

Energy Consumption in Creighton University Residence Halls: Comparing Attitudes and Behaviors¹

Abstract

“On U.S. college campuses, growing concerns since the 1960s have demanded that we become more knowledgeable about our impact on the environment.” (Ruckelshaus 455) This research has aimed to understand attitudes and behaviors regarding energy consumption in Creighton University Residence halls by employing quantitative data gathering methods and analysis of campus energy use. The program Stata will be utilized in analysis to allow for a statistical understanding of student attitudes and behaviors regarding their energy consumption. The findings of this research are meant to allow Creighton University officials to understand student energy consumption habits and interest allowing for better energy consumption practices in the future.

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Introduction: Research Question and Purpose

My personal interest in sustainability was sparked by time I spent in West Virginia where I was able to see how different methods of dirty energy production like coal mining and hydraulic fracturing negatively impacted the communities where they take place. Non-renewable energy sources supply the majority of the United States' energy which means that the detriment that I saw in West Virginia is likely happening in many other communities. Energy consumption also happens to be one of the largest contributors to greenhouse gas emissions and residential facilities consume the most energy. I found this to be intriguing especially due to my status as a resident adviser at Creighton University. I began to wonder if my passion for sustainable practices was reflective of the experience of the students that I was surrounded by every day. I also began to wonder what Creighton's stance was on sustainable energy consumption. All of these factors led me to ask the question of whether or not Creighton University student attitudes and behaviors were in support of sustainable energy consumption. Therefore, the purpose of this research is to provide a better understanding of the attitudes and behaviors of Creighton University students living in residence halls regarding energy consumption.

This research also seeks to determine whether or not Creighton University students act and think in accordance with research done on other university students in regards to energy consumption. Though there is still little research in the field related to the consumptive practices of college students, certain researchers have compiled information on this topic. In her master's thesis titled, *Energy-use Behavior Among College Students*, Lillian O'Connell finds that attitudes, norms, and perceived behavioral control influence pro-environmental behavior (O'Connell, 2008, 33). Also, research done at Oberlin College found that when students are given real-time feedback on the consequences of their energy consumption, they are more likely to act more environmentally responsible (Petersen et al., 2007). While my own research focuses on how attitudes reflect behavior, both of these past studies provide valuable information regarding student energy consumption.

To better understand student attitudes and behaviors regarding energy consumption in residence halls at Creighton University, I conducted a quantitative research study. To collect information from students, I dispersed a survey comprising 39 close-ended questions to students living in residence halls. I also collected information about the amount of energy consumed in the buildings during the time in which the survey was distributed in order to understand the actual amount of consumed energy. The results of these inquiries were analyzed with Stata software.

Theoretical Framework

National Perspective

Many researchers in the United States have written about their perspectives on how to integrate care for the environment and sustainable energy consumption into the social lives of Americans. Because Creighton University college students are immersed in the American way of life, it is important to understand how the country in which they live impacts their decision making regarding energy consumption.

These perspectives range from how different academic groups work together and separately to understand sustainability and also how to incorporate sustainability into preservation programs. One example of how various disciplines can work together to implement the environmental movement is Conrad's article from 2001 which discusses the

hard sciences and the soft sciences. Conrad relates that the hard and soft sciences have differing agendas for how they want the environment to be utilized (the culturals want to treat the environment as a setting while the bios want to decrease cultural development), they are capable of working together to create sustainable change. Conrad states that if the hard and soft sciences are able to work together to promote environmentalism, “Perhaps the public will feel a sense of responsibility for the environment” (Conrad, 2001, 18). By working together to create this sense of responsibility, the bios and the culturals would be reflecting the theoretical framework of cognitive dissonance. This framework claims that in order to create change through cognition, communities must feel a moral responsibility to an action. Working together could create this sentiment (Thogersen, 2004). If Creighton is able to combine the various academic perspectives and have them work together to encourage sustainable change, perhaps students will be inspired to act in a more sustainable manner.

Powter and Ross (2008) also communicate a national perspective about how to integrate sustainability when they discuss how to sustainably renovate heritage properties, or properties from historical periods. Though my research is not focused on how to change the composition of the different buildings on campus to implement more sustainable energy consumption, Powter and Ross are able to discuss what it is that actually makes buildings efficient (Powter and Ross, 2005). This information is useful for determining whether or not the buildings themselves are efficient and can also be utilized to determine the direction of future research.

Former Research on Collegiate Energy Consumption

As stated above, research done on the energy consumption patterns of college students has much room to grow, but there is a lot of valuable information on this topic. In Lillian O’Connell’s master’s thesis, she looks at the consumptive behavior of college students in Florida. Her main findings state that attitude, social norms, and perceived behavior of control all have an influence on energy consumption of students. What is interesting is that all three of these factors relate to each other in the determination of whether or not a student has a sense of environmental responsibility. O’Connell also found that females are more likely to have a pro-environmental stance than males. Her last finding states that environmental studies majors are not necessarily going to act in a more environmentally conscience way than students of other disciplines (O’Connell, 2008).

Research that has been compiled about energy consumption at Oberlin College is also interesting and informative. While completing a study about how feedback can influence student behavior, the researchers found that real-time feedback was the most effective method of influencing students to lower their consumption. This method works because it allows students to see the consequences of their actions as they are occurring. By being able to see the consequences immediately, students were able to have a better understanding of what their consumption actually means (Petersen et al., 2007).

Both studies listed above influenced the framework of my research project by allowing me to see different avenues that I could take. While I ultimately decided to look at how student attitudes relate to student behavior regarding energy consumption, I was able to incorporate pieces of both above pieces into the questions being asked of students. However, I believe that my research has also expanded upon the information compiled by both above researchers in that it does not make the exact same comparisons.

The Perspective of Higher Education

In light of the growth of the sustainability movement over the past few decades, many influential individuals believe that universities should better educate and challenge their students to live sustainably. This push to educate more students about sustainability has a variety of goals that the university setting can likely achieve. Cortese argues that, “Colleges and universities have an obligation to support local and regional communities, making every action lead to community improvement,” and that because universities are almost always economic forces in their communities, they are able to provide these supports (Cortese, 2003, 19).

