Sustainability and Energy Efficiency of Off-Campus Housing at Williams College

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Geoscience 206: Professors Dethier and Boyd

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I. Introduction

Living off-campus at Williams affords students significantly more flexibility and freedom than on-campus dorm life. Off-campus students have the opportunity to make decisions that were previously dictated by JA's, janitors, roommates, and College administrators. Such freedom, however, is accompanied by a host of new and unfamiliar responsibilities such as paying rent, taking out the recycling, and setting the thermostat. As these students are still members of Williams College, their actions should be aligned with Williams' institutional commitment to environmental sustainability. Residing off-campus as a senior is generally students' first time living on their own, so the habits adopted by these individuals is likely to dictate how they will behave after graduating from Williams. Thus, encouraging off-campus students to develop environmentally conscious living habits would not only advance the college's immediate sustainability objectives, but would also promote the continuation of sustainable practices outside of the purple bubble.

Relatively little research has been conducted on off-campus living at Williams College. The lack of information in this area is partially due to the fact that the College has next to no jurisdiction over the residential lives of off-campus students and communication between landlords and the college is rare. Thus, there is great demand for sustainability initiatives for students living off-campus at Williams, because it is currently not integrated into the College's broader environmental mission. The goal of our paper is to offer greater insight into off-campus living by investigating the environmental impact of these off-campus houses as well as of the behavioral practices of their residents. Greater transparency about the current state of off-campus living will help guide suggestions on how to improve the off-campus sustainability of the future.

II. Setting

Currently Williams College allows 120 students, about 6 percent of the total student population, to live off-campus at any given time. Every student who wants to live off-campus as a senior is required to enter a lottery. The 120 randomly selected students chosen are then responsible for finding homes, negotiating with landlords, and signing leases.

Off-campus apartments and houses are all within walking distance of the academic buildings. The off-campus apartments are highlighted in orange and the off-campus houses in blue on the map below. In any given year about fifty of the 120 off-campus students live in the apartment buildings on Spring Street while the other seventy live in off-campus houses. For the purposes of this paper we will be focusing specifically on the off-campus houses highlighted in blue on the campus map (See Figure 1). The following table provides an overview of the location of each off-campus house investigated in our study, the number and gender of the residents, and its size (See table 1).

Figure 1:

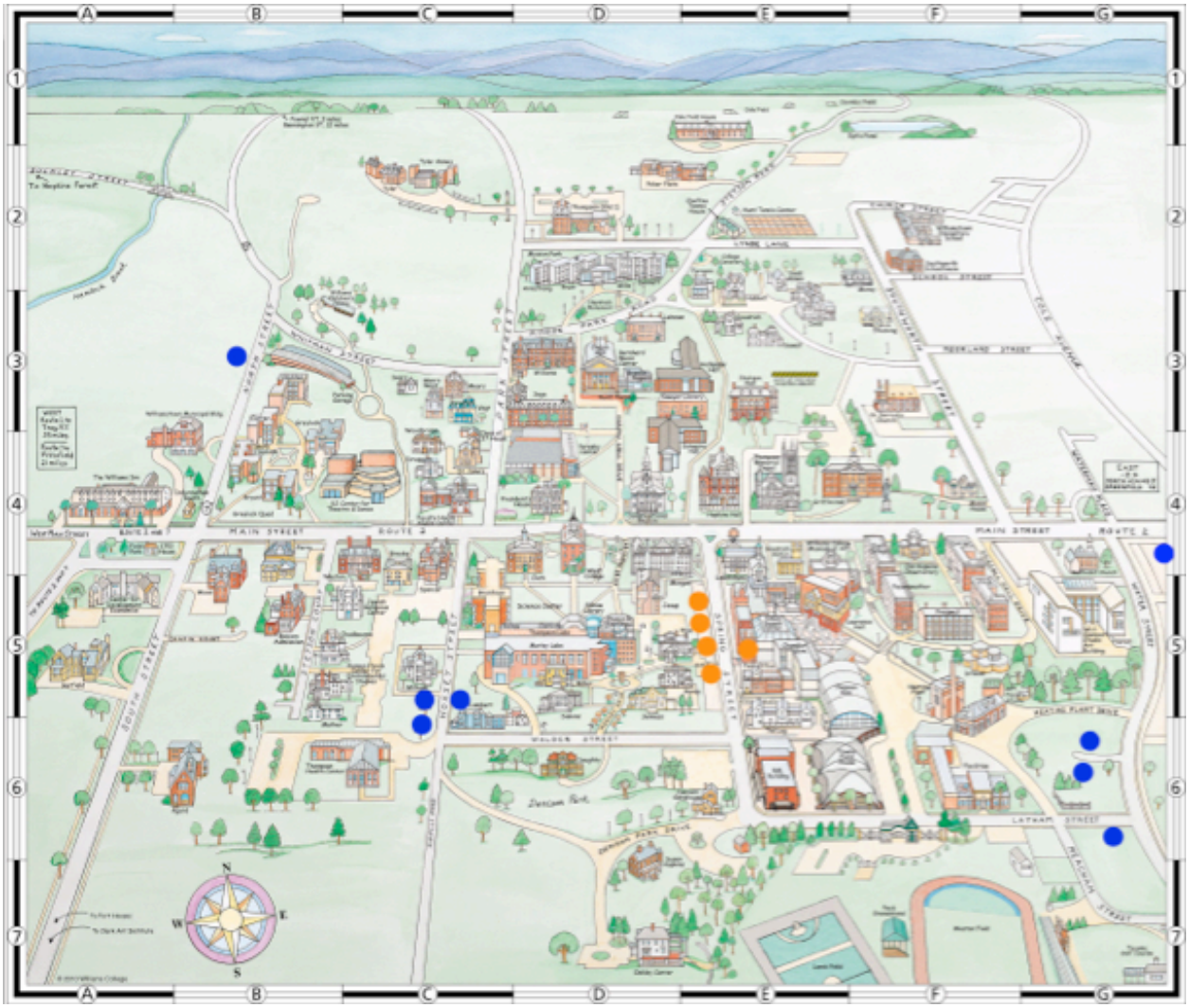


Table 1:

