account when considering the results of our final test yields some interesting observations. We identified six major consumers on campus and can show that there are two general kinds of major contributor. Laptops are an excellent example of Type 1 consumers. These appliances do not use very much energy individually—laptops use 44.28 watts when on and 4.42 watts when asleep—but contribute heavily to campus consumption because almost everyone on campus has one (203 of 210 participants reported use of a laptop). Coffeemakers are an example of Type 2 consumers. These appliances use large amounts of energy—coffeemakers use 1200

watts—and therefore are major contributors despite the fact that they are relatively uncommon (17 of 210 participants reported use of a coffeemaker). Table 3 lists the wattage and commonness of the six major consumers.

**Table 3.** Contribution to Energy Consumption and Commonness of Major Campus Consumers. The number of students reporting use of washers and dryers refers to the number of students who wash and dry at least one load of laundry per week. All other values refer to the number of students who own at least one of the appliance in question.

Appliance	Percentage of Total Energy Consumption	Number of Survey Participants (out of 210) Reporting Use
Clothes Washer	16.2	160
Mini Refrigerator	14.7	141
Coffeemaker	12.4	17
Hairdryer	11.9	109
Clothes Dryer	11.6	145
Laptop	10.4	203

This last study, like the first two, also contains a few sources of error. The first is in our choice of using hot water values for the clothes washers as the washers on campus draw their water from the central water system. The campus uses steam, rather than electricity, to heat water; therefore the amount of energy used by the campus washers may be much lower than the value we used in our calculations (Weisbord 2009 Email). The second is in our wattage value for coffeemakers. We determined that coffeemakers use 1200 watts, though our sources do not differentiate between energy use when the coffeemaker is on and when the coffeemaker is actually making coffee (“Estimating Energy Use” 2009). If these values are different, our consumption values for coffeemakers should be drastically different. This miscalculation would result from the fact that several of the 17 students who have coffeemakers reported that they use their coffeemakers as clocks and leave them plugged in 24 hours a day. This means that we

based our calculations on values of 24 hours per day when they perhaps should have been based on much smaller values, perhaps closer to 30 minutes per day.

### *Recommendations*

Given the current financial crisis, Smith College has developed a plan to reduce costs, as mentioned above. Our results can help the school administration refine its proposed budget reduction plan by guiding the administration towards areas that are most in need of investment or reduction. Our findings address two of the college's goals in particular. The first is the proposal to reduce the college's use of space by 150,000 square feet and the second is to fund conservation-oriented projects (Christ 2009).

At a recent budget plan, President Christ was asked to address the space reduction goal included in the new budget reduction plan. She emphasized that they will most likely be underused administrative buildings on the campus periphery, but that a cost/benefit analysis for the closing of dorms will also be conducted (Christ 2009 Open Forum). Our results factor into that analysis. According to our findings, students use more energy in medium, moderately large, and extremely large houses, which means that these residences cost the school the most money in terms of per capita energy costs. Should the college administrators ever decide to close a dorm, they should consider closing one that houses between 30 and 60 students or one that houses over 80 students. The smaller houses of 30 to 60 would be the more feasible option, as relocating over 80 students would be more challenging than relocating 30 or 60. Furthermore, our findings indicate that the school administrators should consider closing a dorm in Upper or Lower Elm as these houses also use more energy per capita than other houses on campus and therefore cost the school more money to maintain. Conversely, should the school ever consider building a new dorm, either a small dorm of about 20 students or a large dorm of

about 60 to 80 students in Center Campus, Green Street or the Quad would be the most feasible as students in this new house would be likely to use little energy.

Our findings may also help the school decide which types of conservation and efficiency programs to implement and when, though as noted before, some measures have already been taken. One measure highlighted in the budget plan is to replace lighting with energy efficient alternatives (Christ 2009). Given our results, we believe that the school should also focus on clothes washing and drying, refrigeration, and computing. Because mini refrigerators are one of the two greatest contributors to dorm energy consumption, the school should consider providing every dorm with one or two communal refrigerators and to more actively promote refrigerator rental programs such as that of the Refrigerator Company (“College Rentals, Sales and Service” 2009) to discourage students from buying their own, possibly inefficient, refrigerators. To discourage heavy use of clothes dryers, the school should consider providing students with drying racks to hang their clothes; and of course purchasing more efficient washers and dryers when old machines need to be replaced will also save the school in energy costs. To tackle computing, Smith should continue to promote activities such as the Million Monitor Drive, and should consider promoting websites such as Climate Savers Smart Computing (2008) to encourage students both to purchase energy efficient computers and to use their computers efficiently.

To reduce student energy use via hair dryers, coffee makers, and the many other small-time consumers that students own, the school should consider broader tactics such as house competitions and energy education programs. In his book *Earth in Mind*, David Orr (2004) writes that he believes we cannot make the difficult changes that need to be made in order for us to live within the boundaries of the earth because we lack a sense of

community, which drives the practice of virtue; therefore, the administration should incorporate the house community structure of the campus in its planning, particularly if future studies find that house community and “personality” play a significant role in dictating the campus consumption patterns we observed. According to Dano Weisbord, seven houses will be metered in the coming year, enabling students to view their impact on the school’s energy budget (2009). If every dorm on campus were metered, the administration, with the help of house leaders (head residents, house community advisors, house presidents) and Earth reps, could initiate a campus-wide competition, offering a prize to the house with the lowest per capita energy consumption. Finally, building off of Katya Erij’s proposal (2007), we suggest that the school initiate either a sustainability orientation program or information session for incoming students to educate them about responsible energy use and conservation. Students who complete the session can later be enlisted to educate their housemates and future first-years.

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