Cortese encourages starting this education by asking students to challenge their assumptions which will allow them to think critically about sustainability. Some of these assumptions include, “Humans are the dominant species and separate from the rest of nature. Resources are free and inexhaustible. Earth’s ecosystems can assimilate all human impacts” (Cortese, 2003, 17). By challenging these assumptions and many others similar to them, universities give their students the tools to make better decisions about how to utilize resources that will positively benefit them and their community.

One way that universities can encourage a more sustainable lifestyle is to incorporate sustainability into their education. One program that some universities utilize to educate about sustainability and also educate about building composition is preservation studies. According to Chusid, “The field of preservation is inherently sustainable by virtue of its principles and subject matter. Preservation argues for reuse instead of demolition” (Chusid, 2010, 47). Though Creighton University does not have a program in preservation studies, Chusid’s perspective is useful because he is able to discuss how a university can utilize an educational program that already exists to implement more sustainable knowledge. Because universities are supposed to be centers of knowledge and powerhouses for research, they have the opportunity to encourage more sustainable lifestyles through education. Few other institutions have this opportunity and universities should take advantage of it. He also discusses how building composition is related to sustainability which is something this research will also consider.

Data-Collection Site Information – Creighton University

Due to the increased interest in sustainable practices by leaders in higher education, Creighton University has developed its own sustainability action plan in recent years. In order to adequately portray its sustainability plan, Creighton University has broken down its documents regarding sustainability to values, goals, policies, and assessment. Though this study focuses on Creighton University students, Understanding the university’s positioning and policies regarding energy consumption is important because the university influences student opinion and has some impact on the amount of control that Creighton students have over their energy consumption.

Creighton University began to publicly discuss its commitment to sustainability in 2010 when president John Schlegel, S.J., signed the American College and University Presidents’ Climate Commitment (Creighton University Facilities, 2012). By signing the commitment, Schlegel stated that Creighton University recognizes that global warming is caused in large part by human beings and that society needs to reduce greenhouse gas emissions by eighty percent by the middle of the century. The commitment also outlines different steps that the university must take such as initiating a comprehensive action plan

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with set dates for specific outcomes, the initiation of tangible actions such as establishing airfare policy and providing public transportation, making all plans public, and encouraging other universities to sign the commitment (President's Climate Commitment, 2015). By signing this commitment, the Creighton community acknowledges that it deeply values working for a more sustainable community.

Creighton reiterated this commitment in 2013 when president Timothy Lannon, S.J., signed the St. Francis Pledge to Protect Creation and the Poor. The St. Francis Pledge was created by the Catholic Coalition on Climate Change and by signing it, universities, institutions, and individuals agree to pray, learn, assess, act, and advocate for a more sustainable world (Catholic Coalition on Climate Change, 2015). The St. Francis Pledge is meant for community and individual decisions and by signing this pledge, Father Lannon communicated that the Creighton community values acting for sustainability.

To communicate these values and commitments, Creighton University has created a brochure meant for public dissemination. Within the brochure, the university first communicates how it has incorporated sustainability into the curriculum and its construction and design. It then mentions different groups and programs around campus that are committed to sustainability like the Sustainability Council and the Energy Technology Program. The brochure communicates Creighton University's and the Catholic Church's commitment to sustainability by quoting John Paul II and by listing the steps of the St. Francis Pledge. At the end of the brochure, the immediate steps of the university's Climate Action Plan are listed (Sustainability at Creighton, 2013). This brochure does an impressive job of communicating Creighton University's values of sustainability and provides a holistic vision.

Part of communicating values of sustainability to Creighton students involves student education. Numerous academic programs on campus serve to educate students about the benefits of sustainability. Specific programs that have historically addressed issues of sustainability on campus include the Energy Technology program and the Environmental Sciences program. Recently, the university announced that it will also be beginning a Bachelor of Science in Sustainable Energy Science. Other departments of the university including, including, but not limited to the department of cultural and social studies and biology department emphasize sustainability in their courses. Through these programs and departments, Creighton University students are exposed to the university's values of sustainability and are better equipped to incorporate these values into their own lives (Creighton College of Arts and Sciences 2015).

While having values regarding sustainability is integral to improving sustainable practices, goals are also necessary. Creighton has communicated its goals regarding sustainability and energy consumption specifically in its documents titled *Creighton University Climate Action Plan* and *Creighton University Sustainable Design Process*. The climate action plan was written in 2013 and is a long, detailed document which communicates the university's goals and the values that support them. The main steps of the climate action plan involve a greenhouse gas inventory, revising the mission and vision of the university to reflect values of sustainability, aligning sustainable values with the strategic plan, incorporating sustainability into the curriculum, reducing emissions, and working for continuous improvement (Creighton University Climate Action Plan, 2013). The university also recognizes that in order for this plan to be successful, students, faculty, and staff have to share the same commitment. To account for this, methods of student, faculty, and staff engagement are included throughout the document.

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Goals for sustainable energy consumption development are also detailed in the *Creighton University Sustainable Design Process* (2012). The main emphasis of Creighton's sustainable design process is that the health, safety, and education of students is promoted while promoting sustainability. The main goals of the sustainable design process include promoting highly durable and flexible facilities, encouraging a pedestrian oriented campus, ensuring efficient building use, promoting renovation and reuse of buildings and materials, evaluating buildings to ensure optimum energy efficiency, reducing consumption on all fronts, ensuring the use of Energy Star rated equipment, and continuing the pursuit of knowledge in regards to sustainability (Creighton University Sustainable Design Process, 2012). In terms of energy consumption, the university plans to utilize the US Green Building Council LEED rating system on all projects and promises to ensure a silver level of efficiency at minimum.

Clearly Creighton University has large goals with regards to reducing its overall consumption and specifically its energy consumption. Something that is important to note is that the University declares that the entire action plan is subject to change and termination. Also, the university has many requirements that a sustainable action item must meet before it can be implemented. These requirements include, but are not limited to environmental benefits, capital cost differential, operational cost savings, maintenance implications, aesthetic and design consistency, and compatibility with intended use (Creighton University Sustainable Design Process, 2012). While some of these requirements are understandable and necessary such as environmental benefits and operational cost savings, others are relatively unnecessary such as aesthetic and design consistency. Though the presentation of campus facilities is important to promote the university, sustainable consumption should be a higher priority.