Houses	# of Residents	Sq. Footage
71 Hoxsey St.	9 females	3,558
63 Hoxsey St.	12 females	4,403
66 Hoxsey St.	7 males	2,925
23 Thomas St.	5 males	1,537
15 Latham St.	4 females	2,925
11-13 Meadow St.	11 males	3,537
18-20 Meadow St.	7 females	2,240
63 North St.	4 males	1,686
41 Park St.	8 females	3,200

III. Method

In order to assess the environmental impact of off-campus living at Williams, we obtained information from a variety of different sources. Our project is divided into three main sections. The first section analyzes responses from a survey sent to students living off-campus to get a better picture of their general behavioral tendencies. The second section focuses on the energy use of our own home, 71 Hoxsey, and compares that to other residencies both on and off-campus. In order to analyze and compare energy consumption patterns, we collected electricity and gas bills from as many off-campus residents as possible. We also utilized the Williams' sustainability website's energy data to extract information on the energy use and associated carbon emissions footprints of co-ops. In the final section we recommend possible solutions to help increase the sustainability and energy efficiency of off-campus housing in years to come.

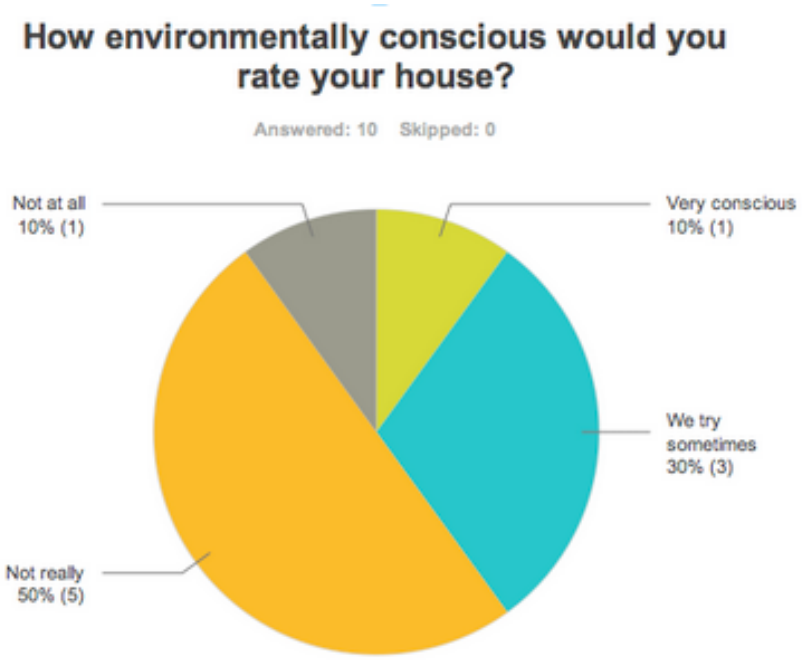
IV. Survey Results

In order to get a better sense of the behavioral characteristics of the current off-campus student body at Williams, we decided to conduct a survey with questions focused on energy efficiency and sustainability practices. Out of the 66 students we sent the survey to, we received eleven responses with at least one student representing each of the ten houses in our study. This provided us with key information concerning the condition of each of the houses as well as the general behavior of the residents.

Our first question asked respondents to rate how environmentally conscious they consider their housemates. We found that only one respondent viewed their house as very environmentally conscious and, at the other end of the spectrum, only one house saw themselves

as not at all environmentally conscious. As evident in Figure 2, 80% of the respondents saw their house falling somewhere in the middle of this sustainability spectrum.

Figure 2:



In the questions that followed, we tried to identify why the majority of students living off campus do not view their houses or roommates as very environmentally conscious. We hypothesized that this widespread lack of environmental consciousness amongst off-campus residents could be due to several different factors--adopting a sustainable lifestyle while living off-campus requires greater individual initiative, research, and energy, can be costly and inconvenient, and also might not be a primary concern of the tenants.

To get a closer look at where and how off-campus students can improve their behavior, we chose a few areas of focus, with the first being recycling. In Williamstown it is mandatory to recycle and violators who do not separate waste into the different categories of paper, cans, metals, and other waste can be fined up to $300 per violation (Codes and Bylaws of

Williamstown, 1990). This law is not strictly regulated and it is common for people to put their recycling into the general waste without considering the environmental or monetary repercussions of that action. There have only been a few instances where larger institutions, e.g. Harvard University, have been fined by someone attempting making an example the organization (Johns).