In order to meet the goals and uphold the values listed with regards to sustainability and sustainable energy consumption, Creighton has had to implement policies that will allow other university offices to be upheld to the same ideals. The policies that have been implemented cover an array of areas such as purchasing procedures and construction. In the policies and procedures draft regarding energy consumption, Creighton University's facilities management department outlines its main objectives as establishing guidelines for energy resource management, controlling waste of natural resources, maintaining a comfortable university environment, and providing an outline for university community members on energy conservation practices. The facilities department plans to utilize and encourage individual actions, technical strategies, education, and outreach to accomplish these objectives. At the end of the document, a list of specific action items for both university personnel and community members are listed. These items range from encouraging the utilization of energy star equipment to minimizing elevator use (Creighton University Facilities, 2011). The amount of detail included in this document sets the university up to be successful in its goals, but yet it is important to note a clause stating, "Creighton can terminate this policy at any time" (Creighton University Facilities, 2011).

Finally, Creighton University's perspective also includes an assessment of the current efforts. Though the sustainability initiatives at Creighton were nonexistent five years ago, ongoing assessment has been conducted to make sure that the new program does not fail in its early years. To assess both student, faculty, and staff response and actual consumption the university implemented a Climate Action Plan Survey and conducted an inventory of the greenhouse gas emissions. The Climate Action Plan Survey tries to understand student, faculty, and staff opinion. Because my population of interest is the student body, I looked more closely at student opinions. Nine percent of Creighton's student population was

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surveyed, and to summarize, most students do value sustainability and lowering energy consumption, but few students view that as the university's top priority. Also, students are apprehensive about potentially paying more each year in tuition in order to fund a sustainability program (Climate Action Plan Survey, 2012). Essentially, if the university wants to make a large impact on consumptive practices, it needs to find a way to engage students so that they prioritize sustainability practices and sustainable energy consumption.

The inventory of greenhouse gas emissions allows the university to better understand where it is doing well and where it needs to improve. Greenhouse gas emissions are analyzed because they have been increasing immensely over the past 150 years and impact economic, social, and ecological health worldwide. Creighton University alone is responsible for 88,534 metric tons of CO₂ emissions of which forty four percent is consumption from electricity. The major finding of the greenhouse gas emission inventory states that ninety five percent of Creighton's emissions are indirect in that they are produced outside of the university or produced indirectly as a result from energy purchased by the university, but generated elsewhere. Overall, sixty eight percent of emissions are indirectly produced by energy purchased by the university that is generated elsewhere (Greenhouse Gas Inventory, 2011). This means that Creighton University needs to focus on reducing energy consumption from energy produced elsewhere and that perhaps the university should look into producing its own energy in a sustainable way through solar, wind, or other green technologies.

Current Research Project

Objective of the Study

The objective of this study is to understand the relationship between student attitudes and behaviors regarding energy consumption in Creighton University residence halls. That objective will be met by addressing the following research questions: What are the attitudes of the students living in Creighton University residence halls regarding energy consumption; do student attitudes regarding energy consumption reflect their consumptive behavior; and what other factors influence energy consumption. This study is a cross-sectional study and its results will be obtained through quantitative data analysis. I chose to approach this project with this methodology because at the time, I had limited knowledge of qualitative methods. Also, while developing this project, I was enrolled in a quantitative course which allowed me to begin to work with the course material and develop my own skills.

Theoretical Perspective

This research is grounded and framed by a variety of theoretical perspectives. The main frameworks that I intend to use are that of political ecology, urban political ecology, economics, and cognitive dissonance. While political ecology and urban political ecology are similar in their background, urban political ecology has a much narrower scope.

Political Ecology

Political ecology as a theoretical perspective combines a variety different perspectives to better understand how populations consume energy. According to Green, factors such as development, ecology, politics, technology, and regions can impact a population's energy consumption and they work together to do so (Green 2004). Mazur also utilizes political ecology in his work to determine whether or not population growth influences rising energy consumptive practices. He found that it does not (Mazur 1994). Both Green and Mazur

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provide a framework for study which I was able to employ in my research. It is rare that one simple factor is the determinant of behavior. The use of political ecology allowed me to understand what outside factors did influence energy consumption in Creighton University residence halls. Factors such as technology and policy were evaluated through a survey that was distributed to the participants.

Urban Political Ecology

Urban political ecology was also utilized in this paper to better understand the behaviors of Creighton students living in the residence halls. I found urban political ecology to be a useful framework because it has notable differences from the classical political ecology. According to Zimmer, urban political ecology varies from standard political ecology because it analyzes how living in an urban setting specifically influences behavior related to the environment. Standard political ecology traditionally looks at how populations interact with their environment in a rural setting, but Zimmer believes that living in an urban setting could present new and different influencing factors. By being in an urban environment, urban political ecology believes that the influence of non-human entities such as powerful institutions can play an important role in determining the ecological behavior of a population (Zimmer 2010). The theoretical framework of urban political ecology is relevant to this research because Creighton University is situated in an urban setting and is influenced by the policies and institutions of that setting. The urban setting was important for me to consider while developing the survey which was disseminated to students.

Economic Theory

Economic theory is also relevant to this research. After having read through a variety of Creighton University's documents which outline plans for the university's future consumption, it was clear that economics played an important role in determining how to pursue sustainable energy consumption. Boulding determines that for sustainable energy consumptive practices to be successful, there must be positive economic development to gain public support. Essentially, if sustainable development places economic strain on a community, it is unlikely that the community will be willing to adopt said practices (Boulding 1973). If this theory is correct, Creighton University is wise in its decision to only adopt practices that do not negatively impact the university. Though a handful of students would be willing to pay more tuition fees to incorporate sustainable practices on campus, most would not be. In order for sustainable energy consumption to occur on Creighton University's campus, the plan must have an economically sound component.

Cognitive Dissonance Theory

The final theoretical framework that is being used to frame this study is cognitive dissonance theory. Though I am drawing on a theoretical framework coming from the field of psychology, I believe that this theoretical framework is useful and necessary for understanding the attitudes and behaviors of students. I draw on the papers of Thøgersen (2004) and Hobson (2006). Thøgersen analyzes the how morals influence dissonance while Hobson describes different psychological techniques that can be utilized to evaluate a human's environmental behavior.

Thøgersen's research was based on a convenience sample of in a mall in Europe and he evaluated environmental behaviors of individuals. What he found was that individuals are more likely to act in environmentally sustainable manners if they believe that they have a moral responsibility to act in that way. He also found that oftentimes environmentally

responsible behaviors are not carried out consistently. Conversely, individuals tend to choose how to act on a case-by-case basis (Thogersen 2004). This information contributes to my own research because it prompted me to inquire about whether or not students feel a moral responsibility to act in an environmentally sustainable manner.

Hobson discusses the influence of institutions on psychological desires of individuals to live sustainably. According to Hobson, individuals feel dissonance about taking responsibility for sustainable energy consumption because their surrounding institutional structures are not taking any responsibility. Their individual actions are viewed as ineffective because their structures are not currently doing anything (Hobson 2006). These sentiments may be felt by Creighton students who desire to engage in sustainable energy consumption, but believe the university as an institution does not support them. These sentiments were assessed throughout the research.

Important Terms

In order to fully understand the scope of this research, it is necessary that definitions of terms are clear. The most important terms to understand in this research are: Sustainability, Energy consumption and Residence hall. For the purposes of this paper, I refer to Eastaway and Winston's definition of sustainability which is, "A value set that has a parallel care and respect for the ecosystem and people within it" and that it should, "Maintain or improve human and ecosystem well-being" (Eastaway and Winston, 2008, 212). Another important definition of sustainability also utilized by Eastaway and Winston states that sustainable development, "Meets the needs of the present without compromising the ability of future generations to meet their own needs" (Eastaway and Winston, 2008, 212). In order to measure sustainability, economic, social, and environmental pillars are evaluated by the researcher throughout their research and by me throughout mine. These understandings of sustainability not only involve understanding potential impacts made on the environment, but also impacts made on the human community. I refer to Eastaway and Winston's definition of sustainability because it encompasses the social, physical, and time components which impact that environment.

To understand what this research means by energy consumption, I look to Boulding's 1973 description of energy and what it means for consumption. To start simply, Boulding views energy as a commodity and states that "[Energy] is an essential input of processes of production which increase goods or diminish bad" and that "Input of energy is necessary to overcome material entropy" (Boulding, 1973, 122). Throughout his article, Boulding describes a variety of types of energy consumption and production, but states that the United States is in the wave of utilization of fossil fuels. With the utilization of fossil fuels comes increased affluence, but with increased affluence comes pollution and exhaustion (Boulding, 1973). Boulding's definition of energy and energy consumption is useful because it not only defines energy consumption, but also lists both positive and negative consequences of energy consumption involving fossil fuels.

Finally, knowing what a residence hall is according to Creighton University is important for understanding where it is that the students being surveyed live. According to Creighton University's department of residence life, "Creighton University provides a class-year housing system designed to provide an exceptional opportunity for students to build community with one another ... asking students intentional questions about themselves, their relationship to others, and ultimately as leaders to the world" (<https://www.creighton.edu/studentlife/departmentofresidencelife/residencehallsandapartments/>, 2015). The residence life program provides housing in nine different residential

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facilities which allows for over half of the undergraduate population to live on campus. It is important to note that Creighton's residence life program seeks to educate its students, which suggests that if students seem to care about issues like energy consumption, it is the university's responsibility to educate them.

Subjects for the Study

In order to conduct the analysis of the attitudes of students living in residence halls, I researched the individual residents of Creighton University's nine residential buildings. These buildings included Kiewit Hall, Gallagher Hall, Swanson Hall, Deglman Hall, McGloin Hall, Heider Hall, Kenefick Hall, Davis Apartments, and Opus Apartments. Unfortunately, information from Heider Hall and Kenefick Hall could not be included in this study due to certain limitations experienced in this research. Because I wanted to compare student attitudes and student behavior, I determined the average student attitude per residence hall. Next, in order to research the actual behavior of the residents, I studied the energy use of each specific residence hall. This means that for these two portions of the study, the units of analysis were the students for the attitudinal study and the building for the behavioral study.

The first subject, student living in a residence hall, was nominally defined as an individual Creighton University student living in the residence hall who has some impact on the energy consumption of that residence hall. The second subject, the residence hall, was nominally defined as a Creighton University affiliated building that houses university students. In order to conduct this study, I sampled from each residence hall in Creighton University. In order to obtain this sample, I distributed a questionnaire to each Resident Director of the nine residence halls and asked them to distribute them to their residents. This survey employed the convenience sampling method. Convenience sampling was employed because of certain limitations in gaining access to e-mail lists of all residence hall residents. This information is not available to students so the resident advisors in each building were responsible for distributing the survey to their floor. Each resident advisor who was included in distributing the survey was trained to direct questions to me and had the necessary contact information in case I needed to be reached. The resident advisors were also aware of the time frame in which the survey needed to be completed. My goal was to receive questionnaires from at least ten percent of the residents from each building with a fairly equal representation from each floor of the building. The final responses totaled out to be seven percent of the residents living in the residence halls with an equal representation from seven of the nine buildings. Because the representation was equal, I have determined that the sampling method is valid.

Measures

The survey which was distributed to the residents of the residence halls included thirty nine close ended questions which were broken into four sections. The first section asked questions regarding demographic information so that I as a researcher could gain some sense of the background of the respondent. The second section contained questions which asked about student opinions regarding energy consumption. These questions were on a nine point scale and were included because they best represent student attitudes. The third section included questions which asked about what types of electronics students own. These questions were asked in order to understand how many consumptive items students have. The last section included questions regarding the frequency of student consumption. These questions were on a five point scale and allowed students to reveal their own

perception of their behavior. The full survey which was distributed can be found in the appendix at the end of this paper.