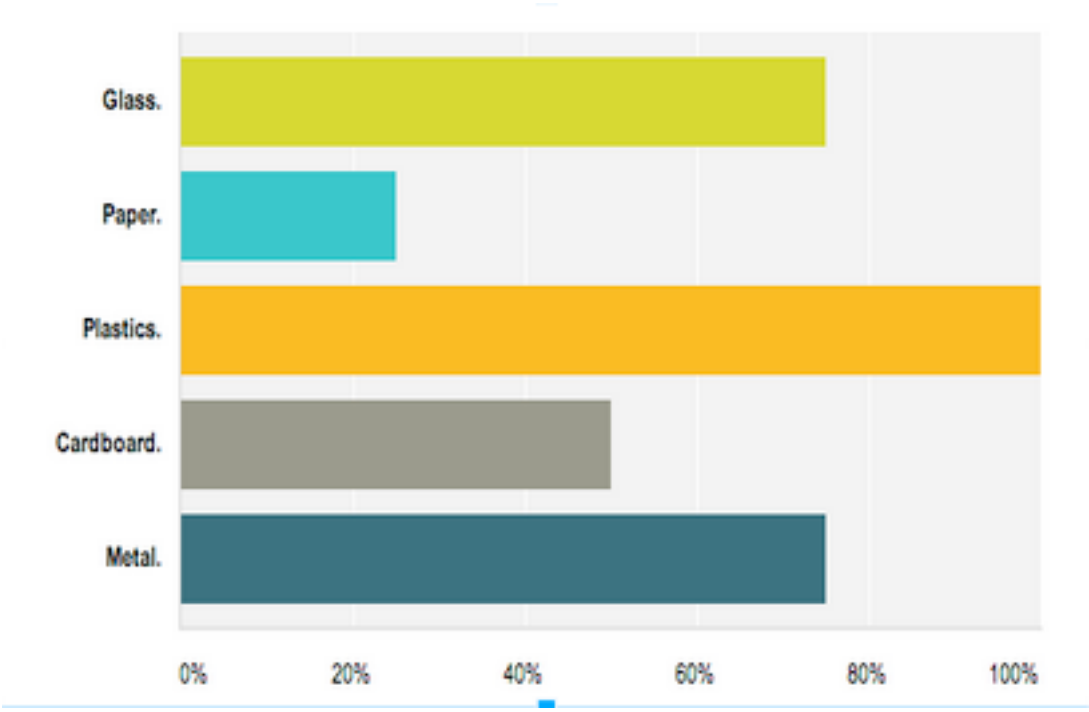
Recycling in Williamstown is split into three separate systems respectively operated by the college, individual haulers, and the town. The college's recycling haulers take their materials to a transfer station in North Adams that can handle larger volumes. Williams College facilities collects hazardous waste including oil paints, fluorescent light bulbs, and electronic waste, and makes a series of shipments to a holding facility every year. Like the Williams College haulers, independent haulers take recyclables from residential Williamstown homes to the North Adams transfer station. Williamstown also has a transfer station of its own that is smaller in size but has a more limited selection of the recyclable items they accept (they restrict certain types of recyclable plastics). In order to dispose of recyclables at the town's transfer station, residents must buy a sticker at $8 per month or $74 per year. The town has annual hazardous waste collection days that are unspecified but supposedly announced on the town's website, although they are not currently posted (Codes and Bylaws of Williamstown, 1990).

Of the ten houses we surveyed, only two of the houses' tenants recycle regularly. The students living in these houses both carry their recycling to the nearest dormitories. This is messy process that requires a great deal of energy and dedication. Two other houses recycle sporadically; one house has the woman who cleans the house take their cans and bottles, and the other house occasionally takes cans and bottles to the redemption center. These attempts at recycling are inefficient as they leave out a lot recyclable material, namely papers and cardboard.

Additionally, the redemption center only takes containers bought at Stop & Shop, so the materials that are not applicable are throw in the trash regardless.

The fact that students concentrate their recycling efforts on a limited selection of materials was evident in the responses to the next question in our survey. For those who do recycle, we found that paper and cardboard are recycled the least out of all possible solids and liquids. This is seen in Figure 3 below.

Figure 3. Answer to the question: What do you recycle? Check all that apply.



Seeing as recycling is required by law, the lack of recycling occurring in off-campus houses is surprising and disconcerting, begging the question of why these houses do not have established recycling systems. After some investigation, we discovered that our house, 71 Hoxsey, has recycling included in the monthly rent, but this was unknown to us as our landlord did not specify information about recycling in our lease and was unable to tell us when or where the recycling could be picked up. 71 Hoxsey has never seen a recycling collector visit our house,

and we were not provided with containers to store the recycling. Despite this, we pay a bi-weekly fee to have our recycling picked up by the same company who collects the trash, Scott Smith Trucking. We have discussed this issue with our landlady (who is also the landlady for other off-campus houses) and the details on recycling are now clearly stated in her leases and the trucking company knows that we are regular customers. We believe that other off-campus houses are facing a similar problem, and we have been talking to landlords to ensure that there is greater upfront transparency in their recycling policies.

We also looked into the heat use in the off-campus houses in order to understand the different types of heating and how each house's temperature is controlled. We found that half of the houses have central heating and half have individual room controls. Most houses set their thermostats somewhere between 60 and 65 degrees in the winter months, which is a fairly low considering the Williamstown climate. Only one respondent said they change their temperature based on the time of day and when people are actually in their house. This type of behavior is highly energy efficient and is a habit that all off-campus students should adopt. The main problem with heating in these houses is the lack of control and variability of the old systems in place. Most students complained that the temperature that the thermostat is set to rarely matches the actual temperatures of the rooms. Moreover, all students found that the temperatures within the houses varied greatly by floor and parts of the house, so the coldest people in the house had the most control over the thermostat.

We next looking into how often and in what ways electricity is used in the houses. As we know from the survey, most of these houses do not consider themselves very environmentally conscious, implying that turning the lights off when not in use might not be a major concern for them. Other than daily light use, electricity is commonly used for cooking, laundry, appliances,

electronics, and occasionally for space heating or hot water. We found that 60% of the respondents cook meals at home, ranging from 2-3 meals per week to 14 meals per week. In the kitchen of 71 Hoxsey Street, we have a multitude of different cooking appliances including coffee makers, a microwave, a toaster, a blender, a smoothie maker, personal grills, as well as an electric range. 71 Hoxsey does have nine tenants but such an extensive list of kitchen appliances is unnecessary. 60% of the survey respondents do their laundry at home, and of those 100% do laundry every other week. We also discovered that 50% of the respondents shower for ten minutes or more. This is a big use of energy and water.

The responses to our survey were helpful in providing us with insight to some of the behavior characteristics of students living off campus. The responses to our survey highlighted the greatest areas of inefficiency in off-campus living- recycling, heating, and refrigerator use. These inefficiencies most likely stem from a combination of general disinterest in one's environmental impact and the amount of effort required to take initiative given the state of the houses and the willingness of landlords to cooperate.