Ethical Considerations

This study should not have negatively impacted the residents who are being studied. Potential impacts included residents feeling guilt at the recognition of their own energy use or potential embarrassment about the energy use of the residence halls on campus. I worked to minimize these impacts by ensuring the residents of the confidentiality of the study and by providing resources after the study on how individuals can make small changes in their lives to be more sustainable in their energy use. Residents were also made aware that their resident director and I would be available to address any and all concerns.

Operationalizing Variables

The main objective of this study was to evaluate whether or not the attitudes of the students living in the residence halls reflected their behavior in terms of energy consumption. The concepts of “attitudes about energy consumption” and “energy consumption” were therefore being researched in this study. The phrase “attitudes about energy consumption” was nominally defined as student interest towards energy consumption and the phrase “energy consumption” was nominally defined as the amount of energy used per residence hall in kilowatt hours. The existence of various opinions of residents towards energy consumption were used as an indicator of “attitudes about energy consumption.” Also, this study used the various amounts of energy consumed per residence halls as an indicator of “energy consumption.”

For the first stage of this study, the main variable was defined as the student attitude towards energy consumption in the residence halls. These term is further operationalized in the section which discusses the data collection methods. For the second stage of this study, the defined variable was energy consumption. This term is also further operationalized in the data collection methods section of this proposal. The third stage of this study involved a comparison between the findings of each of the first two parts of this study.

Many dimensions exist that can quantify student attitudes towards energy consumption. In order to specify these dimensions, I proposed an original survey of questions about individual energy consumption that are measured in the same way to eliminate potential differentiation. There are also many dimensions of the amount of energy consumption. In order to specify the attributes of minimal, moderate, and excessive, I used current standards of energy consumption from the United States Department of Energy to identify whether or not energy use falls under a minimal, moderate, or excessive rating. According to data collected in 2012 by the United States Department of Energy, the total United States household average daily energy consumption is 4.679 kilowatt hours and the Nebraska household average daily energy consumption is 5.353 kilowatt hours (Gifford et al. 46). The household standard was utilized in this research because it is the standard that most closely resembles the residence hall. A standard was not set specifically for residence halls in this document and the household standard had the closest resemblance. Due to this data, daily energy consumption below 4.5 kilowatt hours was considered minimal energy use, daily energy consumption between 4.5 kilowatt hours and 5.5 kilowatt hours was considered moderate energy consumption, and daily energy consumption above 5.5 kilowatt hours was considered excessive energy consumption.

Data for the first stage of this study were collected by distributing a survey among the residence halls. I ensured that this survey was distributed by having a preliminary

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meeting with the various Resident Directors of all of the various residence halls at Creighton University. I submitted my research proposal to them so that they could recognize the importance of this study and the relevance of this study. This also allowed the Resident Directors to be familiar with the study in case questions arose from the students. During this meeting, I worked with the Resident Directors to give the resident directors the materials they would have needed in case the residents were negatively impacted by the study. After this meeting, I instructed the Resident Directors to distribute the survey to the students residing in the residence halls from December 3, 2014 to December 12, 2014. This section of the study involved field research meaning the data will be entirely new.

For the second stage of this study, I analyzed the amount of energy used per residence hall by looking at the data collected by Creighton University's office of Environmental Health and Safety for each residence hall. This data came from the Omaha Public Power District bill for the month of December (Personal Communication, January 26, 2015). I used the data that corresponds to the time period in which the survey was distributed and received. I then compared the data about energy consumption to the data presented by the United States Department of Energy from the year 2012 in order to determine whether or not the residence hall could be categorized as a minimal energy consumer, a moderate energy consumer, or an excessive energy consumer (United States Department of Energy 2012). This section of the study involved reanalyzing data on energy consumption in the residence halls that was initially collected by Creighton University's Office of Environmental Health and Safety to determine the amount of energy consumption. The third stage of this study involved a comparison between two separate data collections and therefore did not involve data collection.

Data Analysis

In order to analyze the data from the first part of stage one of this study, I first found the average score of each question in the questionnaire. The scores were on a scale of one to nine. A score of one will correspond to "very unconcerned about energy use" and a score of nine will correspond to "very concerned about energy use." This data is identifiable as continuous ordinal data. Some questions in the questionnaire had a reversed polarity and that had to be adjusted in the data analysis. For the second part of stage one, I coded never as one, almost never as two, sometimes as three, almost always as four, and always as five. Again, some of these questions had polarity reversed in the data analysis section. For the third part of stage one of this study, I recorded percentages for each column for each student. For example, if the respondent has nine of the twenty two appliances for his or her own personal use, I recorded a percentage of 40.1 for that column. I then found the average score for the students in a particular residence hall for each section and question to determine the attitude of an average student of that residence hall.

As stated previously, I analyzed data for stage two of this study by comparing the energy use of each building to standardized data on what would be considered minimal, moderate, and excessive energy use. Therefore in this section, depending on where the building falls on the scale during analysis, it was labeled as having excessive energy use, moderate energy use, or minimal energy use.

For stage three, I compared the average student of each building who was labeled as concerned about energy consumption, indifferent about energy consumption, and unconcerned about energy consumption, to the rating of the building. If the student was labeled as concerned, but the building the student lives in was labeled as having excessive energy use, then there was an inconsistency between behavior and attitude. However, if the

average student was labeled as concerned and the building the average student lives in was labeled as having minimal energy use, there was consistency between attitude and behavior toward energy consumption in residence halls. After comparing the student scores for the residence halls to the residence hall consumption, there was an inconsistency between student attitudes and the actual building consumption.

All of the quantitative data that was gathered from stage one through stage three was analyzed with the use of the Stata data analysis program and Microsoft Excel. Most of the analysis involved correlation figures paired with means.