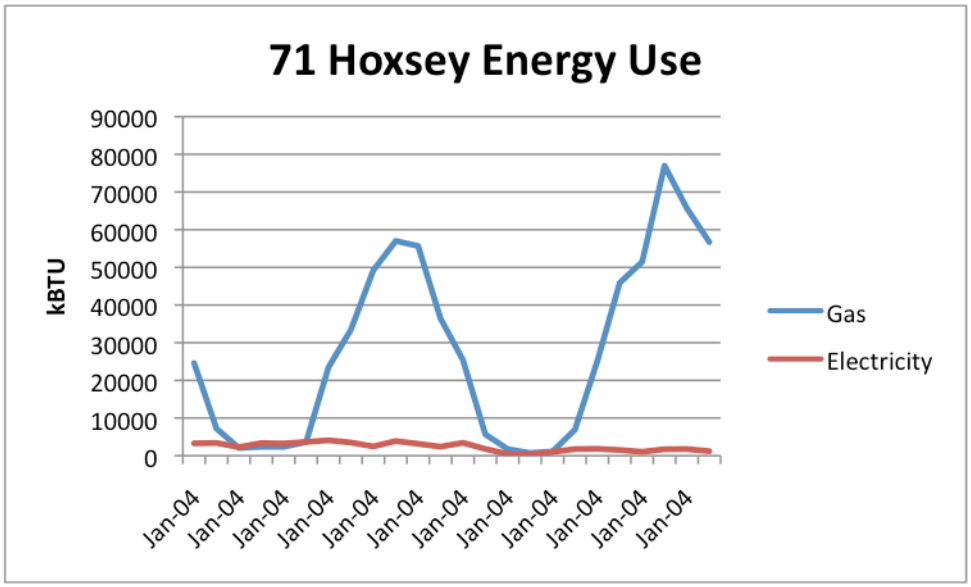
V. The Sustainability of 71 Hoxsey

This section analyzes 71 Hoxsey Street's gas usage, carbon emissions, and electricity consumption in order to identify the best targets for sustainability initiatives within our own home. 71 Hoxsey is a 3,558 square foot, four-story home, with nine bedrooms, two baths, a kitchen, living room, dining room, and cellar. Bedrooms are located on all three stories of the home with one bedroom and one bathroom on the first floor, four bedrooms and one bathroom on the second floor, and three bedrooms on the third floor. The cellar holds the hot water heater and gas boiler and is used by the tenants for general storage purposes.

A) Heat Use

As illustrated in Figure 4, the majority of the total energy consumed by 71 Hoxsey is allocated to heating efforts. Over the course of this two-year period, 92% of the home's total energy use was for heating purposes, while only 7% took the form of electricity. Gas use is minimal in the summer months when the house is unoccupied and rises rapidly during the academic year, peaking in the cold winter months. Although disconcerting at first glance, the large spike in gas usage in January of 2013 can be justified by the fact that this month had more heating degree days (1,222) than any other month displayed on the graph.

Figure 4:



71 Hoxsey Street is heated by a Weil-McLain Gas boiler connected to system of cast iron steam radiators. According to our landlord, Elaine Hantman, the boiler was installed in the summer of 2012, and boasts an efficiency rating of 84%, which is a considerable improvement from the previous boiler. A central thermostat located on the second floor controls the temperature for the entire home. Steam radiators are advantageous for a number of reasons—they are efficient in heating rooms, may be easily turned off or turned down in areas where

heating is not desired, and require relatively little gas to keep the steam boiler operating (Citizens Energy Group, 2012). Despite these advantages, the distribution of heat throughout 71 Hoxsey is highly variable, especially during the winter months when it is used the most. The bedroom on the first floor retains heat well but the first floor common spaces are cooler as they are larger spaces with multiple windows that do not close properly. The bedrooms on the second floor are generally cold unless the thermostat is set to seventy degrees. Meanwhile, the residents of the third floor are often forced to open windows to keep their rooms from overheating, even when their radiators are turned off.

A number of factors dictate the amount of energy a building consumes, including the size of the space, how often the building is in use, what the building is used for, heating and cooling systems, insulation, lighting, and appliances. While there are a variety of possible explanations for 71 Hoxsey's comparatively high energy consumption, many of them are associated with the age of the home and its lack of recent renovations. One explanation may be a shortage of insulation in the walls and under the home resulting in constant hot air leakage. 71 Hoxsey was built in 1890 without any insulation. Elaine Hantman, the landlord of the home, believes that sometime in the early 1980's blown in cellulose insulation was applied to the first and second floor walls (Hantman). The process of retroactively inserting insulation into the walls of a home is imperfect process, especially in older homes with many wall obstructions. Additionally, there is no insulation on the third floor, meaning that hot air could be leaking out through the attic. The blown in insulation was certainly an improvement in terms of energy conservation, but there is no telling how complete this system of insulation is and whether or not more insulation would help to reduce energy use in the future.

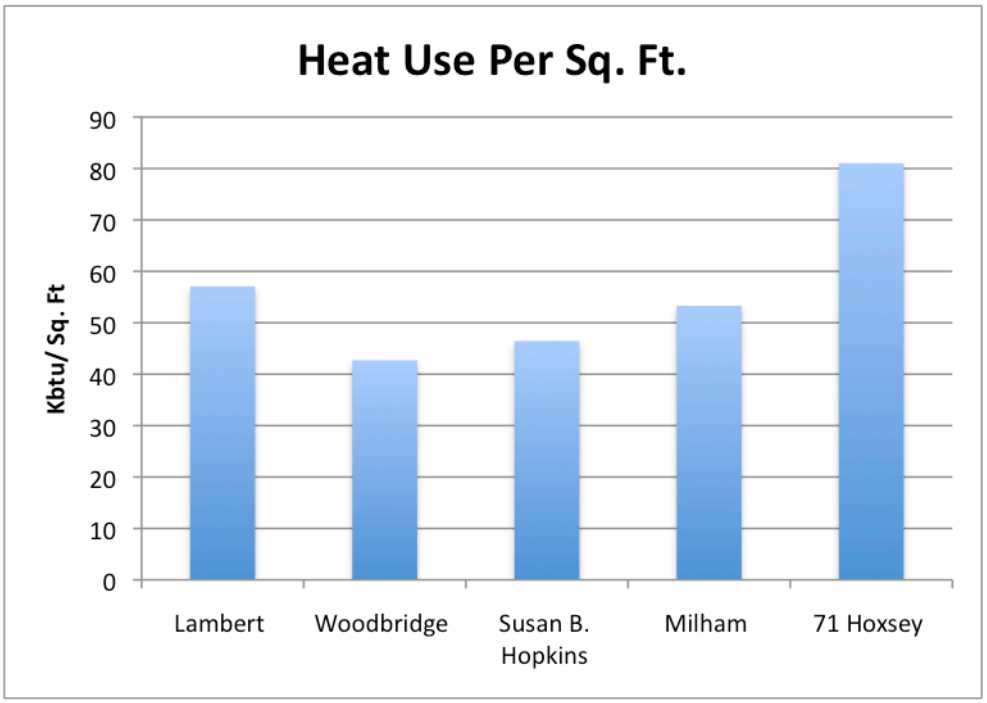
Drafty windows and doors simultaneously allow heat to escape the home and cool air to enter, thus requiring the boiler to burn more gas in order to keep the house at the desired temperature. Additionally, a number of the windows in the home do not shut completely and are not weatherized to prevent air leakage in the winter.

The process of deciding upon a single temperature for the entire home is also problematic. Some tenants are cold while others are hot, so the thermostat is often set higher than it needs to be. Additionally, the thermostat temperature remains constant throughout the day and night, regardless of the conditions outside. This problem could be alleviated with the addition of a smart thermostat or by a conscious change in habits of the tenants. The problem is aggravated by the interior decorating choices of our roommates. In several of the bedrooms, the radiators are trapped behind lay-z-boys, dressers, couches, and other pieces of furniture. The presence of a large mass in front of the radiator prevents heat from efficiently circulating around the room.

B) Emissions

In order to get a better understanding of 71 Hoxsey's energy profile, we decided to compare our energy use with that of other buildings. We chose to use four Williams College co-ops as benchmarks because these buildings are of a similar size and serve a similar purpose as homes for Williams seniors. Over the course of the 2011-2012 fiscal year, 71 Hoxsey consumed a total of 288,300 kBTUs of natural gas, or 81 kBTUs per square foot, which is considerably higher than the energy use per square foot taken to heat Lambert, Woodbridge, Susan B. Hopkins, and Milham houses (See figure 5 below). On a per resident basis, these differences become even more pronounced.

Figure 5:



In addition to energy use, carbon emission is another important indicator of a building's environmental efficiency. Table 2 shows the emissions footprint of the four coops and 71 Hoxsey. The following emissions coefficients provided by Amy Johns from the Zilkah Center were used to calculate the number of kilograms of eCO2 emitted per MMBTU or kwh of energy.

Natural gas: 52.94241 kg eCO2/MMBTU
#2 fuel oil: 72.42 kg eCO2/MMBTU
Steam: 53.69444 kg eC02/MMBTU
Electricity from the New England grid=.410013 kg eCO2/kwh

Table 2:

Property	Electricity Emissions	Steam Emissions	Nat. Gas Emissions	# 2 Fuel Emissions	Total Emissions kg eCO2/MMBTU	Emissions/Sq. Ft.
Lambert	5,088		-	14,828	19,916	5.55
Woodbridge	8,445	13,558	399	-	22,402	3.68
Susan B. Hopkins	7,097		-	18,047	25,144	4.68
Milham	8,289		-	23,558	31,847	5.21
71 Hoxsey	2,868		15,675	-	18,543	5.21

According to the last column of the table, Woodbridge emits the smallest amount of carbon per square foot followed by Susie B. Hopkins, 71 Hoxsey, Milham, and finally, Lambert. Since oil has a higher emissions coefficient than natural gas, the fact that 71 Hoxsey uses more energy per square foot for heating purposes is somewhat counteracted out by the fact that Lambert, Susie B. Hopkins, and Milham all use #2 oil to supply their heat as opposed to natural gas. Unsurprisingly, Woodbridge, the only co-op that uses steam and natural gas instead of oil, has the lowest emissions per square foot. The 5.2 kg eC02/MMBTU per square foot currently being released by our home as compared to Woodbridge's 3.68 kg eC02/MMBTU per square foot suggests that there is dramatic room for improvement in the area of heat and electricity use of 71 Hoxsey.

C) Electricity Use

Although 71 Hoxsey expends more energy per square foot for heating purposes than any co-op on campus, our electricity bills tell an entirely different story. Figure 6 shows the annual electricity use per square foot for various coops on campus in comparison to 71 Hoxsey Street. The four coops each expend between 11 to 12 KBTUs per square foot, while our home consumed a little more than half of the electricity used by Lambert house over this same time period. 71 Hoxsey consumes much less electricity than other off-campus houses as well, and here the disparity is even more pronounced (See figure 7).

Figure 6:

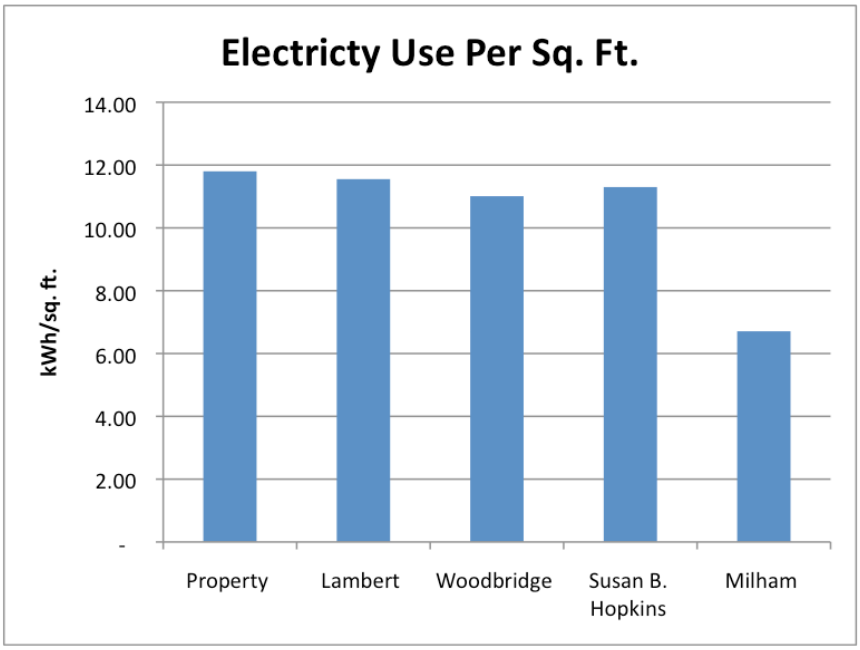
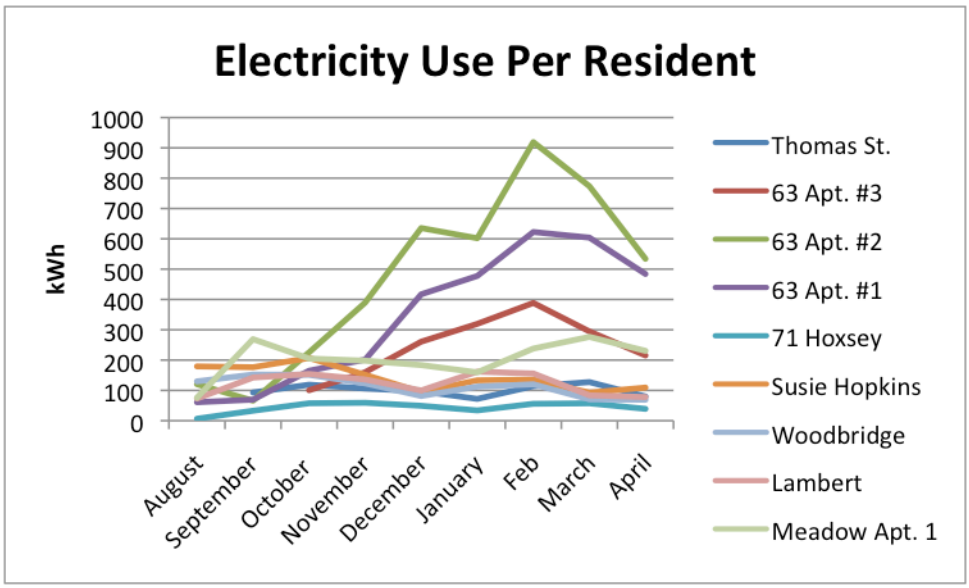