Results

Three major results emerged from this research. First, students genuinely feel responsible for the environment. Second, students do not feel that it is important to make sustainable practices one of their main priorities, but it should be a university priority. Third, the physical composition of the various residence halls plays a larger role in energy consumption for the building than student behavior. The first two results are demonstrated by figure one:

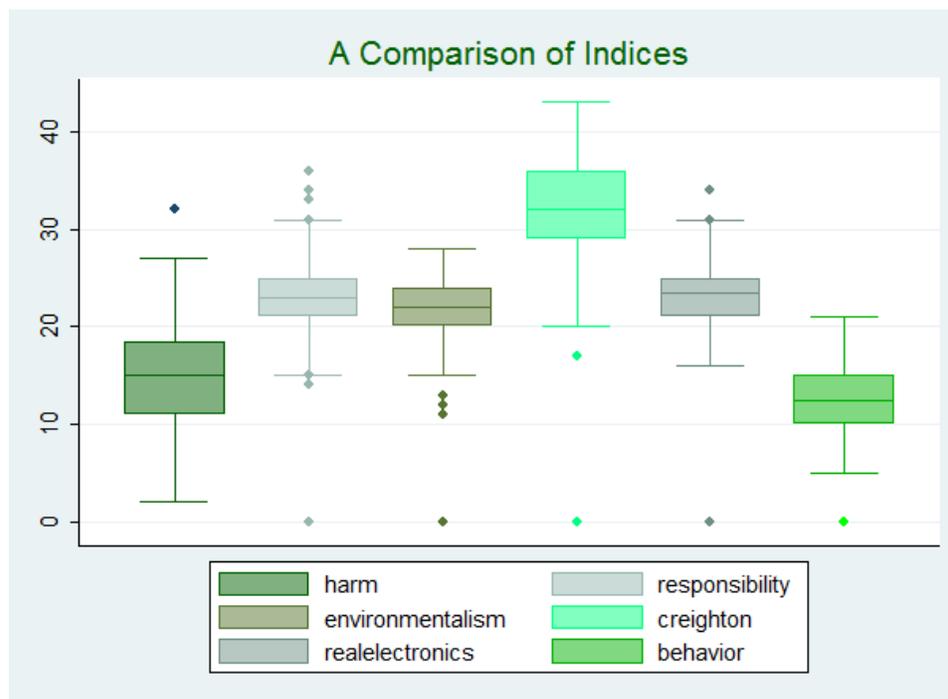


Fig. 1. Comparison of indices.

This graph provides a comparison of the indices which were created by looking at the research questions. The six indices included are harm, environmentalism, realelectronics, responsibility, Creighton, and behavior. The index labeled harm is comprised of results from questions in the questionnaire asking about how students perceived (or did not perceive) harm caused by energy consumption. The index labeled environmentalism is a compilation of results from questions asking about a student's own assessment of his or her level of environmentalism. The realelectronics index relates the results of questions asking students about what electronics they actually own and/or use. The index labeled responsibility details

the responses to questions which asked students if they feel an individual responsibility to the environment. The Creighton index is composed of results from questions which asked about how much environmental responsibility the university should have. Lastly, the behavior index is a compilation of responses to questions which asked students to evaluate their own environmental behavior.

The box and whisker plot was chosen because it allows the means and outliers of each index to be seen in comparison to all other indexes. This is useful because it allows for a better understanding of how each index compares to the others. The index labeled responsibility reflects responses attributed to questions which asked students about their own perceived responsibility for energy consumption. The index labeled Creighton reflects responses attributed to questions which asked students about their opinion on Creighton's responsibility for energy consumption. As is visible in the graph, the Creighton index falls much higher than the responsibility index on the box-and-whisker plot. The higher the index, the more important it is. While the reasoning behind why students believe the university carries more responsibility is unknown, it is rather clear that students do believe the university is more responsible.

Graph two describes the third result:

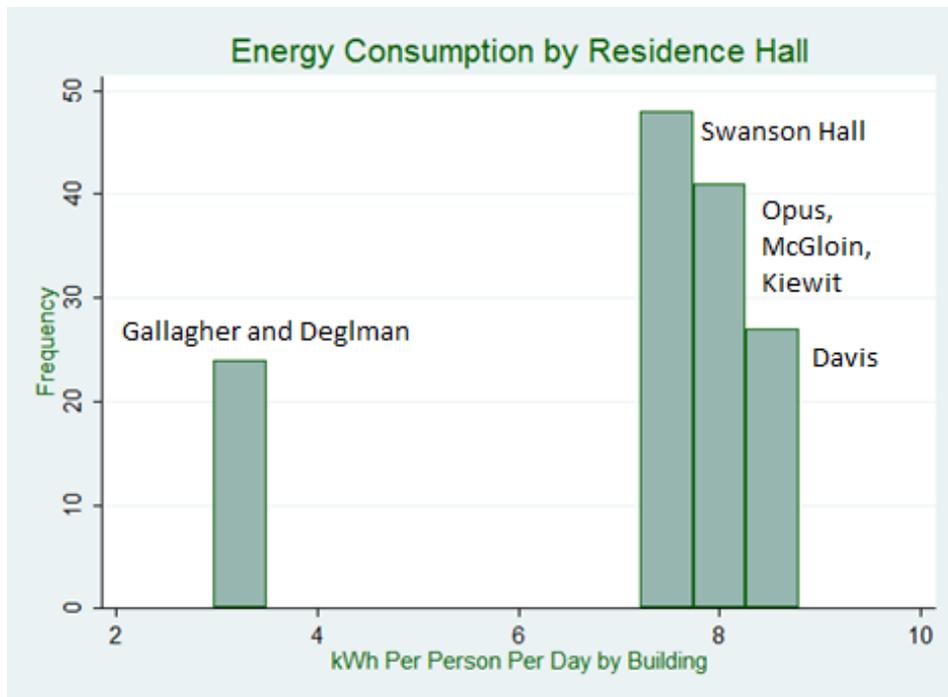


Fig. 2. kWh of energy consumed per person per day, by residence hall.

Each bar represents the kWh of energy consumed per person per day by building. This image reveals that there is far too much of a range of energy consumption for student behavior to be the main factor in consumption. Instead, building composition plays a more important role in actual consumption.

Though the results listed above are reflected in the analysis that was completed, a question of the validity of the measure remains. The sample used in this research was a

Energy Consumption in Creighton University

convenience sample and was much smaller than all of the students who reside in the residence halls. Though this is true, certain attributes of the sample make it a valid sample. First, the ratio of male to female participants reflects that of the overall ratio of male to female residents. Second, there are respondents from each year of students and from seven of the nine buildings. Though responses from each building would have been ideal, most buildings were represented and the two that lacked responses were not included in analysis. Third, the responses were not heavily favored in an overly environmental or overly consumptive pattern which reflects that the student responses had variety. Due to each of these factors, the questionnaire is valid.