Figure 7:



What are some of the explanations for 71 Hoxsey's low electricity use relative to these comparable residencies?

One possible explanation for the greater electricity use of co-ops could be that the residences of the co-ops are more likely to have individual appliances as opposed to communal

house appliances due to the random assignment of pick-groups living within these co-ops at any given time. Another explanation that we considered is that perhaps the electricity meter of 71 Hoxsey is misrepresenting our electricity use. While these explanations may contribute to the results observed above, we decided to investigate a more likely cause of this disparity.

71 Hoxsey has virtually the same basket of appliances as these off-campus houses including an electric stove and oven, refrigerators, microwave, dishwasher, televisions, laptop computers, hairdryers, and other common household electronic devices. But unlike these co-ops, 71 Hoxsey lacks a washing machine, a dryer, and a dehumidifier, three of the most energy intensive appliances a household can have.

In order to estimate how much of the electricity variation is explained by the lack of these appliances, it is necessary to first make a few assumptions. The average washing machine draws between 0.35 and 0.5 KW of power (energy.gov). Assuming that each of my roommates washes her clothes every other week and that each washing cycle takes an hour, having a washing machine in the home would add between 75.6 and 108 kWh to our annual electricity usage. The nameplate wattage for clothes dryer ranges from 1.8 KW to 5 KW. Using the same assumptions (18 loads per month at an hour a load), clothes dryer in the home would add between 389 and 1,080 kWh of electricity use per month. Finally, the average dehumidifier has a nameplate rating between .3 and .7 KW. Dehumidifiers vary dramatically in the number of hours they are in operation, but an average dehumidifier runs 10 hours per day, meaning that the coops use between 1095 and 2555 kWh per year on dehumidifying.

1) Washing Machine:

Lower bound: 0.35 KW*18 hours*12 month= 75.6 kWh/year
Upper bound: 0.5 KW*18 hours*12 months= 108 kWh/year

2) Dryer:

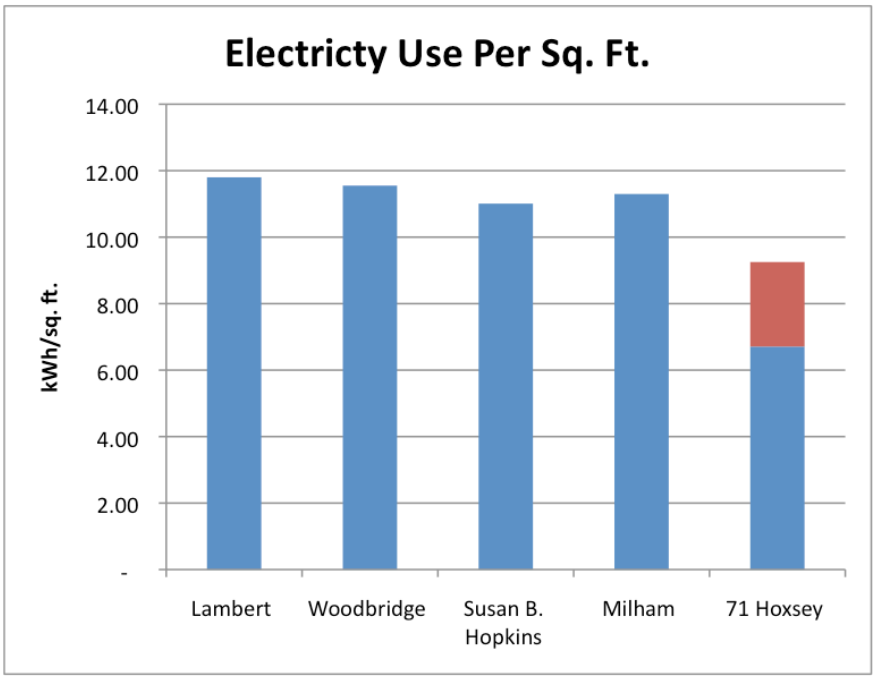
Lower bound: 1.8 KW*18 hours*12 month= 389 kWh/year
Upper bound: 5 KW*18 hours*12 months= 1,080 kWh/year

3) Dehumidifier:

Upper bound: 0.3KW*10 hours*365 days= 1095 kWh/year
Lower Bound: 0.7KW*10 hours*365 days= 2555 kWh/year

Together these three appliances would add an estimated 1,560 to 3,743 additional kWh to our annual electricity bill. Figure 8 graphically illustrates the results of this calculation, with the red section representing the average Kbtu/square foot saved in the absence of these three appliances.

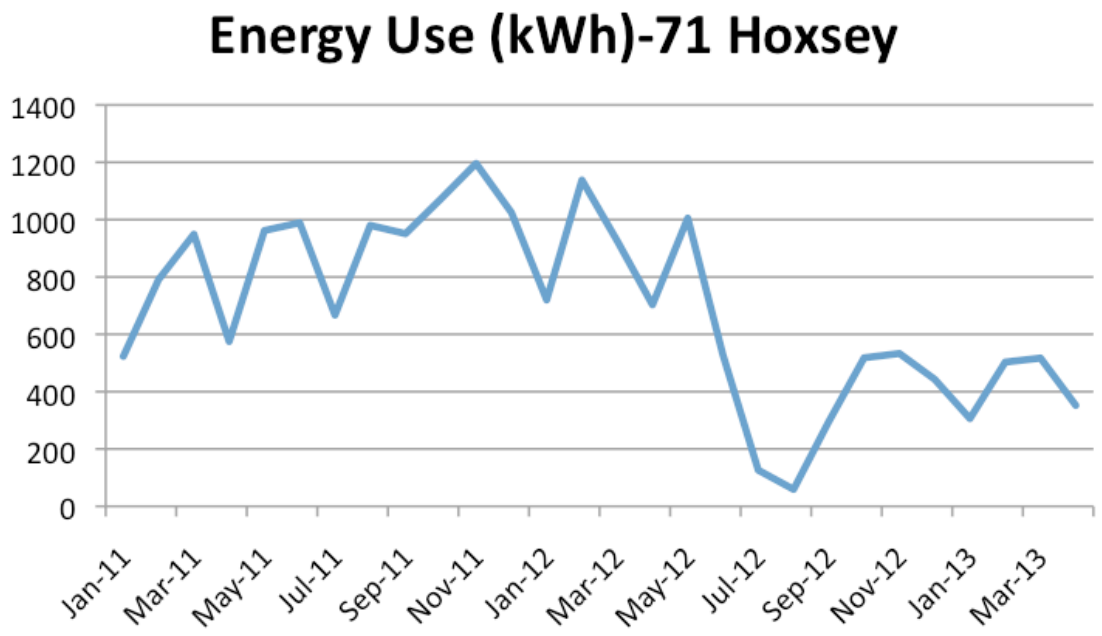
Figure 8:



Clearly the lack of a washer, dryer, and dehumidifier accounts for a large portion of 71 Hoxsey's electricity savings, but the graph suggests that other unidentified factors may still be in play. Over the summer of 2012, the landlord of 71 Hoxsey invested in a 50 gallon ProMax hot water heater with a patented "Eco-Friendly" design that claims to reduces NOx emission by up

to 33% as well as an 84% efficient Weil-McLain Gas boiler. Considering that heating water accounts for 14-25% of a building's electricity consumption, the replacement of our inefficient old appliances probably explains a considerable proportion of the remaining disparity (DOE, 2009). This conclusion is supported by the following graph (Figure 9) depicting the electricity use of 71 Hoxsey over the last two years. Although electricity use is highly variable from one month to the next, there is a clear reduction in consumption from the spring of 2012 to the autumn of 2012, indicating that the energy efficient heating appliances may have dramatically improved the energy efficiency of the home.

Figure 9:



VI. Conclusion and Recommendations

For seniors living off-campus, there is a lack of accessible information on how to continue being sustainable members of the Williamstown community and on easy steps could be taken to improve energy efficiency. A few of Williams' peer institutions provide sustainability

guides, online resources, and workshop series specifically targeted to educate students living off-campus. We believe that this is a great solution to help ease the transition of living sustainably on-campus to off-campus since as we have seen by initiatives taken on-campus, the greatest results come from actions that make it easy for students to be sustainable or energy efficient.. We created a pamphlet for landlords to distribute to future students that includes tips and tricks for how to live sustainably in an off-campus home (See appendix).

Though off-campus students dictate much of their own individual environmental impact, landlords play an important role in promoting sustainable behavior amongst their tenants. Property owners are familiar with their properties and the various systems in place, such as lighting, plumbing, appliance, and heating/cooling. With this knowledge, the property manager is in the best position to suggest improvements to increase energy efficiency and minimize waste. Several landlords own multiple pieces of student-rented real estate, so progress towards a more sustainable system of off-campus living is inevitably limited by the responsiveness of a small handful of people.

Greater information sharing and transparency between landlords and tenants is an important step towards improving the sustainability of off-campus living. For this reason, we recommend that landlords "green" their leases to promote sustainable tenant behavior. First, as it is the law in Williamstown to recycle, all leases should include information about the recycling process including the name of the hauler, the types of materials that can be recycled, and the day/time of weekly pickups. Additionally, landlords could increase the energy efficiency of their homes by recommending a reasonable day-time/night-time temperature in the lease. An alternative way to motivate tenants to increase their number of "negawatts" would be to require that off-campus students pay their own monthly gas and electricity bills. Currently only four of

the ten groups of off-campus students have access to their monthly electricity bills, and none of them have ever seen a gas or oil bill. In the absence of such feedback, tenants are completely unaware of their energy use patterns. Granting students access to these bills and making them pay for utilities out-of-pocket would provide a financial (and possibly a moral) incentive for off-campus residents to monitor and reduce their home's energy consumption.

In addition to modifying leases to motivate sustainable behavior, landlords should consider other ways of "greening" their properties. Before doing so landlords should have their houses energy audited in order to identify the building's problem areas as well as areas of potential energy savings. Many efficiency improvements are relatively inexpensive and easy to implement while others are more costly, complex, and have longer payback times than their conventional counterparts. Although landlords have a limited budget available for large-scale renovations, they should keep environmental considerations in mind when allocating these funds to various home improvement projects.