Conclusion

Significance of Research

This research is significant for a variety of reasons. First and foremost, it provides an understanding about student attitudes in the residence halls regarding energy consumption. Though the attitudes of everyone are important regarding energy consumption, students living in the residence halls are arguably the largest consumers of energy on campus and comprise of the largest single population on campus. Knowing what these students believe can guide future action regarding energy consumption on Creighton's campus. This research is also significant because it reveals details about building composition that were unknown before. For example, certain residence halls were constructed with different materials and in different time periods. This means that the residence hall may be more or less efficient due to the materials from which it was made or due to its age. This is important because revealing this information can potentially provoke the administration to restructure the residence halls in a way which makes them more efficient. Lastly, this research is significant because it provides an understanding of Creighton's current policies regarding energy consumption. Little can be done to improve consumptive practices if an understanding of current policy does not exist. By having an understanding, Creighton students, faculty, and staff can begin to help develop and change policies about energy consumption so that they can be adequately implemented and improved.

This research is also significant to communities beyond Creighton University because it supports finding of other research while also expanding upon those findings. It supports past research such as cognitive dissonance theory which states that individuals are more likely to act upon an issue if they feel a moral connection to that issue. While Creighton students believe that acting in an environmentally conscious way is important, the results of the research reveal that it was not of high moral importance which is why students do not act as their attitudes suggest they would. This research adds to former research because of the interesting finding that students hold the administration at Creighton to a higher standard than they hold themselves. While students do not feel compelled to change their behavior, they believe the administration has a moral responsibility to make changes. This result creates an interesting dynamic between students and administration which would be interesting to explore further.

Limitations

A major limitation experienced in this research was the limited ability of the Department of Residence Life to distribute the survey to the students. In preliminary meetings with department meetings, I as a researcher was told that the department would be able to distribute the survey to all students living in the residence hall. However, in later

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meetings at the time when the survey needed to be distributed the department informed me that they are not allowed to distribute student surveys to all students, only some students. To account for this miscommunication, the department allowed me to distribute the survey to the resident advisors for all of the buildings and ask them, but not require them, to send it to their floors. While some resident advisors distributed the survey to their residents, not all were willing or able to do so. Had this not occurred, perhaps the survey sample would have been larger.

Another major limitation that I faced during this research is that Creighton University does not have energy efficiency designations for its residence halls. Initially, I had hoped to utilize these values to better understand why certain buildings are higher consumers than other buildings, but that simply was not possible without energy efficiency ratings.

A final limitation experienced in this research was the small sample size. Because I utilized a convenience sample, it is likely that the sample of students surveyed may not wholly reflect the attitudes of the entire student body which resides in the residence hall. Due to the high variety of responses gathered from the survey, I can confidently state that I am comfortable with the number of students surveyed, but future research could be strengthened with a larger sample or a more intentionally descriptive sampling method such as quota sampling.

Suggestions for Future Research

Because this research revealed that students do have a sense of responsibility for the environment, but do not believe that it is their priority to make real personal efforts, future research should study why it is that students do not feel they need to make sustainability more of a priority. This would best be done with a qualitative or mixed-methods approach so that a deeper understanding of student opinions could be understood. Future research could also study why it is that different buildings consume more energy than other buildings and why the administration has not addressed that issue. If an understanding is gained about why the administration has not yet modified the residence halls so that they consume similar amounts of energy, perhaps the buildings will be modified sooner.

Closing Statement

This research reveals important information about student attitudes and behaviors regarding energy consumption in Creighton University residence halls. It can be utilized by Creighton University to change and better their programs regarding energy consumption and will hopefully allow for more student engagement in the future.

Sarah Kelly
Creighton University

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Appendix

Survey for Stage One Content Analysis

General Information

Dear Participant,

You have been selected to participate in this research study due to your status as a resident of Creighton University's Residence Halls. This study will be researching energy consumption in the residence halls and your participation will involve filling out the survey below to describe your attitudes about energy consumption and your perceived level of your own consumption.

There are no expected risks with your participation in this study.

The expected benefits of this research are a better understanding of what energy consumption looks like in Creighton University Residence Halls and also a better understanding of how students feel about energy consumption practices. This is beneficial because it will allow the university to cater to the attitudes of the students while also having relevant information regarding energy consumption.

The data will be kept confidential by not attaching any identifying information to the survey results. The IOP address from computer responses will be eliminated, thus leaving all responses confidential.

You will not be compensated for your participation in this study.

If you have any questions or comments regarding the research, please contact Sarah Kelly at SarahKelly1@creighton.edu. If you have questions about your rights as a participant, you must contact the Institutional Review Board at 402-280-2126.

Sincerely

Sarah Kelly and Mr. James Ault

Kelly

What is your gender?

What is your ethnicity? (Choose all that apply)

- Alaska Native
- American Indian
- Asian
- Asian Middle Eastern
- Asian Pacific Islander
- Black
- Hispanic
- Latino
- Native Hawaiian
- Non-Hispanic White
- Non-Latino White
- White

Year in School

- First year undergraduate student
- Second year undergraduate student
- Third year undergraduate student
- Fourth year undergraduate student
- Fifth year undergraduate student
- First year graduate/professional student
- Second year graduate/professional student
- Third year graduate/professional student
- Fourth year graduate/professional student
- Fifth year graduate/professional student
- Other

Residence Hall in which you reside

- Davis Apartments
- Deglman Hall
- Heider Hall
- Gallagher Hall
- Kenefick Hall
- Kiewit Hall
- McGloin Hall
- Opus Apartments
- Swanson Hall

Energy Consumption in Creighton University

Student Attitude Toward Energy Consumption

Do you consider energy consumption to be harmful to the environment?

- 1 Extremely harmful to the environment
- 2
- 3
- 4
- 5 Moderately harmful to the environment
- 6
- 7
- 8
- 9 Not harmful to the environment

Do you think that consumption of electricity generated with the use of fossil fuels (coal, oil, natural gas, etc.) is harmful to the environment?

- 1 Extremely harmful to the environment
- 2
- 3
- 4
- 5 Moderately harmful to the environment
- 6
- 7
- 8
- 9 Not harmful to the environment

Do you think that the consumption of electricity produced with the use of fossil fuel is important to protect the environment?

- 1 Not important
- 2
- 3
- 4
- 5 Moderately important
- 6
- 7
- 8
- 9 Extremely important

Do you think it is a human being's responsibility to protect the environment?

- 1 Not the responsibility of individual humans
- 2
- 3
- 4
- 5 Moderately the responsibility of individual humans
- 6
- 7
- 8
- 9 Very much the responsibility of individual humans

Kelly

Do you think that it is a university's responsibility to protect the environment?

- 1 Absolutely
- 2
- 3
- 4
- 5 Moderately the responsibility of the University
- 6
- 7
- 8
- 9 Not the responsibility of the University

Do you think that it is the government's responsibility to protect the environment?

- 1 Absolutely
- 2
- 3
- 4
- 5 Moderately the responsibility of the government
- 6
- 7
- 8
- 9 Not the responsibility of the government

Do you think that the environment is harmed by human activity?

- 1 Very seriously harmed
- 2
- 3
- 4
- 5 Moderately harmed
- 6
- 7
- 8
- 9 Not harmed

Do you think that human individuals can change the course of global warming through their actions?

- 1 Absolutely! Change must begin with individuals
- 2
- 3
- 4
- 5 Individual action can have a moderate effect
- 6
- 7
- 8
- 9 No, individuals are unable to have much impact

Energy Consumption in Creighton University

Do you think that the human race as a whole can change the course of global warming through their actions?

- 1 Absolutely if they agree as a population
- 2
- 3
- 4
- 5 Moderately if they develop a large coalition
- 6
- 7
- 8
- 9 No global warming is beyond human beings abilities

Do you consider yourself to be an environmentalist?

- 1 Absolutely not
- 2
- 3
- 4
- 5 To a moderate degree
- 6
- 7
- 8
- 9 Not important at all

How important is environmentalism to you?

- 1 Very important
- 2
- 3
- 4
- 5 Moderately important
- 6
- 7
- 8
- 9 Not important at all

Do you think that Creighton University is successful at promoting environmental sustainability?

- 1 Not successful at all
- 2
- 3
- 4
- 5 moderately successful
- 6
- 7
- 8
- 9 very successful

Kelly

Do you think that Creighton University is successful at promoting responsible electrical energy use?

- 1 Not successful at all
- 2
- 3
- 4
- 5 Moderately successful
- 6
- 7
- 8
- 9 Very successful

Do you think your Residence Hall uses electrical energy responsibly?

- 1 Not successful at all
- 2
- 3
- 4
- 5 Moderately successful
- 6
- 7
- 8
- 9 Very successful

Do you wish that you could do more to promote responsible energy consumption in your residence hall?

- 1 Yes, this is very important to me
- 2
- 3
- 4
- 5 This is moderately important to me
- 6
- 7
- 8
- 9 This is not important to me

Do you believe that global warming is a serious problem?

- 1 This is not a serious problem
- 2
- 3
- 4
- 5 This is a moderately serious problem
- 6
- 7
- 8
- 9 This is a very serious problem

Energy Consumption in Creighton University

Do you believe that there is enough evidence to say that global warming is taking place?

- 1 No there is little or no evidence
- 2
- 3
- 4
- 5 There is some credible evidence
- 6
- 7
- 8
- 9 Yes, the available evidence makes it clear that we should take immediate action

Do you think that the issue of global warming should receive immediate action?

- 1 Yes, the available evidence makes it clear that we should take immediate action
- 2
- 3
- 4
- 5 There is some credible evidence
- 6
- 7
- 8
- 9 No, there is little or no credible evidence

Do you think that Creighton University should adopt more environmentally sustainable practices?

- 1 No it is not the university's responsibility
- 2
- 3
- 4
- 5 Moderately and within reason
- 6
- 7
- 8
- 9 Absolutely! All universities should take a leading role in achieving sustainable environments

How large of an additional fee would you be willing to pay in order for Creighton University to support more sustainable energy consumption practices?

- \$0.00-\$9.99
- \$10.00-\$19.99
- \$20.00-\$49.99
- \$50.00-\$74.99
- \$75.00-\$99.99
- \$100.00-\$124.99
- \$125.00-\$149.99
- \$150.00-\$199.99
- \$200.00+

Kelly

Do you think Creighton University students in the residence halls care too much about being environmentally sustainable?

- 1 Yes, there is too much pressure to work toward sustainable environments
- 2
- 3
- 4
- 5 The emphasis on environmental sustainability is reasonable
- 6
- 7
- 8
- 9 No, not enough people care about the issue

Owned Items that Consume Electrical Energy (select all that apply)

	Do not own and do not intend to purchase.	Do not own, but do intend to purchase	Own and share with roommate and others	Own only for personal use.
Television	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Refrigerator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Microwave	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IPAD or Tablet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell Phone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
IPhone or Music Player	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stereo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floor Lamp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desk Lamp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Charger				
Cell Phone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Charger				
Camera	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Charger				
Fan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heater	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Game System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decorative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lights				
Camera	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clock	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Power Strip	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Air Freshener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plug-In				
Night Light	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desktop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer				
Coffee Pot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Energy Consumption in Creighton University

Do you turn off your lights when you leave your room?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you leave all of your electronics plugged in when you are not using them?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you press the handicap button for your residence hall doors when you do not need it

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you take the elevator when you go up in your building?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you take the elevator when you go down in your building?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you run multiple electronics in your room at one time?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Kelly

Do you use hot water to shower for more than ten minute intervals?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you have three or more devices plugged into an outlet at one time?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you share electronic devices with your roommates and/or suite-mates?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you use energy-efficient labeled devices (i.e. light bulbs, lamps, etc.)?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you leave your electronics running when you are not in your room?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Do you leave your window open when you are not in your room?

- Never
- Almost Never
- Sometimes
- Almost Always
- Always

Insert any questions that you did not see on the survey above that you would have liked to see.

Energy Consumption in Creighton University

If you would like to receive the results of this survey or more information, please print your e-mail address here.

Kelly

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