If existing appliances are in need of replacement, landlords should invest in energy efficient heating and cooling equipment as well as Energy-Star refrigerators, washers, dryers, and dishwashers which can dramatically reduce electricity consumption and energy costs over time. Reducing the setting of hot water heaters to 120 degrees F, is an easy and inexpensive energy efficiency solution that does not require behavior changes on the part residents. Landlords should also consider providing tenants with compact fluorescent light bulbs at the beginning of the year, as a single CFL can save as much as $30 over its lifetime (DOE, 2009). In order to reduce heating expenses, landlords could install smart thermostats which automatically moderate the temperature of the home during the day when there is less demand for heat and return it to a higher temperature at night. Additionally, replacing old windows with double-glazed, low-E

windows, winterizing doors and windows with caulking, door sweeps, and weather-stripping, and filling in gaps around plumbing, electrical sockets, chimneys, recessed lights and unfinished spaces behind cupboards and closets would prevent a significant amount of unnecessary air-leakage and heat loss (Wesleyan). Poor insulation attributes to a significant amount of energy loss in off-campus houses, as many of these homes are over a hundred years old and have little to no insulation. Although re-insulating these buildings would be costly and at times architecturally infeasible, landlords should consider adding additional insulation to the walls if possible.

One potential problem that we foresee in working with landlords is that each landlord views their houses differently. Those who see their houses as long-term investments, would be more likely to comply with some of our suggestions of buying Energy Star appliances and making efforts to weatherize their houses. These landlords also have a greater monetary incentive to make energy efficiency investments that have a later payoff date. Landlords who view their houses as short term investments would be more likely to only make investments when the payoff is immediate. Thus, the interests of landlords create a unique dynamic that has the potential to align with or collide with our efforts to increase sustainability and energy efficiency.

We hope that this project will be the impetus for future energy conservation and sustainability efforts amongst off-campus residents at Williams. Though incentivizing sustainable behavior is likely the most direct way to improve the sustainability of off-campus housing in the immediate future, a combination of behavioral and structural changes will be necessary in order to minimize the long-term ecological impact of off-campus living. By elucidating trends in energy consumption and behavioral practices of off-campus students, it is our goal to promote environmentally conscious choices amongst future students and landlords.

VII: Appendix

A Guide to Living Sustainably Off-Campus

Williams College

Goal:

Living off-campus gives students the freedom to make decisions about their living habits that will most likely continue to persist after college. Students can practice sustainable living by reducing their energy consumption and waste production. This guide attempts to align the behaviors of students living off-campus with the college's commitment to efforts of sustainability and energy efficiency. The pamphlet provides students ways to reduce their environmental impact through waste management, recycling, electricity and heat consumption tips and tricks.

Table of Contents:

Waste Management

1. Reducing

- "Bring Your Own"- use a travel coffee mug instead of using disposable cups and lids.
- Use a water bottle instead of bottled water.
- Eat meals in the dining halls or at home and not to-go.
- Eat food as you buy it and save leftovers to reduce food waste

2. Reusing

- Consider buying clothes, appliances, and household decorations from second-hand shops: Minerva (600 Main Street), Goodwill (North Adams, Bennington), The School of Design (Spring Street), ABC sales.
- Compost leftover food

3. Recycling

- Talk to your landlord about the easiest way to recycle
    - Independent haulers : eg) Scott Smith Trucking [(413) 458-4453]
    - Or buy a sticker and take recyclables to the town's transfer station: the Transfer Station at 675 Simonds Road is open Tuesday-Friday from 7:30 a.m. to 3:30 p.m. and Saturday from 7:00 a.m. to 3:00 p
- What can you recycle?
  - Paper & Plastics (1, 2, &3)
  - Glass
  - Metals
  - Special: oil-based paint, motor oil, fluorescent bulbs, electronics, batteries.
- Dispose of 'special' recyclables and hazardous waste through the college by contacting Joe Moran, the Williams Environmental Health and Safety Officer.

Reduction of Power Use

1. In your room.

- Lower the thermostat by a couple degrees and put on a sweater instead
- Turn off lights and unplug appliances or chargers when not in use--power strips make this especially easy!
- Use compact fluorescent light bulbs (CFLs use 75% less energy and last 10x longer than incandescent bulbs).
- Keep windows closed in the winter.
- Use natural lighting- align sleep with the sun.
- Keep your doors closed to keep heat in the room.

2. In the kitchen and bathrooms.

- Buy eco-friendly cleaning products.
- Turn off the water if not in immediate use.
- Use the dishwasher only with full loads.
- Use washable clothes rather than disposable napkins and paper towels.
- Make your own cleaning products http://www.mnn.com/your-home/at-home/stories/make-your-own-housecleaning-products.
- Unplug appliances when not in use.
- Use cold water when possible as hot water requires more energy.
- Report faucet leaks and faulty toilets to landlord immediately.
- Take shorter and cooler showers.
- Keep the doors open after showering to prevent mold growth.

- Invest in EcoFlow low pressure shower heads

3. In the common areas.

- Unplug devices such as TVs, DVD players, and stereos when not in use.
- Use communal TVs instead of individual ones.
- Purchase electronics with Energy Star Labels
- Use the washing machines only with full loads and try to do laundry sparingly and with cold water.
- If a small load is necessary, adjust the water level accordingly.
- Hang clothes on a drying rack or outside whenever possible.

Food For Thought

- Carpool when driving to run errands in town.
- Use reusable grocery bags.
- Buy seasonally and locally when you have the opportunity to use less energy in getting to a farmers market rather than a grocery store.
- Buy products with minimal packaging.
- Go paperless with online billing and bank statements.
- Get a bike!

Ways to Get Creative

- Use newspaper for gift-wrapping.
- Use cereal boxes to send postcards.
- Go vegetarian- livestock production generates a lot of methane and requires large amounts of water.

Get Involved on Campus!

1. Join Thursday Nights Grassroots Group: a group of students dedicated to discussing and acting against global warming through efforts of large scale change on campus, in the community, and in the world at large. The group meets every Thursday night at 9pm in the Harper House.
2. Join the Williams Sustainable Growers: a group of students who work in the campus' garden where the produce goes to dining halls, students, and the Berkshire Food Project. The gardeners meet every Saturday morning to harvest.
3. Join the Williams Outing Club (WOC): a group of students and faculty members that stimulates participation in and appreciation for outdoor activities.

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